

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT

PROJECT NO. BR 2B20 (098)

CR  
POLK COUNTY

FHWA TEXAS DIVISION	PROJECT NO.	SHEET NO.
	BR 2B20 (098)	1
STATE	DISTRICT	COUNTY
TEXAS	LFK	POLK
CONTROL	SECTION	JOB HIGHWAY NO.
0911	04	089 CR

FUNCTIONAL CLASS: LOCAL ROAD  
DESIGN SPEED = MEET OR EXCEED EXISTING CONDITIONS  
ADT(2015) = 62

FINAL PLANS

LETTING DATE: \_\_\_\_\_  
DATE CONTRACTOR BEGAN WORK: \_\_\_\_\_  
DATE WORK WAS COMPLETED: \_\_\_\_\_  
DATE WORK WAS ACCEPTED: \_\_\_\_\_  
FINAL CONTRACT COST: \$ \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_

CONSTRUCTION WORK ON THIS PROJECT WAS PERFORMED IN ACCORDANCE WITH PLANS, CONTRACT AND APPROVED CHANGE ORDERS.

\_\_\_\_\_ DATE \_\_\_\_\_

**CCG** CIVIL CONSULTING GROUP  
1575 HERITAGE DRIVE, STE. 308  
MCKINNEY, TEXAS 75089  
P 972.569.9193 F 972.569.9197  
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



02/04/2022

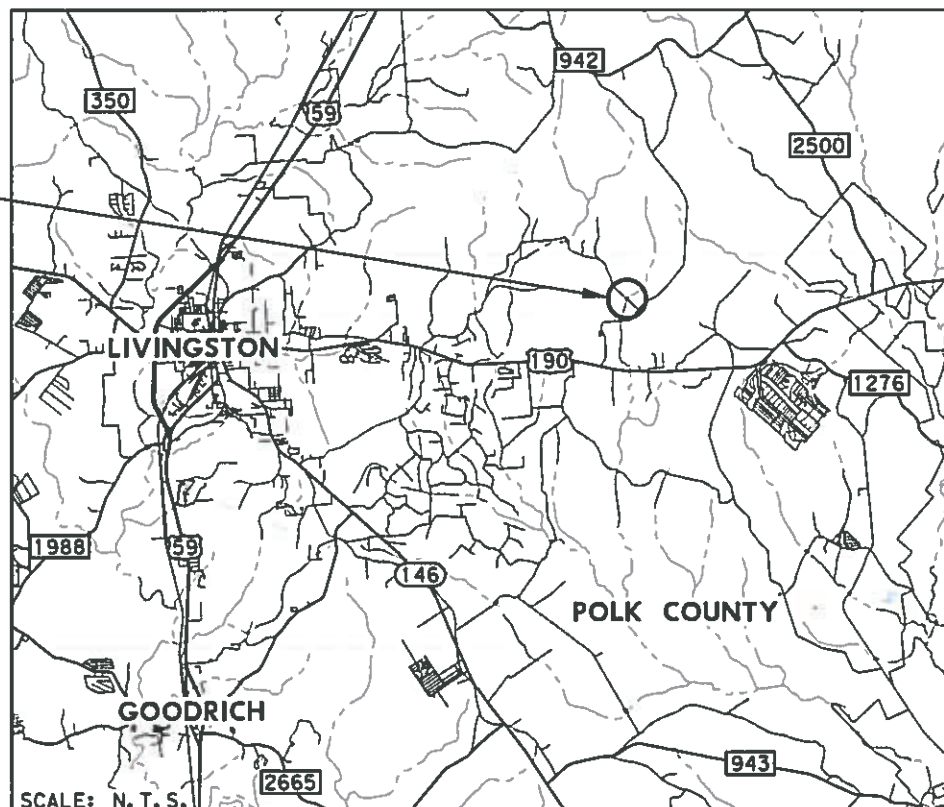
*Trevor L. Castilla*

CSJ	ROADWAY		BRIDGE		TOTALS	
	FT	MI	FT	MI	FT	MI
0911-04-089	300.00	0.057	75.00	0.014	375.00	0.071

LIMITS: KELLY RD AT BLUFF CREEK

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

BEGIN PROJECT  
KELLY RD AT BLUFF CREEK  
CSJ: 0911-04-089  
STA 12+45.00  
LAT: 30.7220681°  
LONG: -94.7925471°  
END PROJECT  
STA 16+20.00  
LAT: 30.7227788°  
LONG: -94.7934109°



NO EXCEPTIONS  
NO EQUATIONS  
NO RAILROAD CROSSINGS

BARRICADES AND WARNING SIGNS

PROVIDE AND ERECT BARRICADES AND WARNING SIGNS IN ACCORDANCE WITH THE BARRICADE & CONSTRUCTION STANDARDS, TCP STANDARDS, THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND AS DIRECTED.



CONCURRENCE: \_\_\_\_\_

*Mary Kay*  
POLK COUNTY JUDGE

RECOMMENDED FOR LETTING: \_\_\_\_\_ APPROVED FOR LETTING: \_\_\_\_\_

DocuSigned by:  
*celm31, P.E.* 3/3/2022  
AF852E728AEC4C0...

DISTRICT DESIGN ENGINEER

DocuSigned by:  
*Kelly B. Morris, P.E.* 3/3/2022  
F044211639424B4...

DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 2012).

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FILENAME: ...\\01 General\PS&E1\*INDEX.dgn

DRAWING DATE: 2/22/2022

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- 5 ESTIMATE & QUANTITY SHEET
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**SHEET NO. DESCRIPTION**

**TRAFFIC DETAILS**

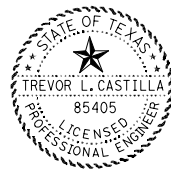
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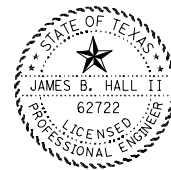
**CROSS SECTIONS**

- 82 - 86 CROSS SECTIONS



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A \* HAVE BEEN ISSUED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

*Trevor L. Castilla*  
 \_\_\_\_\_  
 TREVOR L. CASTILLA, P.E.      02/23/2022  
 DATE



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A \* HAVE BEEN ISSUED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

*James B. Hall II*  
 \_\_\_\_\_  
 JAMES B. HALL II, P.E.      02/22/2022  
 DATE

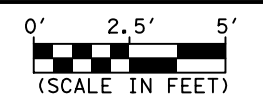
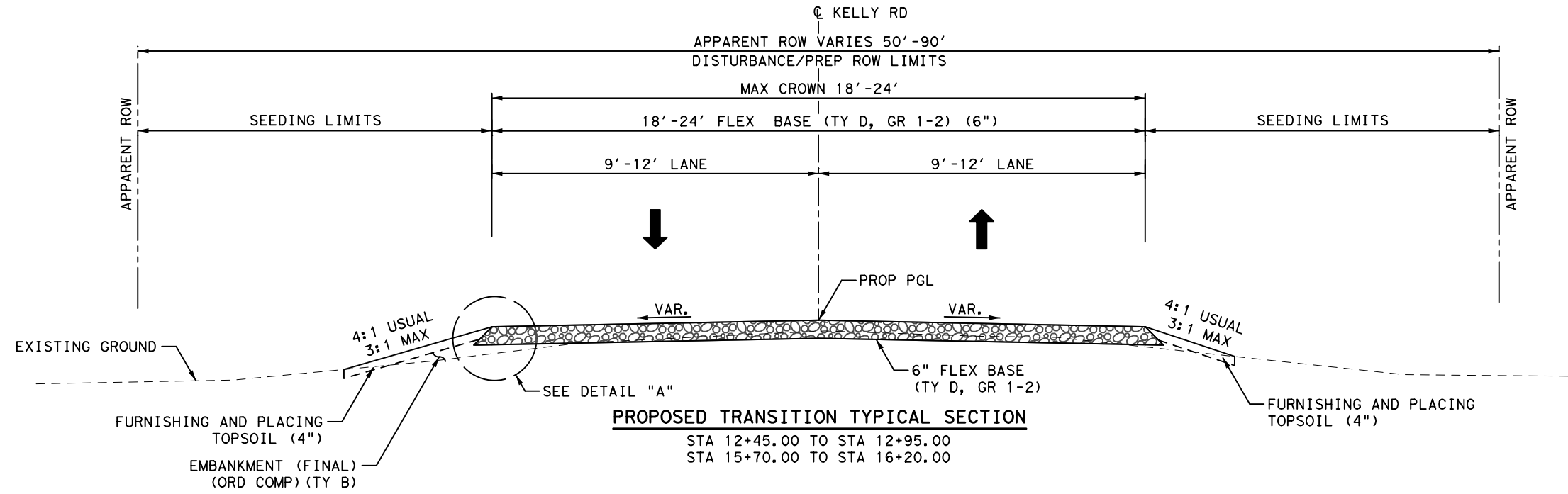
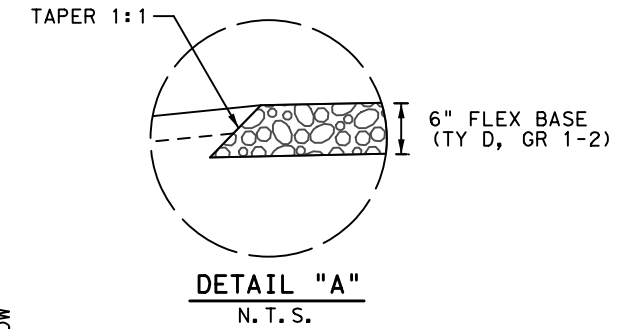
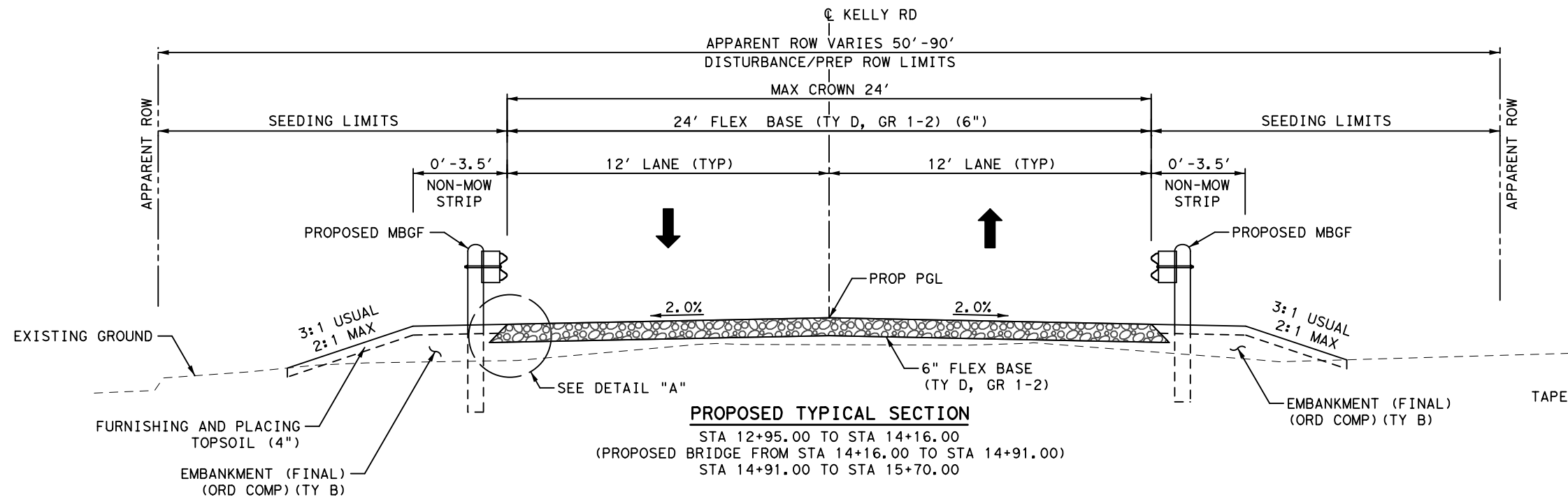
1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

**Texas Department of Transportation**  
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6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	2
CONTROL	SECTION	JOB	
0911	04	089	

FILENAME: ...\\01 General\PS&E1\*TYP01.dgn  
DRAWING DATE: 2/22/2022



02/23/2022

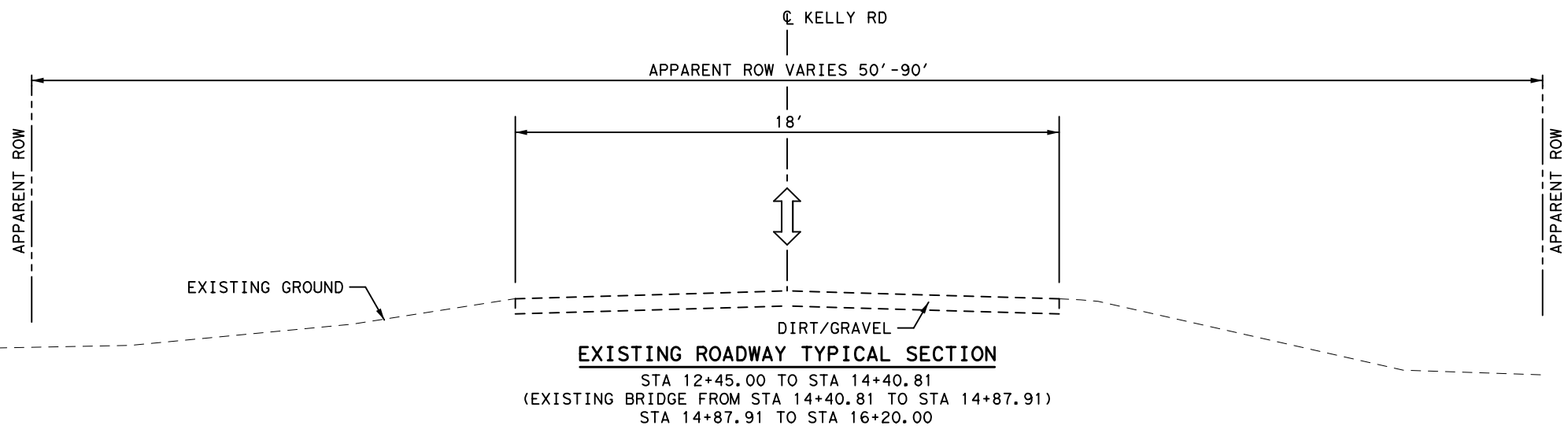
*Trevor L. Castilla*

**CIVIL CONSULTING GROUP**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
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**TYPICAL SECTIONS**  
(KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	SHEET NO.
6		CR	
STATE	DISTRICT	COUNTY	3
TEXAS	LFK	POLK	
CONTROL	SECTION	JOB	
0911	04	089	



**GENERAL NOTES:**

Existing regulatory, warning and guide signs within project limits are to remain visible to the traveling public at all times. If a sign must be repositioned during construction operations, move and install the sign to an approved location. Use care when working near existing signs and repair or replace signs damaged by work operations. All work involved repositioning existing signs will be subsidiary to various bid items.

Furnish materials and make repairs to the existing roadway at any location damaged by construction operations. This work shall be done in an approved manner and will be subsidiary to various bid items.

Ensure drainage structures and outfall channels constructed on this project are free of silt and debris at the time of project acceptance. Final clean out work will be subsidiary to various bid items.

Maintain adequate surface drainage throughout the project limits during all phases of construction.

Roadway cross slopes shall conform approximately to the existing surface, unless otherwise directed.

Provide suitable access at all times to adjacent businesses, private property and side roads.

Remove dirt, silt, rocks, debris and other foreign matter that accumulates in structures due to the Contractor's operations as directed. Keep stream channels open at all times. This work will not be paid for directly, but will be subsidiary to pertinent Items.

The bridge at Bluff Creek has a posted weight limit of 7500 lbs. per tandem axle. This weight limit shall not be exceeded during project construction.

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

Shannon Ramos, Area Engineer [Shannon.Ramos@txdot.gov](mailto:Shannon.Ramos@txdot.gov)

Homar Munoz, Asst. Area Engineer [Homar.Munoz@txdot.gov](mailto:Homar.Munoz@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.

The contractor's attention is directed to the EPIC sheet(s) included in this plan set for additional information regarding environmental permits, issues, and commitments.

**Project Mowing**

Mow the right of way within the project limits a maximum of 3 cycles per year as directed. Mowing will not be measured or paid for directly, but will be subsidiary to various bid items.

The equipment used for mowing shall consist of approved mowing units capable of mowing on slopes without marring finished slope surfaces or injuring existing growth. The minimum cutting width shall not be less than 5 ft., unless otherwise approved.

Mow all areas of existing vegetation and vegetation placed during the project as directed. The mowing height shall be 5 in. unless otherwise directed. Repair portions of sod or grass that are injured during mowing operations as directed.

Mow as close as possible to all fixed objects, exercising extreme care not to damage trees, plants, shrubs, signs, delineators or other appurtenances which are part of the facility. Hand trim around such objects, unless otherwise specified.

Use safety chains or other manufacturer's safety device to prevent damage to people or property caused by flying debris propelled out from under rotary mowers. Chains shall be a minimum size of 5/16 in. and links spaced side by side around the mower's front, sides and rear. When mowing at the specified cutting height, the chains shall be long enough to drag the ground. If at any time, it is determined mowing or trimming equipment is defective to the point that it may affect the quality of work or create an unsafe condition, then that equipment shall be immediately repaired or replaced.

**Litter Pickup**

Remove litter from the right of way in the limits of this project a maximum of 3 cycles per year as directed. Litter pickup will not be measured or paid for directly, but will be subsidiary to various bid items.

The equipment used for litter pickup shall be approved.

Collect and dispose of all litter deposited by construction operations or the traveling public including cans, bottles, paper, plastic items, metal scraps, lumber, etc. from within the project right of way or as directed. Properly dispose of all collected litter. Do not dump or stockpile collected litter on State property.

**Precast Alternate Proposals.**

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 5: Control of the Work**

In the event utility lines needing unforeseen adjustments are encountered during construction operations, alter operations and continue to prosecute the contract in such a manner that will allow utility adjustments to be made by others. An extension of working time may be granted for any delays caused by the utility adjustments if deemed necessary.

#### **Item 7: Legal Relations and Responsibilities**

No significant traffic generator events identified.

The proposed work of this project is to replace the bridge and approaches at Kelly Road over Bluff Creek. The total disturbed area is 0.503 acres. The disturbed area in this project and the contractor project specific locations (PSLs) within 1 mile of the project limits for the contract will further establish the authorization requirements for storm water discharges. As the disturbed area including PSLs is less than 1 acre, the TPDES CGP does not apply; however, the contractor shall place BMPs as directed to adhere to water quality requirements associated with section 404/401 permits. If the total area disturbed shown in the plans and PSLs within 1 mile of the project limits exceed 1 acre, the engineer will develop a SWP3 site plan and post a small construction site notice for the construction activities.

Dispose of all vegetative matter and any other materials removed from State Right of Way in accordance with applicable environmental laws, rules, regulations and requirements.

Burning locations must be approved by the Engineer prior to beginning. Burning activities must be conducted in compliance with Texas Commission on Environmental Quality (TCEQ) regulations. Notify the Engineer when burning activities will take place.

In order to maintain compliance with Chapter 64 of the Texas Parks and Wildlife Code and Migratory Bird Treaty Act (MBTA), construction activities that may affect nests (i.e. tree removal, tree limbing, bridge work) shall be conducted outside of the nesting season (March 15 to September 15). In the event birds or active nests (eggs and/or nestlings present) are encountered, contact the engineer prior to conducting work.

#### **Item 8: Prosecution and Progress**

For this project, working days will be computed and charged in accordance with Item 8, Section 3.1.4 "Standard Workweek".

Submit monthly progress schedules no later than the 20<sup>th</sup> calendar day of the month. Failure to comply with this deadline may result in the Engineer withholding progress (monthly) payments.

A 90 day delay has been included to give contractors flexibility of when to start work due to the time needed for the fabrication of beams.

Provide a Critical Path Method (CPM) Construction Schedule unless otherwise approved.

#### **Item 100: Preparing Right of Way**

The equipment used to trim limbs shall be approved. A boom axe will not be allowed.

#### **Item 110: Excavation**

#### **Item 132: Embankment**

Hauling materials with scrapers across or along existing roadways will not be permitted without written permission.

Drying of material deeper than 6 inches below subgrade elevations will not be permitted without written permission.

Grading required for shaping driveways and side road turnouts for pipe culverts at all access locations, will be subsidiary to various bid items.

All blading, rolling, and scraper work to construct and remove temporary slopes adjacent to pavement drop-offs, will be subsidiary to various bid items.

Compact embankment material used to reshape existing slopes to a density comparable with adjacent undisturbed material to the satisfaction of the Engineer.

#### **Item 162: Sodding for Erosion Control**

Provide Bermuda block sod unless St. Augustine is the prevailing grass cover at particular placement locations. Provide St. Augustine block sod at those locations.

#### **Item 166: Fertilizer**

Fertilize all seeded or sodded areas.

#### **Item 168: Vegetative Watering**

Equip water trucks with sprinkler systems capable of watering all of the entire seeded or sodded areas from the roadway.

Water all newly placed sodded or seeded areas at the time of installation. Thereafter, maintain the sodded or seeded areas in a well-watered condition, at no time allow the areas to dry to a condition where water stress is evident.

#### **Item 169: Soil Retention Blankets**

In areas designated for soil retention blankets (SRB) in the plans, furnish only spray-on products listed on the Approved Product List for Erosion Control Products based upon the Class and Type specified in the plans. Any substitution to spray-on products must be approved in writing, be

listed on the Approved Product List for Erosion Control Products based upon Class and Type, and shall not contain UV degradable, photodegradable or polypropylene materials.

**Item 247: Flexible Base**

Provide flexible base with a minimum plasticity index of 2.

Provide flexible base material with a minimum Bar Linear Shrinkage of 2% as determined by Test Method Tex-107-E, Part II.

Stockpiling of base material will not be required if testing has been performed and the material has been approved at the source. Deliver approved specified materials to the project.

Compaction requirements for flexible base are ordinary compaction.

Remove and properly dispose of any piles of asphaltic concrete and all other debris left on the right of way daily.

**Item 421: Hydraulic Cement Concrete**

The Engineer will provide curing facilities and strength testing equipment for acceptance testing.

Livingston Area Office, 3161 US 59 N., Livingston TX 77351

**Item 422: Concrete Superstructures**

Saw-cut grooves are not required.

**Item 427: Surface Finishes for Concrete**

Provide a rub finish for Surface Area I.

**Item 432: Riprap**

Stone riprap will require the placement of filter fabric prior to placement of stones.

Welded wire fabric will not be allowed for reinforcing concrete riprap. Reinforcing shall consist of No. 3 or 4 bars meeting the requirements of grade 60 reinforcing steel. Place bars on 12 in. centers in each direction, supported on reinforcing chairs.

**Item 496: Removing Structures**

Lead was detected in paint less than 90 ppm on the Bluff Creek bridge at Kelly Rd. (0911-04-089). Requirements of Item 6 Special Provisions are not required. Contractor may request a copy of the Asbestos and Lead Paint Inspection Report from the Area Engineer. Any contracting personnel who may disturb the steel components should be made aware of the lead content in the materials so that they may use proper OSHA procedures.

**Item 502: Barricades, Signs, and Traffic Handling**

Traffic Control Plan (TCP):

Ensure the Contractor's Responsible Person (CRP) or their alternate for Barricades, Signs and Traffic Handling is available at all times and able to receive instructions from the Engineer or authorized Department representative. The CRP shall be a person that is usually at the project site during normal working hours.

For protection of the traveling public, direct traffic through the work area using signs, flaggers and other devices. Required signs are shown in the plans on the Barricade and Construction Standards and Traffic Control Plan Sheets. The latest edition of the "Texas Manual on Uniform Traffic Control Devices" shall also be used as a guide for handling traffic on this project.

Provide adequate flaggers to protect the traveling public when working on or near a roadway carrying traffic. All flaggers shall wear hardhats and reflective vests.

Install "Be Prepared to Stop" (CW3-4) and "Flagger Ahead" (CW20-7aD) signs when flaggers are present. Position the signs where good visibility and traffic control can be maintained.

Provide one high-intensity yellow, rotating dome-light on all equipment such as distributors, spreader boxes, lay-down machines, dump trucks, rollers, backhoes, road graders, loaders, etc. within the work zone. Mount lights high enough to be visible from all directions and operating when the equipment is in the work zone. On all other equipment such as automobiles, trailers, etc. use emergency flashers while within the work zone.

All blading, rolling and scraper work to construct and remove temporary slopes adjacent to pavement drop-offs, will be considered subsidiary to various bid items.

Notify the Engineer prior to placing any materials or equipment on the right of way. Any equipment, stockpiles, or materials placed within 30 ft. of the driving lane must have adequate signs, barricades or other warning devices as approved. As a minimum place an 8 ft. wide TY III Barricade or barrels on the approach side of each site that is within 30 ft. of the driving lane. Use TY III Barricade or barrels for the site similarly on the departure side if the location is within 30 ft. of the opposing traffic lane.

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.

Texas Transportation Code 547.105 authorizes the use of warning lights to promote safety and provides an effective means of gaining the travelling public's attention as they drive in areas

where construction crews are present. In order to influence the public to move over when high risk construction activities are taking place, minimize the utilization of blue warning lights. These lights must be used only while performing work on or near the travel lanes or shoulder where the travelling public encounters construction crews that are not protected by a standard work zone set up such as a lane closure, shoulder closure, or one-way traffic control. Refrain from leaving the warning lights engaged while travelling from one work location to another or while parked on the right of way away from the pavement or a work zone.

All workers shall wear reflective clothing meeting ANSI Class II requirements during the day and ANSI Class III requirements during the night.

**Item 506: Temporary Erosion, Sedimentation, and Environmental Controls**

Locations and types of BMPs may require adjustments prior to or after placement as directed by the Engineer. Adjustments should be made to ensure BMPs are working effectively and maintain compliance with the Construction General Permit. Notify the Engineer prior to making adjustments.

Other erosion or sediment control measures deemed necessary by the Engineer will be paid for in accordance with article 4.4, "Changes in the Work".

**Item 540: Metal Beam Guard Fence**

Use round timber posts.

Use timber post on all metal beam guard fence installations except where steel posts are required.

At the close of work each day, protect the ends of metal beam guard fence in an approved manner, so that no blunt ends are exposed to approaching traffic. Plastic drums will be required at these locations.

**Item 658: Delineator and Object Marker Assemblies**

Install delineators on the departure side of the posts when mounting to metal beam guard fence and guardrail end treatments.

Install D-SW delineators on the departure side of steel bridge rail posts.



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0911-04-089

DISTRICT Lufkin  
HIGHWAY CR 1243

COUNTY Polk

CONTROL SECTION JOB				0911-04-089		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00061486			
COUNTY				Polk			
HIGHWAY				CR 1243			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	3.750		3.750	
	110-6001	EXCAVATION (ROADWAY)	CY	190.000		190.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	595.000		595.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	502.000		502.000	
	162-6002	BLOCK SODDING	SY	150.000		150.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	633.000		633.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	633.000		633.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY	1,265.000		1,265.000	
	168-6001	VEGETATIVE WATERING	MG	54.000		54.000	
	169-6002	SOIL RETENTION BLANKETS (CL 1) (TY B)	SY	448.000		448.000	
	247-6073	FL BS (CMP IN PLC)(TY D GR 1-2) (6")	SY	775.000		775.000	
	400-6005	CEM STABIL BKFL	CY	81.000		81.000	
	416-6004	DRILL SHAFT (36 IN)	LF	300.000		300.000	
	420-6013	CL C CONC (ABUT)	CY	37.600		37.600	
	422-6001	REINF CONC SLAB	SF	1,950.000		1,950.000	
	422-6023	SHEAR KEY	CY	0.400		0.400	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	298.000		298.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	304.000		304.000	
	450-6019	RAIL (TY T631LS)	LF	198.000		198.000	
	454-6003	ARMOR JOINT	LF	44.000		44.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6.000		6.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	50.000		50.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	50.000		50.000	
	506-6034	CONSTRUCTION PERIMETER FENCE	LF	117.000		117.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	823.000		823.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	823.000		823.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	27.000		27.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2.000		2.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	2.000		2.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	6.000		6.000	
	658-6053	INSTL OM ASSM (OM-3L)(TWT)GND	EA	2.000		2.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

DISTRICT	COUNTY	CCSJ	SHEET
Lufkin	Polk	0911-04-089	5




DRAWING DATE: 2/2/2022 FILENAME: ...\\01 General\PS&E1\SUM01.dgn


ROADWAY QUANTITIES							
ITEM DESCRIPTION	100	110	132	247	540	540	544
	6002	6001	6003	6073	6001	6016	6001
	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	FL BS (CMP IN PLC) (TY D GR 1-2) (6")	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)
	STA	CY	CY	SY	LF	EA	EA
KELLY RD AT BLUFF CREEK							
STA 12+45.00 TO STA 14+16.00	1.71	7	330	447	13.5	1	1
STA 14+16.00 TO STA 14+91.00	0.75	176	182				
STA 14+91.00 TO STA 16+20.00	1.29	7	83	328	13.5	1	1
<b>PROJECT TOTAL</b>	<b>3.75</b>	<b>190</b>	<b>595</b>	<b>775</b>	<b>27.0</b>	<b>2</b>	<b>2</b>

REMOVAL QUANTITIES		
ITEM DESCRIPTION	496	644
	6009	6076
	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOVE SM RD SN SUP&AM
	EA	EA
KELLY RD AT BLUFF CREEK	1	2
<b>PROJECT TOTAL</b>	<b>1</b>	<b>2</b>

DELINEATOR AND OBJECT MARKER QUANTITIES		
ITEM DESCRIPTION	658	658
	6016	6053
	INSTL DEL ASSM (D-SW) SZ (BRF) GF1 (BI)	INSTL OM ASSM (OM-3L) (TWT) GND
	EA	EA
KELLY RD AT BLUFF CREEK		
STA 12+45.00 TO STA 14+16.00	2	1
STA 14+16.00 TO STA 14+91.00	2	
STA 14+91.00 TO STA 16+20.00	2	1
<b>PROJECT TOTAL</b>	<b>6</b>	<b>2</b>



1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**Texas Department of Transportation**  
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## SUMMARY OF QUANTITIES

(SHEET 1 OF 2)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	6
CONTROL	SECTION	JOB	
0911	04	089	

SWP3 QUANTITIES												
ITEM DESCRIPTION	160	162	164	164	164	168	169	506	506	506	506	506
	6003	6002	6009	6011	6021	6001	6002	6002	6011	6034	6038	6039
	FURNISHING AND PLACING TOPSOIL (4")	BLOCK SODDING	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	CELL FBR MLCH SEED (PERM) (RURAL) (SANDY)	VEGETATIVE WATERING (10 GAL/SY) x (2 APPS)	SOIL RETENTION BLANKETS (CL 1) (TY B)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION PERIMETER FENCE	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	SY	SY	MG	SY	LF	LF	LF	LF	LF
KELLY RD AT BLUFF CREEK	502	150	633	633	1,265	54	448	50	50	117	823	823
<b>PROJECT TOTAL</b>	<b>502</b>	<b>150</b>	<b>633</b>	<b>633</b>	<b>1,265</b>	<b>54</b>	<b>448</b>	<b>50</b>	<b>50</b>	<b>117</b>	<b>823</b>	<b>823</b>

\* BLOCK SODDING TO BE USED ONLY AS DIRECTED.

**NOTES:**

1. LOCATIONS AND TYPES OF BMPs MAY REQUIRE ADJUSTMENTS PRIOR TO OR AFTER PLACEMENT AS DIRECTED BY THE ENGINEER. ADJUSTMENTS SHOULD BE MADE TO ENSURE BMPs ARE WORKING EFFECTIVELY AND MAINTAIN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT AND WATER QUALITY REQUIREMENTS ASSOCIATED TO SECTION 404/401 PERMITS. NOTIFY THE ENGINEER PRIOR TO MAKING ADJUSTMENTS.

BRIDGE QUANTITIES									
ITEM DESCRIPTION	400	416	420	422	422	425	432	450	454
	6005	6004	6013	6001	6023	6035	6033	6019	6003
	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	REINF CONC SLAB	SHEAR KEY	PRESTR CONC GIRDER (TX28)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)	ARMOR JOINT
	CY	LF	CY	SF	CY	LF	CY	LF	LF
NBI: 11-187-0-AA03-29-007									
KELLY RD AT BLUFF CREEK	81.0	300	37.6	1,950	0.4	298	304	198	44
<b>PROJECT TOTAL</b>	<b>81.0</b>	<b>300</b>	<b>37.6</b>	<b>1,950</b>	<b>0.4</b>	<b>298</b>	<b>304</b>	<b>198</b>	<b>44</b>

FILENAME: ...\\01 General\PS&E1\SUM02.dgn

DRAWING DATE: 2/2/2022

1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

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SUMMARY OF QUANTITIES

(SHEET 2 OF 2)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	7
CONTROL	SECTION	JOB	
0911	04	089	

**BRIDGE OUT**  
 ¼ MILES AHEAD  
 LOCAL TRAFFIC ONLY

R11-3b  
 60" X 30"

①

**BRIDGE OUT**  
 1 MILES AHEAD  
 LOCAL TRAFFIC ONLY

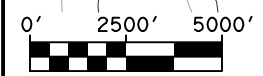
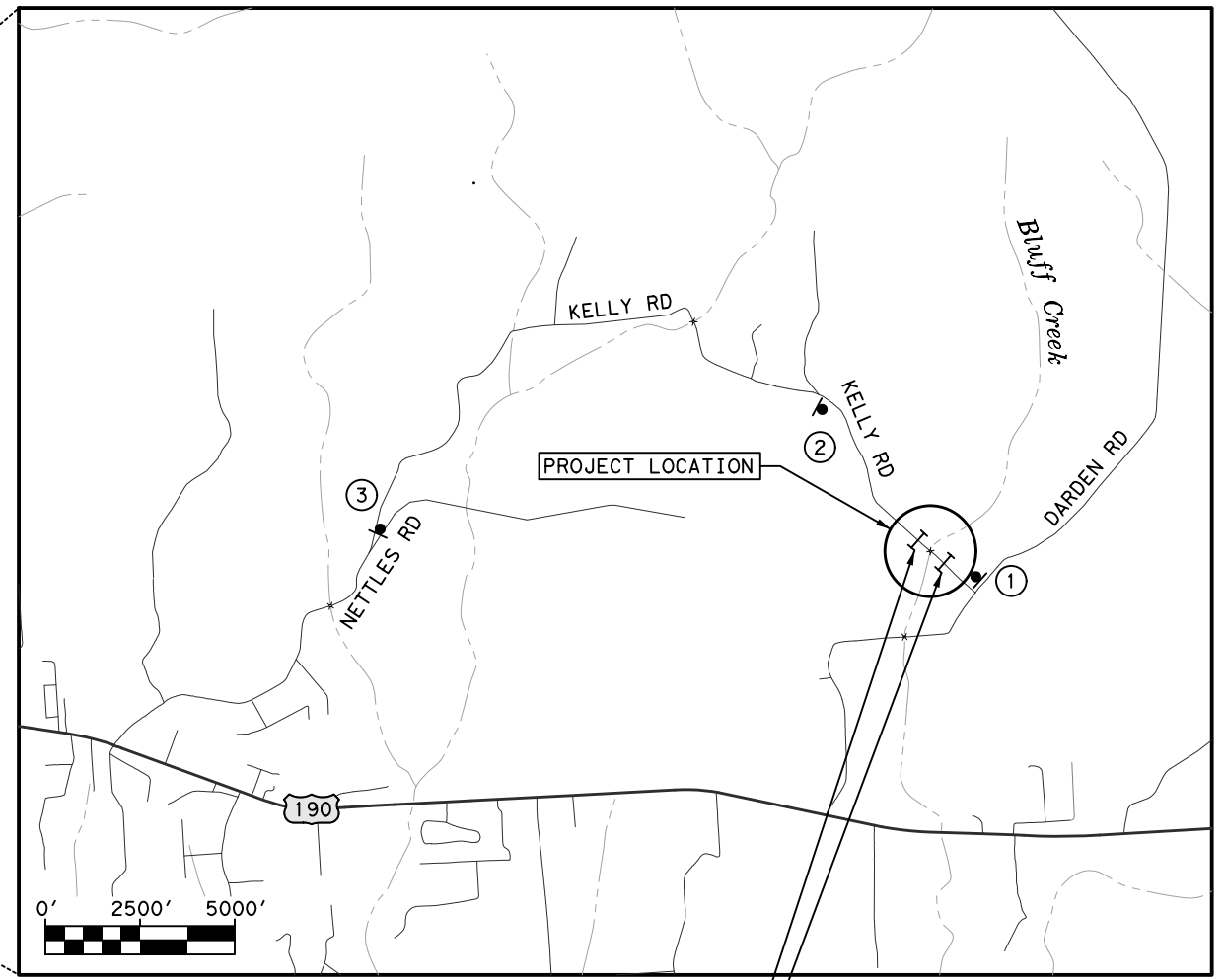
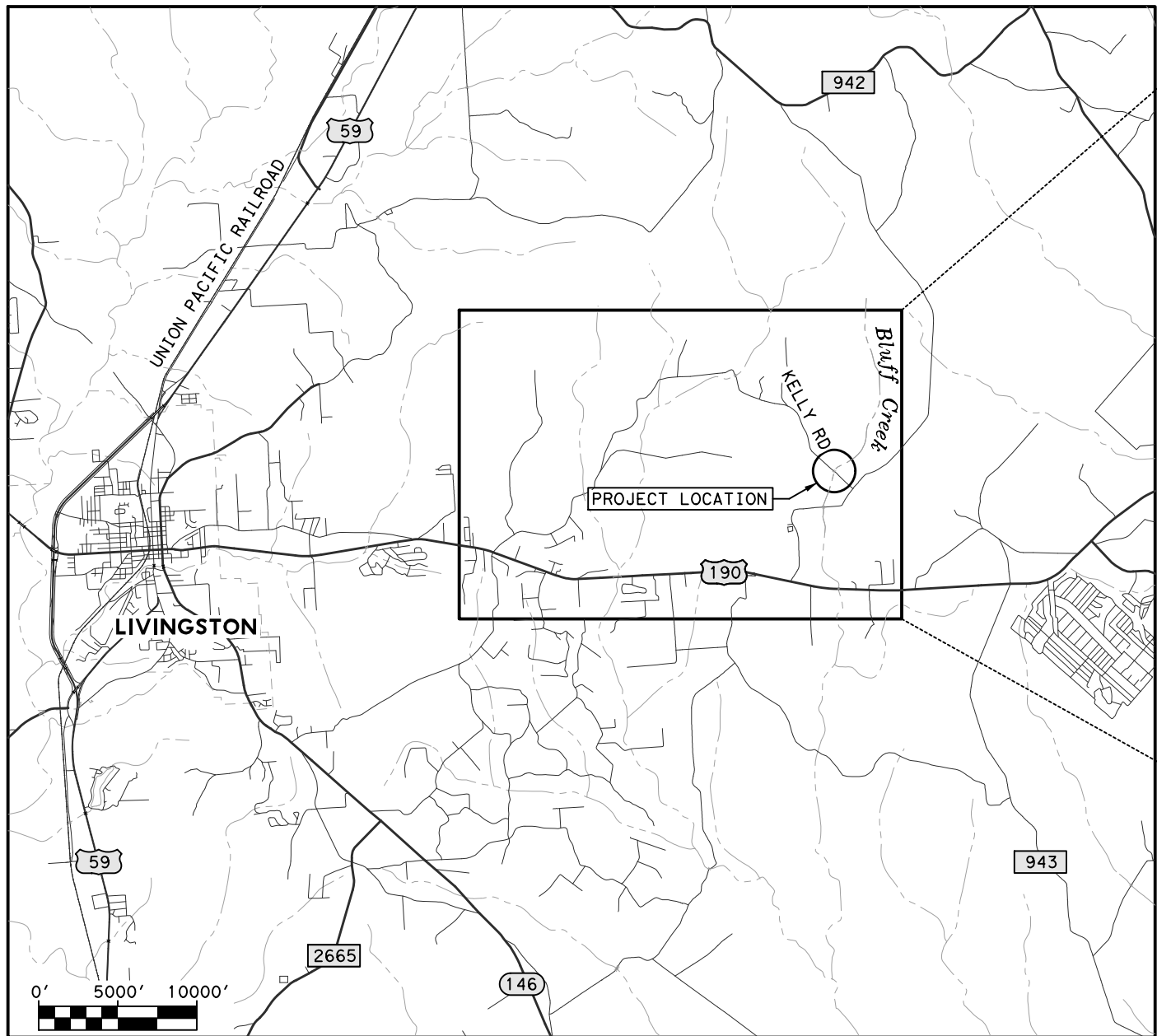
R11-3b  
 60" X 30"

②

**BRIDGE OUT**  
 4 MILES AHEAD  
 LOCAL TRAFFIC ONLY

R11-3b  
 60" X 30"

③



**NOTES:**

1. IT IS THE INTENT OF THIS PROJECT TO CLOSE KELLY RD AT THE BRIDGE SITE FOR A MINIMUM LENGTH OF TIME. DO NOT CLOSE THE ROAD UNTIL CONTRACTOR IS MOBILIZED FOR BRIDGE CONSTRUCTION. SIGNS AND BARRICADES SHOWN HERE ARE TO BE IN PLACE PRIOR TO THE ROAD CLOSURE AND SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION. REFER TO BC STANDARDS FOR ADVANCED WARNING SIGNS.

**SEQUENCE OF WORK**

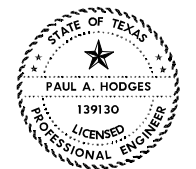
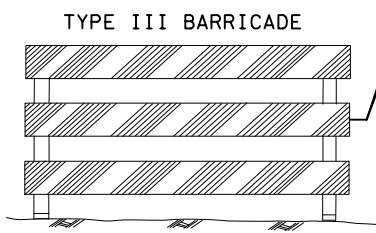
1. SET BARRICADES AND ADVANCED WARNING SIGNS
2. CLOSE ROAD
3. PREPARE ROW AND PLACE SWP3 MEASURES
4. REMOVE EXISTING BRIDGE
5. CONSTRUCT PROPOSED BRIDGE
6. CONSTRUCT APPROACH ROADWAYS
7. INSTALL T631LS, MBGF, DAT AND SGT
8. SEED AND FERTILIZE
9. CLEAN UP
10. REMOVE BARRICADES/SIGNS AND OPEN BRIDGE

NAME  
 ADDRESS  
 CITY  
 STATE  
 CONTRACTOR

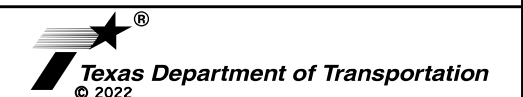
G20-6T  
 48" X 30"

**BRIDGE  
 CLOSED**

R11-2b  
 48" X 30"



**CIVIL CONSULTING GROUP**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**TRAFFIC CONTROL PLAN**  
 (KELLY RD AT BLUFF CREEK)

FED. RD. DIST. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	8
CONTROL	SECTION	JOB	
0911	04	089	

FILENAME: ...KELLY\*DET01.dgn

DRAWING DATE: 2/2/2022

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DATE: 2/2/2022 \$TIME\$  
 FILE: ...\\Standards\bc-21.dgn

**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).

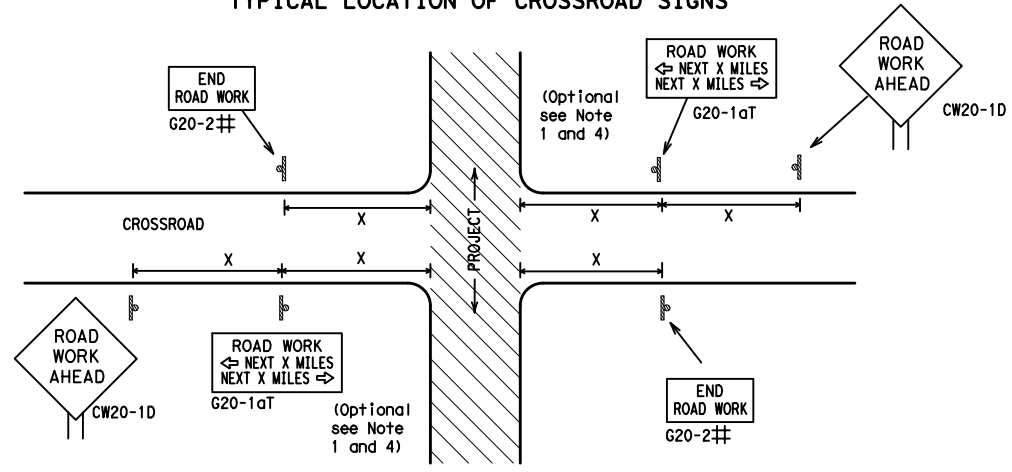
<p><b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b>  <a href="http://www.txdot.gov">http://www.txdot.gov</a></p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD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

SHEET 1 OF 12

<span style="font-size: small; vertical-align: middle;">Texas Department of Transportation</span>		<span style="font-size: x-small;">Traffic Safety Division Standard</span>
<p><b>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</b></p> <p><b>BC (1) -21</b></p>		
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT SECT	JOB HIGHWAY
REVISIONS	0911 04	089 CR
4-03 7-13	DIST	COUNTY SHEET NO.
9-07 8-14	LFL	POLK 9
5-10 5-21		

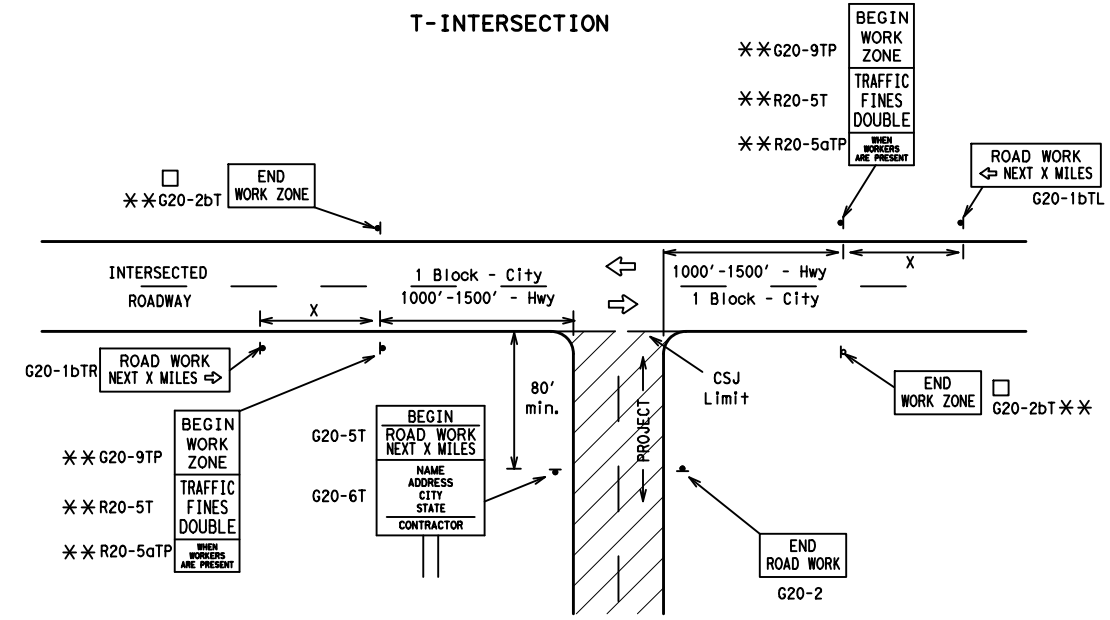
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



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

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

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

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

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

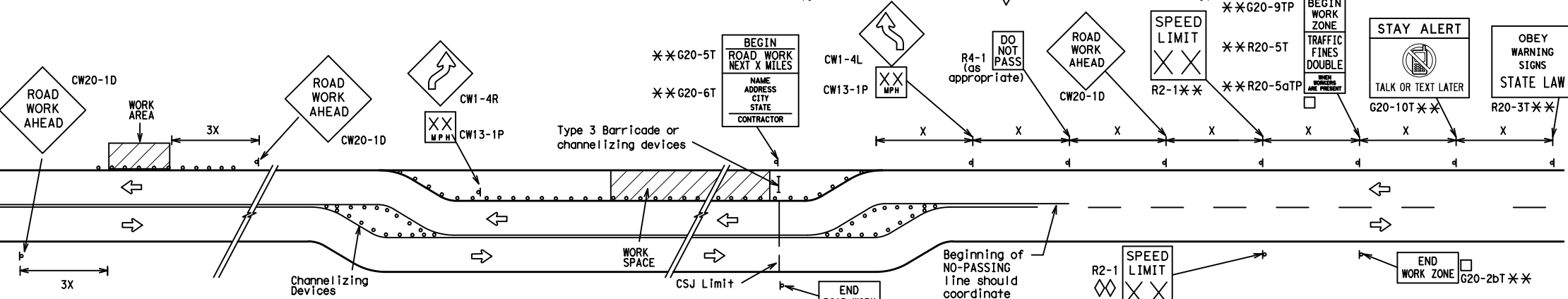
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

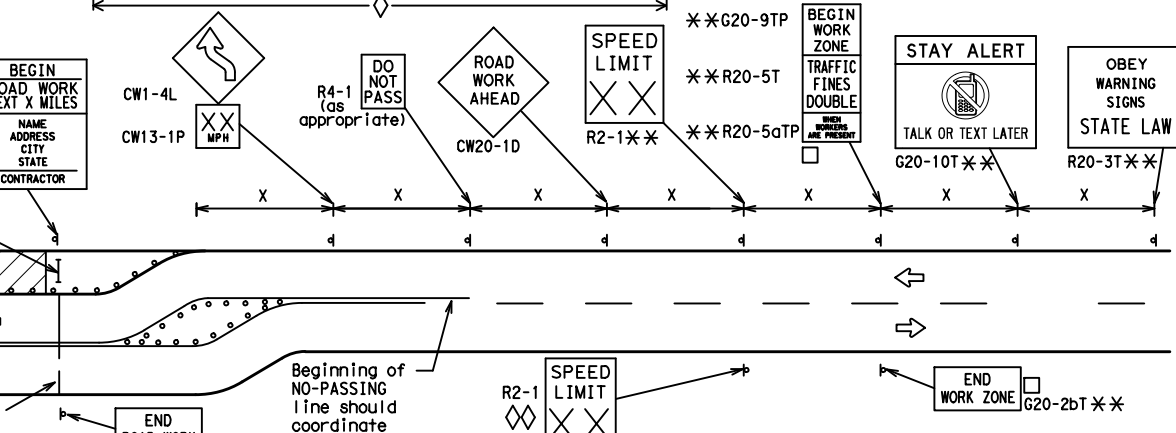
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

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



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

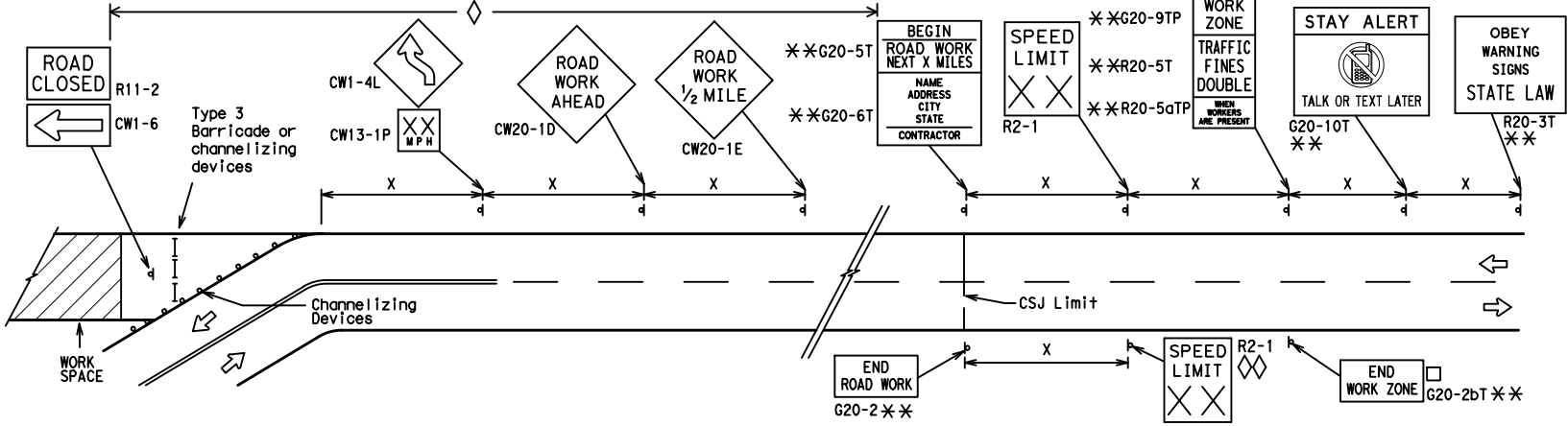
**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS**



**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.

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



**LEGEND**

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

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC(2)-21**

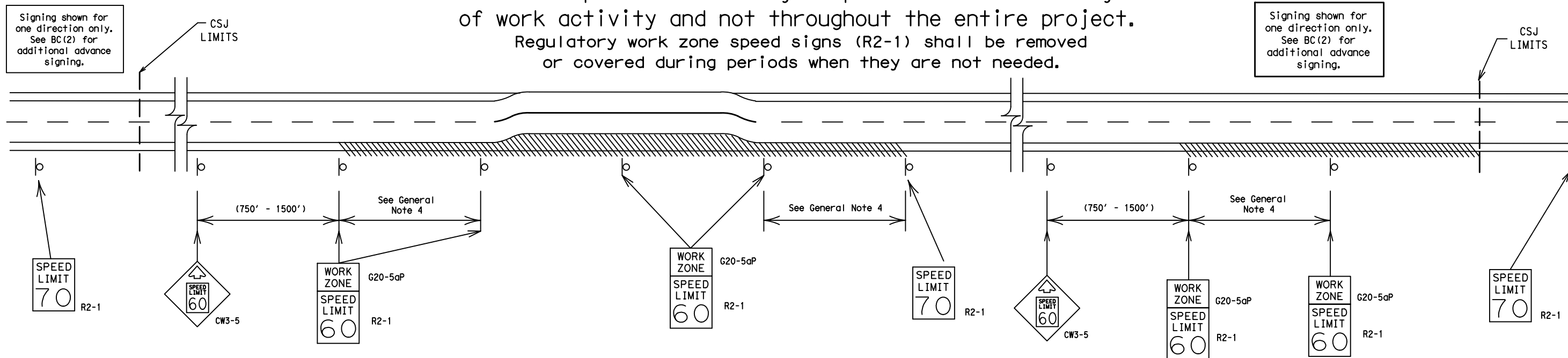
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LFK	POLK	10	

DATE: 2/2/2022 \$TIME\$ FILE: ...Standards\bc-21.dgn

# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

### GENERAL NOTES

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

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SHEET 3 OF 12



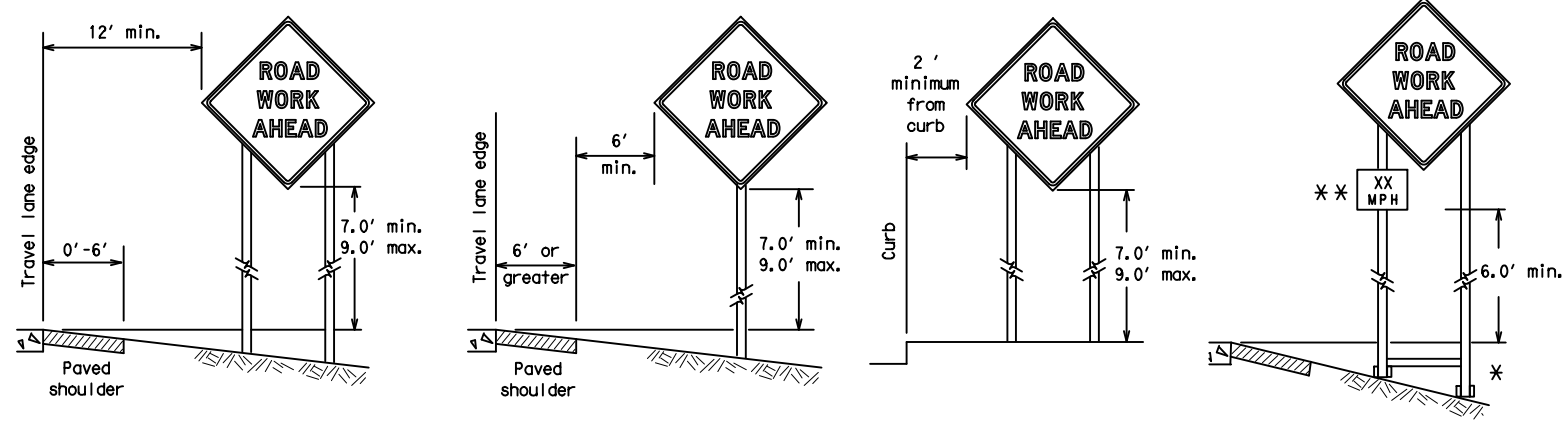
## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) -21

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0911	04	089	CR				
9-07	8-14								
7-13	5-21	DIST	COUNTY	SHEET NO.					
		LFK	POLK	11					

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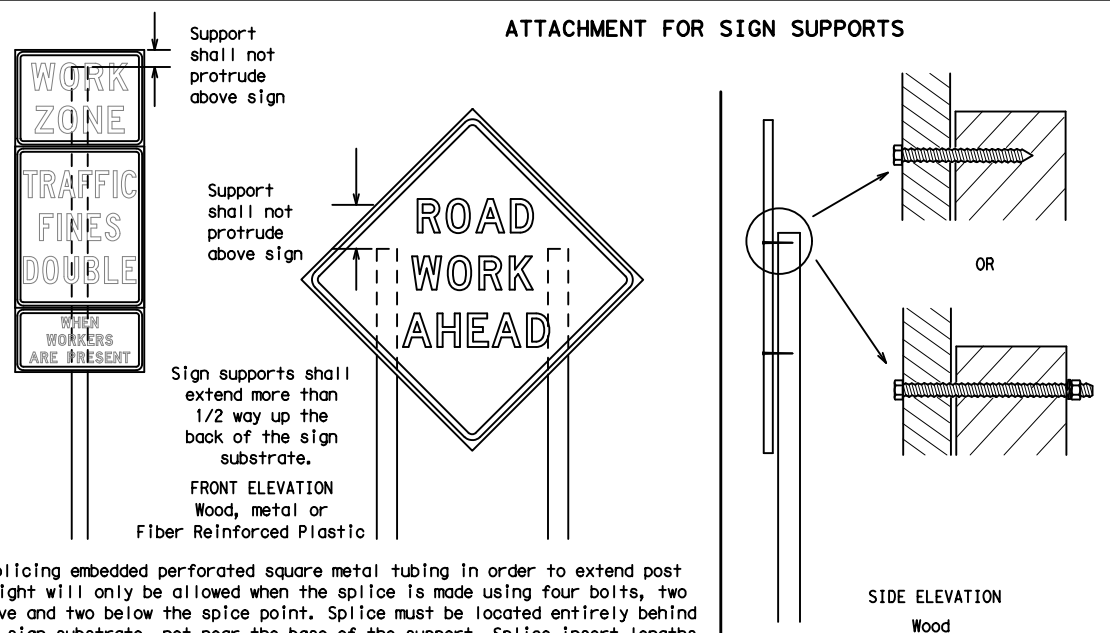
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



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

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

**ATTACHMENT FOR SIGN SUPPORTS**



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

**GENERAL NOTES FOR WORK ZONE SIGNS**

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

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

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

**SIGN MOUNTING HEIGHT**

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

**SIZE OF SIGNS**

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

**SIGN SUBSTRATES**

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

**REFLECTIVE SHEETING**

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

**SIGN LETTERS**

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

**REMOVING OR COVERING**

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

**SIGN SUPPORT WEIGHTS**

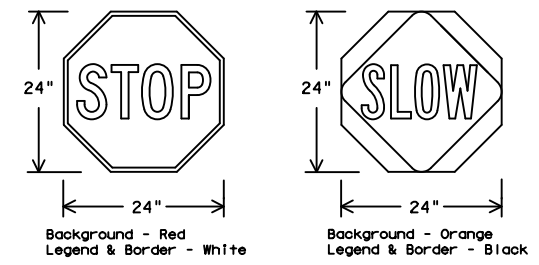
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

**FLAGS ON SIGNS**

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

**STOP/SLOW PADDLES**

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



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

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

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

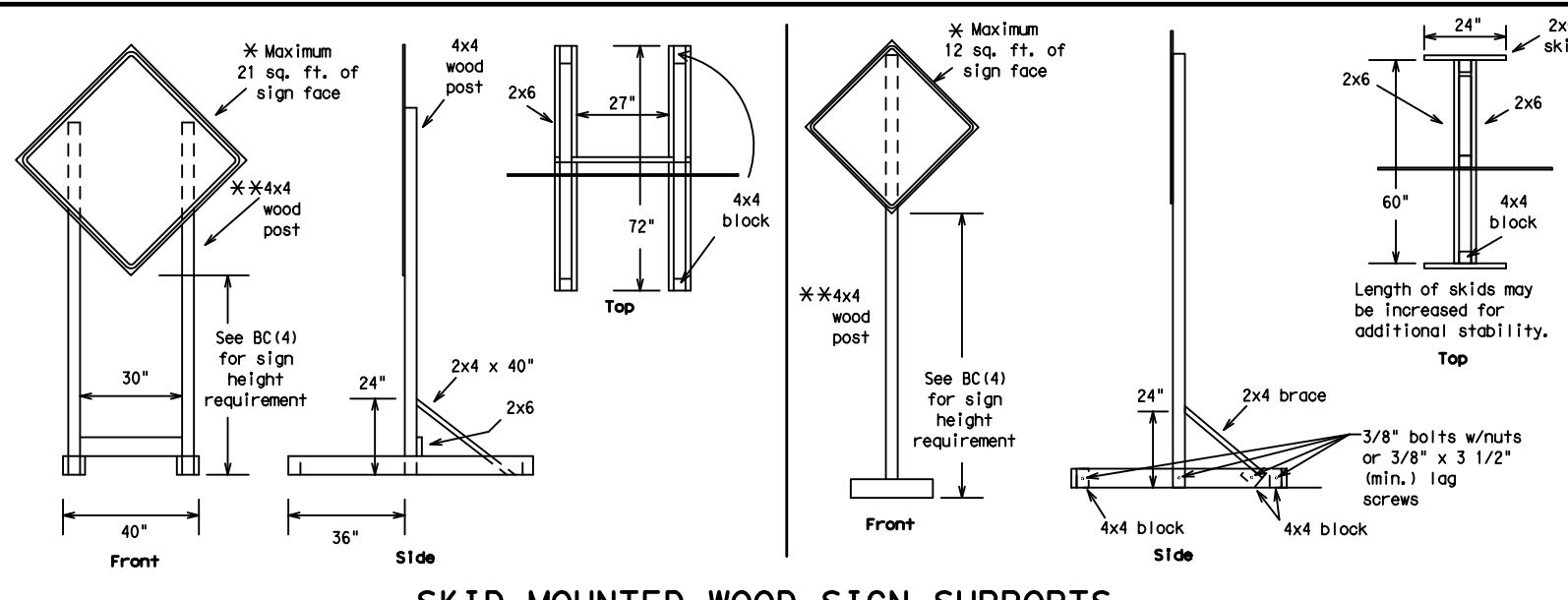


**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

**BC(4)-21**

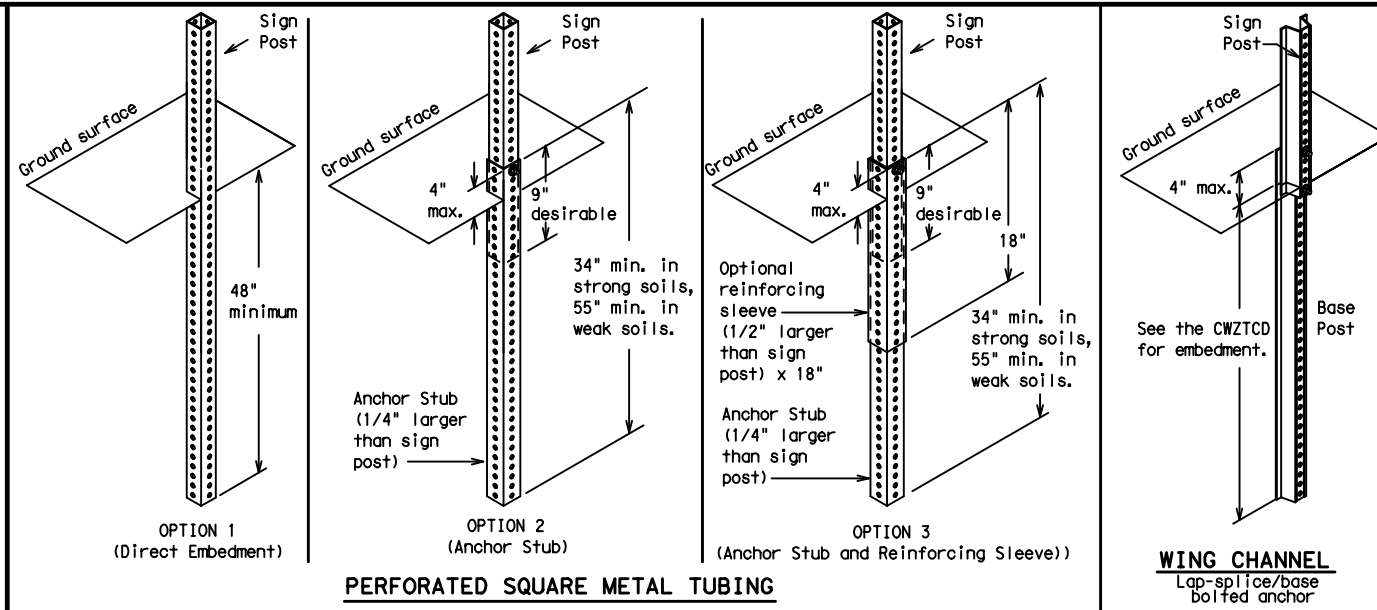
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LFK	POLK	12	

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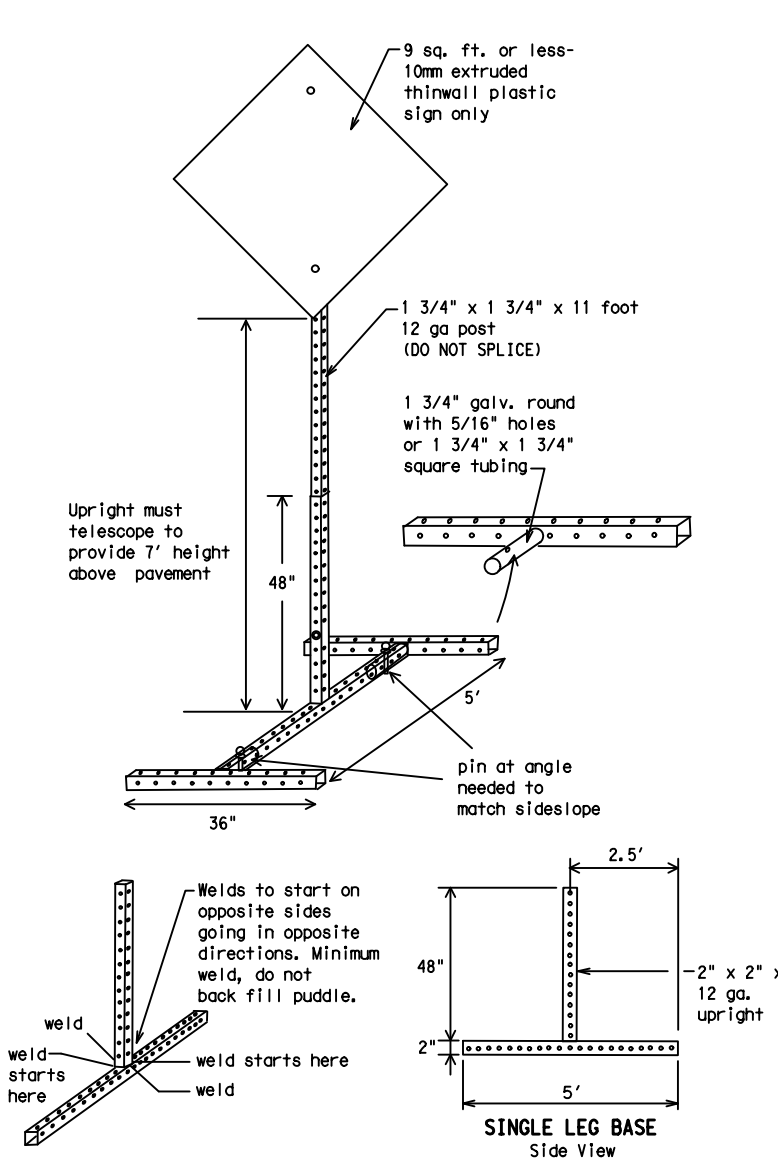
**SKID MOUNTED WOOD SIGN SUPPORTS**

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



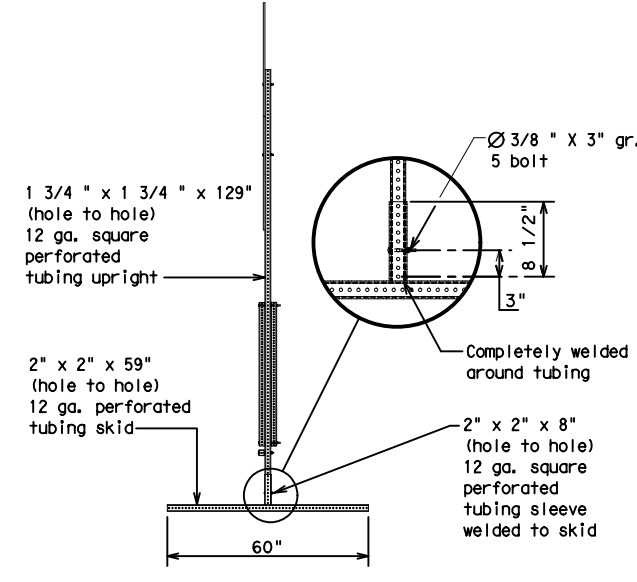
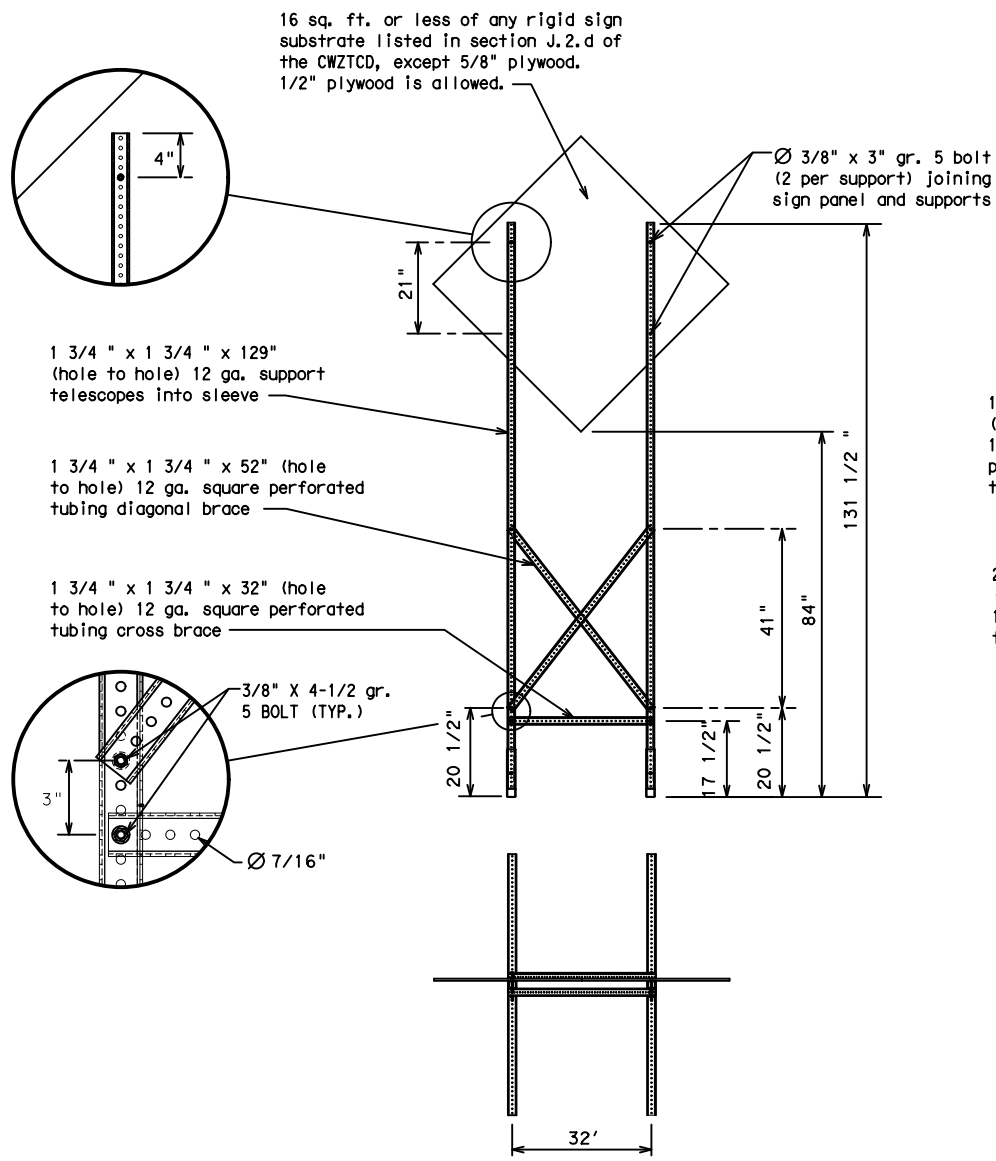
**GROUND MOUNTED SIGN SUPPORTS**

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



**SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS**

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



**WEDGE ANCHORS**

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

**OTHER DESIGNS**

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

**GENERAL NOTES**

- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
  - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
  - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
- \* See BC(4) for definition of "Work Duration."  
 \*\* Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.  
 See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

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**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**

**BC(5) - 21**

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7-13 5-21	LFK	POLK	13	

DATE: 2/2/2022 \$TIME\$ FILE: ...Standards\bc-21.dgn



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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Other Condition List

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

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

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

### Location List

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

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

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

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

## FULL MATRIX PCMS SIGNS

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

SHEET 6 OF 12



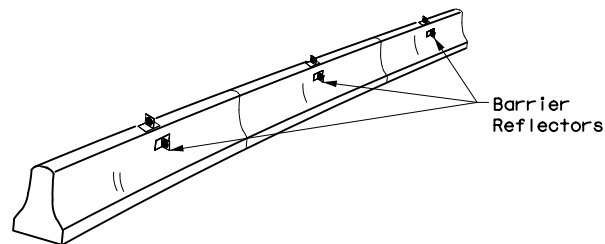
## BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) -21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0911	04	089	CR
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LFK	POLK	14	

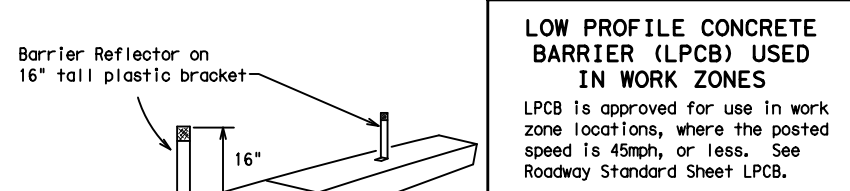
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



**CONCRETE TRAFFIC BARRIER (CTB)**

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

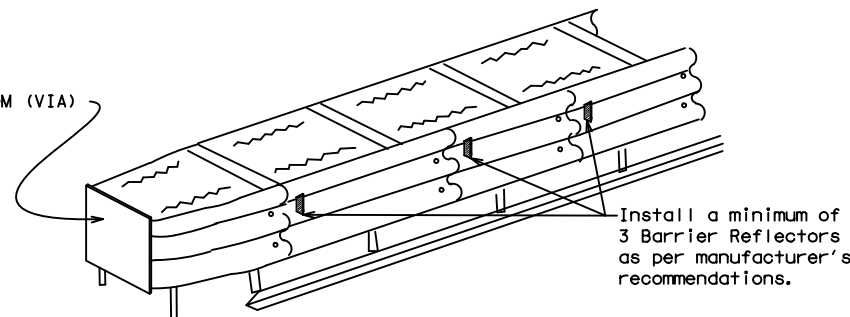


**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

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

**LOW PROFILE CONCRETE BARRIER (LPCB)**



**DELINEATION OF END TREATMENTS**

**END TREATMENTS FOR CTB'S USED IN WORK ZONES**

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

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

**WARNING LIGHTS**

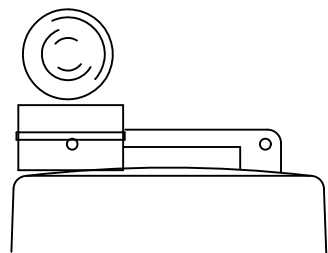
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

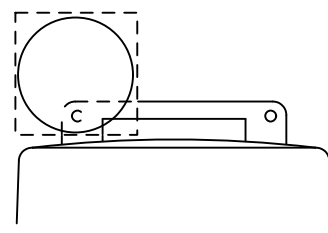
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



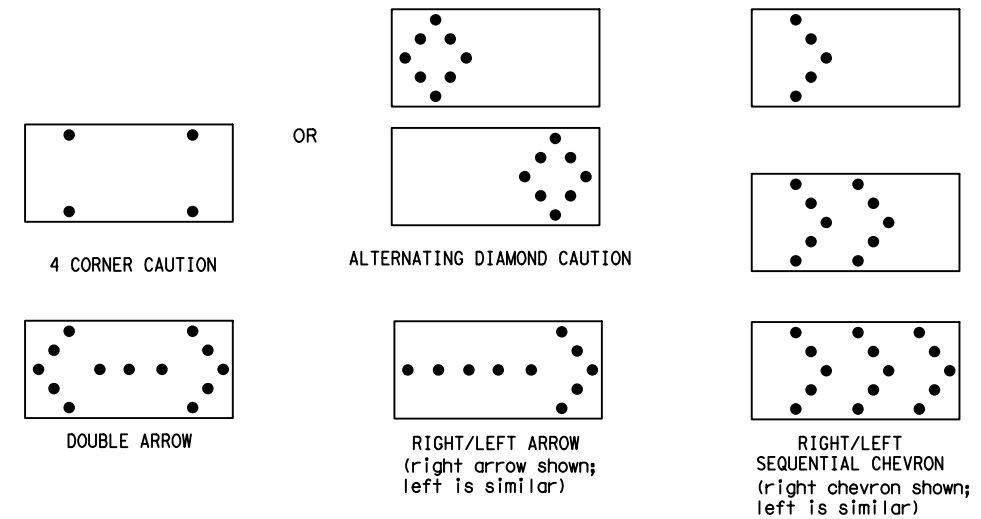
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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

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



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

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

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

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

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

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



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

**BC (7) -21**

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**GENERAL NOTES**

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

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

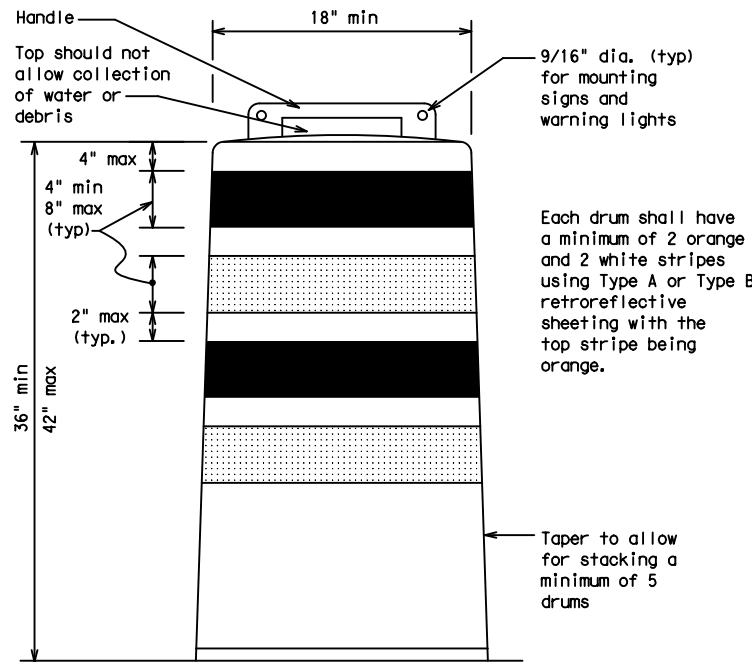
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

**RETROREFLECTIVE SHEETING**

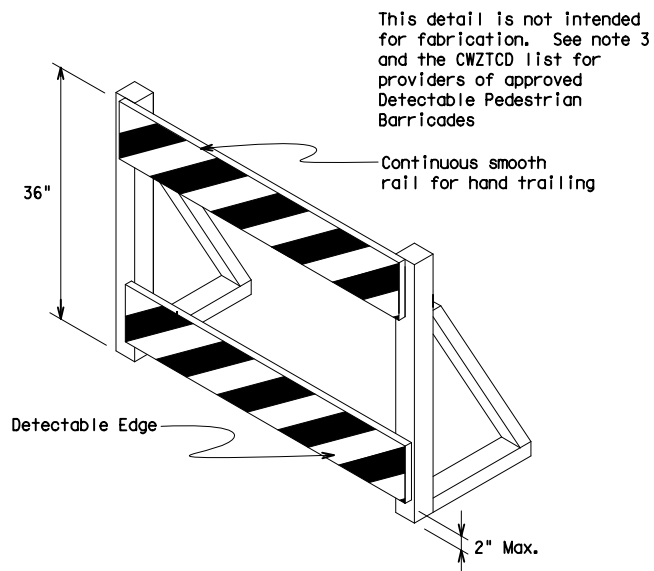
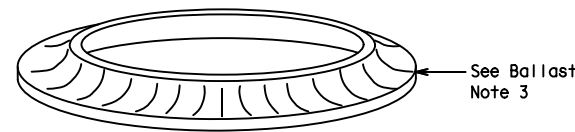
- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall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

**BALLAST**

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



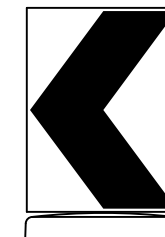
Each drum shall have a minimum of 2 orange and 2 white stripes using Type A or Type B retroreflective sheeting with the top stripe being orange.



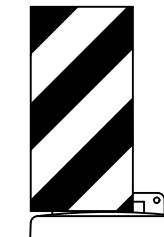
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

**DETECTABLE PEDESTRIAN BARRICADES**

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



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



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

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

**SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS**

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

SHEET 8 OF 12



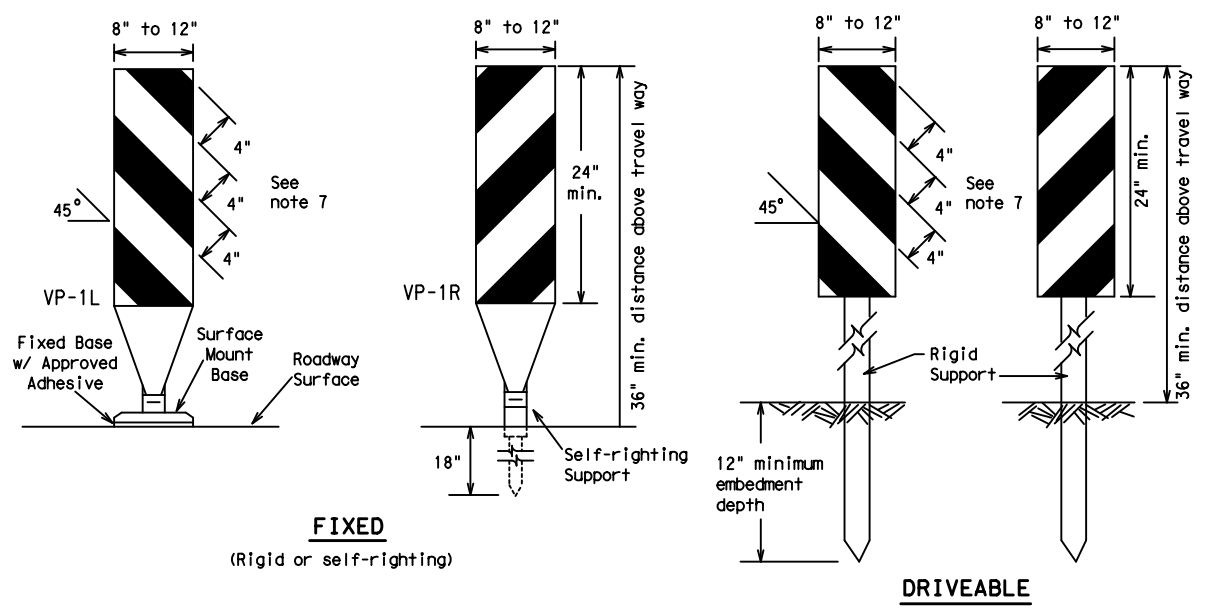
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC(8)-21**

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7-13				

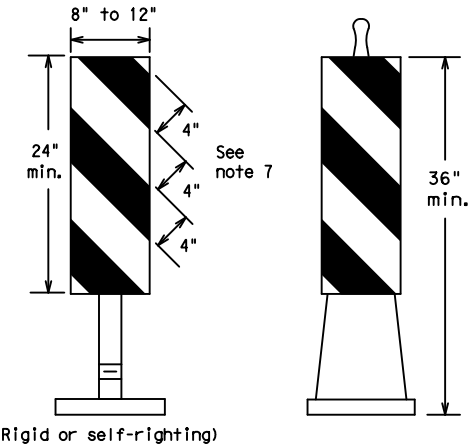
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**FIXED**  
(Rigid or self-righting)

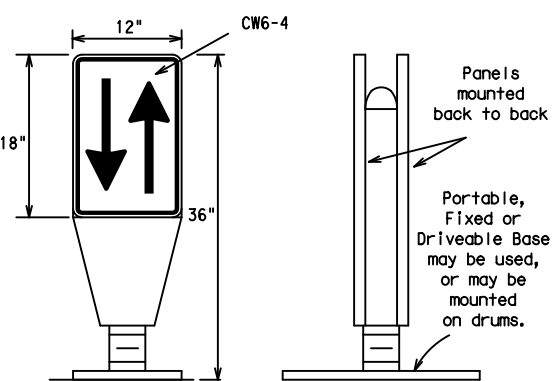
**DRIVEABLE**



**PORTABLE**

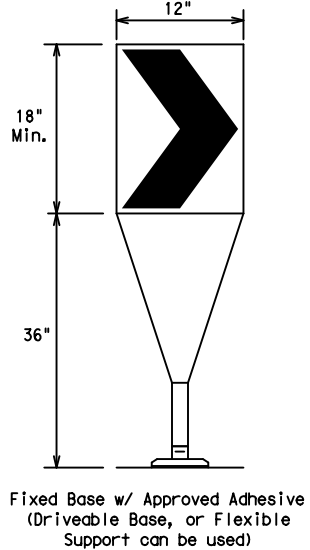
**VERTICAL PANELS (VPs)**

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



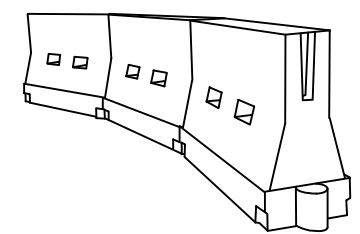
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

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



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

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

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

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

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

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

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

**GENERAL NOTES**

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

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

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

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 21**

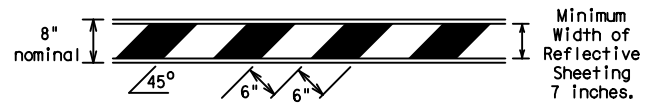
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7-13 5-21	LFK	POLK	17	

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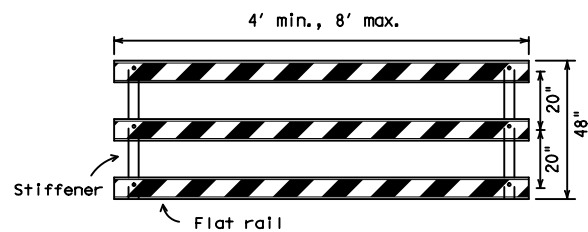
**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

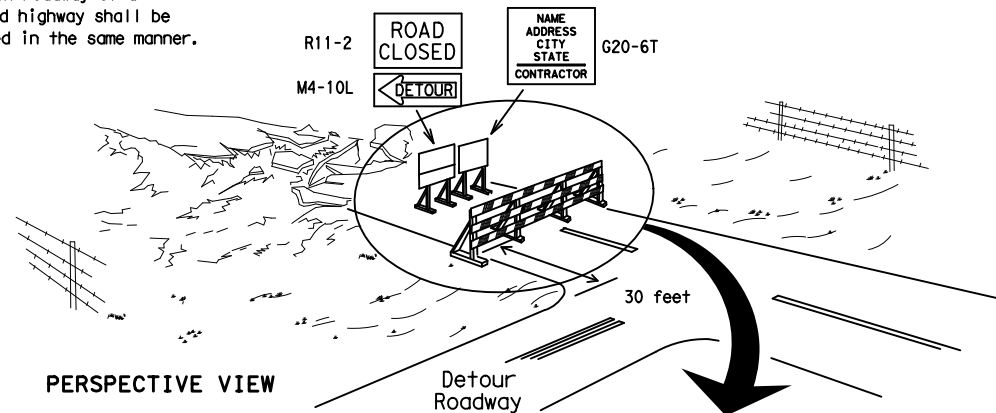


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



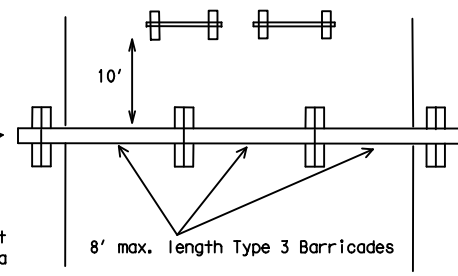
**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

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



PERSPECTIVE VIEW

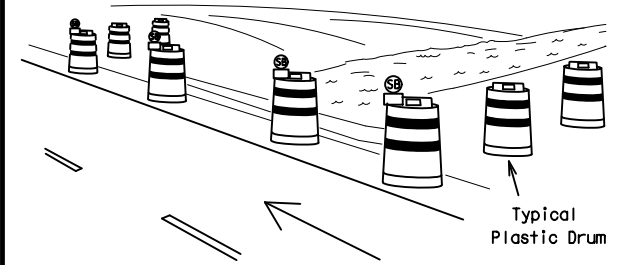
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



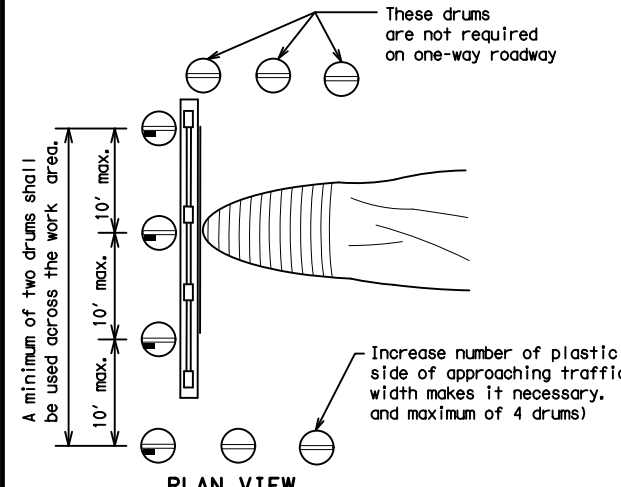
PLAN VIEW

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**



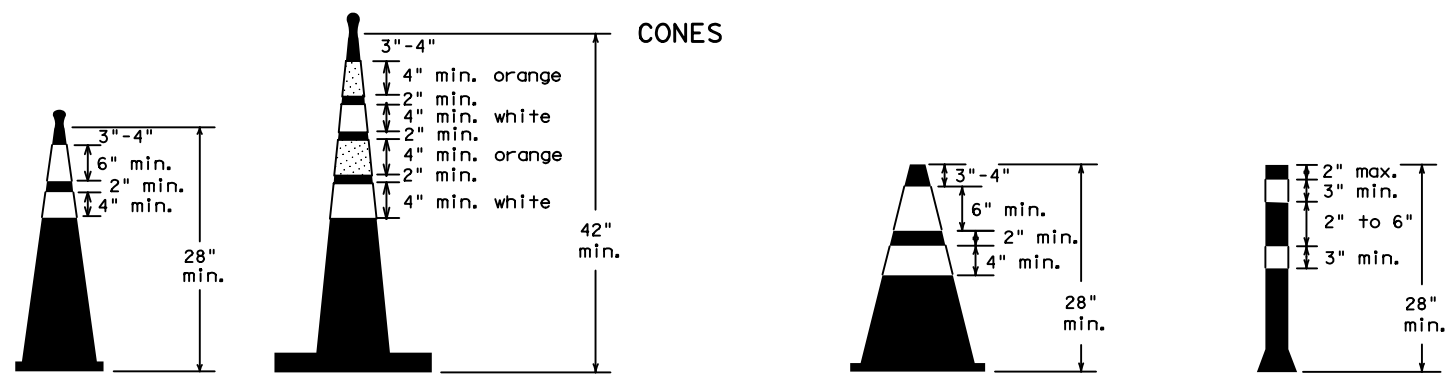
PERSPECTIVE VIEW



PLAN VIEW

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

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



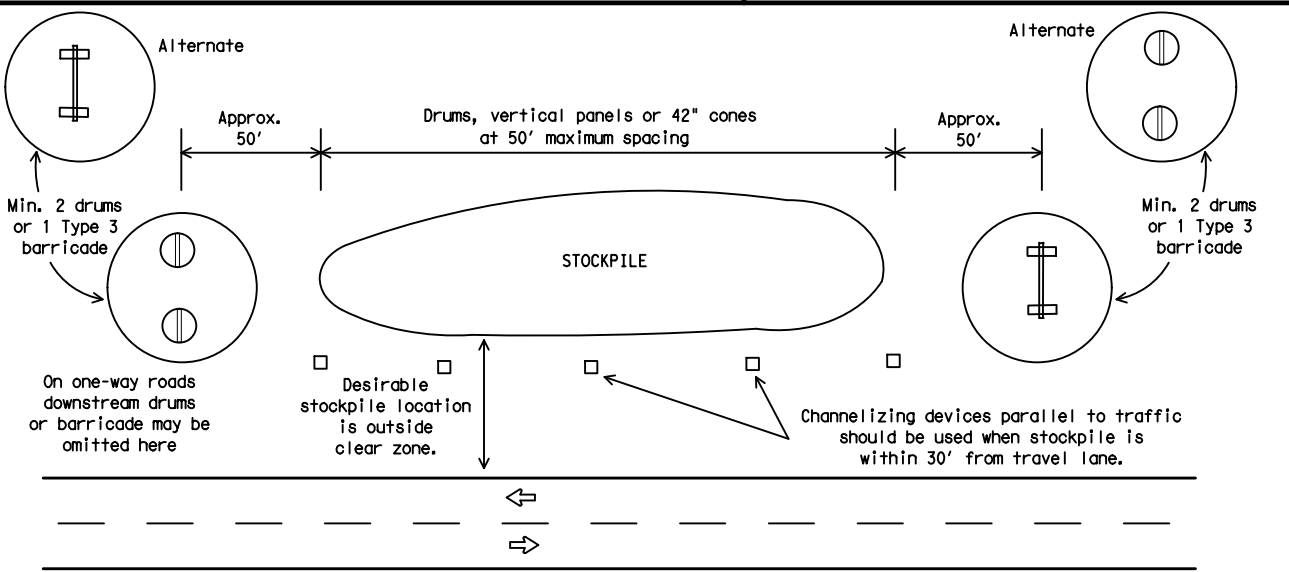
Two-Piece cones

One-Piece cones

Tubular Marker

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

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC(10)-21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LFK	POLK	18	

DATE: 2/2/2022 \$TIME\$ FILE: ...Standards\bc-21.dgn

## WORK ZONE PAVEMENT MARKINGS

### GENERAL

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

### RAISED PAVEMENT MARKERS

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

### PREFABRICATED PAVEMENT MARKINGS

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

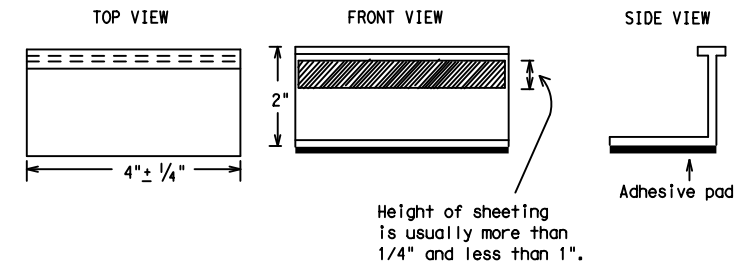
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

### REMOVAL OF PAVEMENT MARKINGS

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

## Temporary Flexible-Reflective Roadway Marker Tabs



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

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

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11)-21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	LFK	POLK	19	
11-02 8-14				

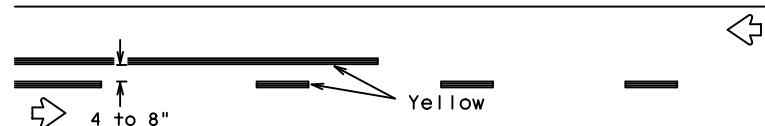
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2/2/2022 \$TIME\$  
FILE: ...Standards\bc-21.dgn

## PAVEMENT MARKING PATTERNS

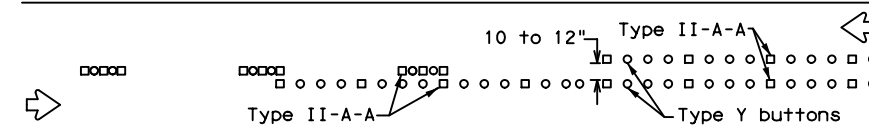


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

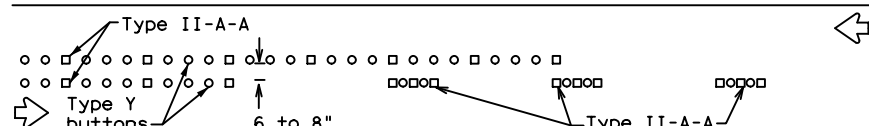


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

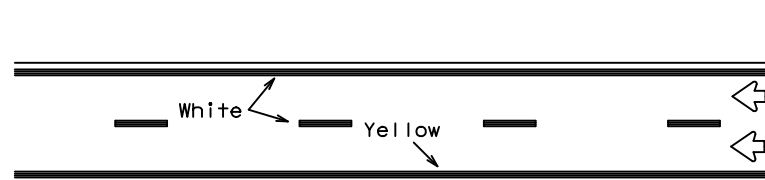


RAISED PAVEMENT MARKERS - PATTERN A



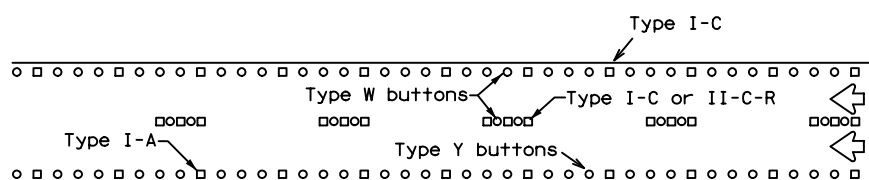
RAISED PAVEMENT MARKERS - PATTERN B

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



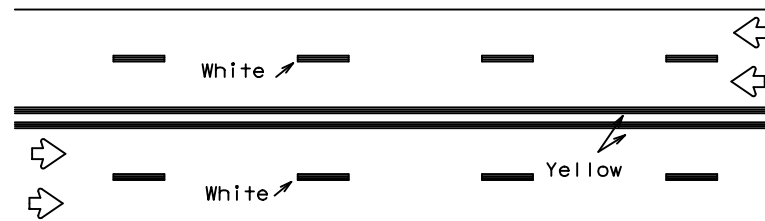
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



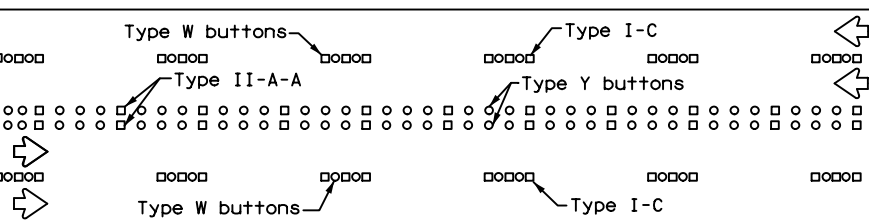
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



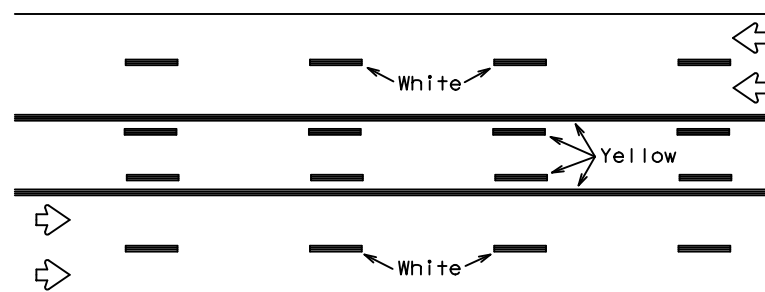
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



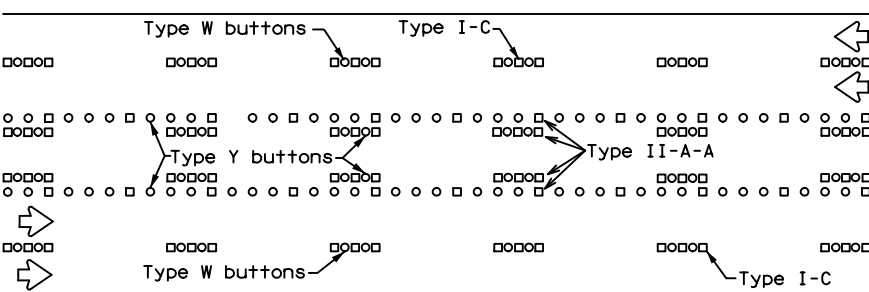
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

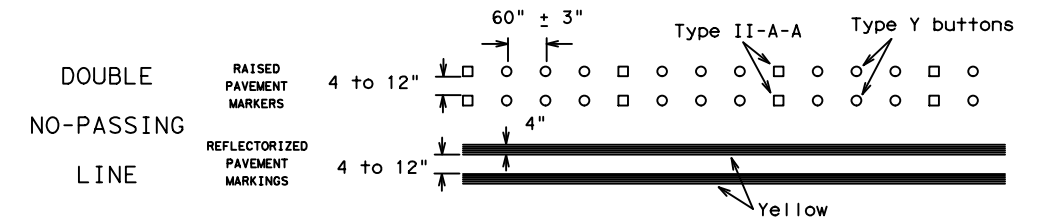
Prefabricated markings may be substituted for reflectORIZED pavement markings.



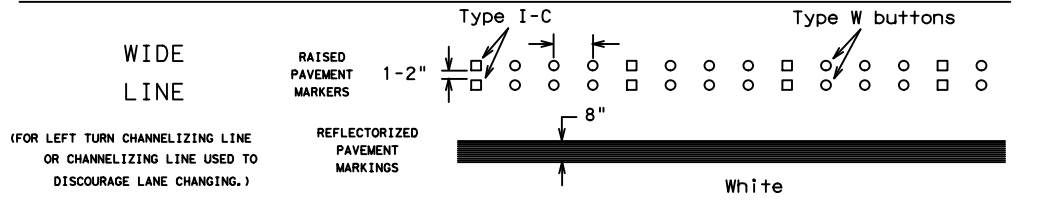
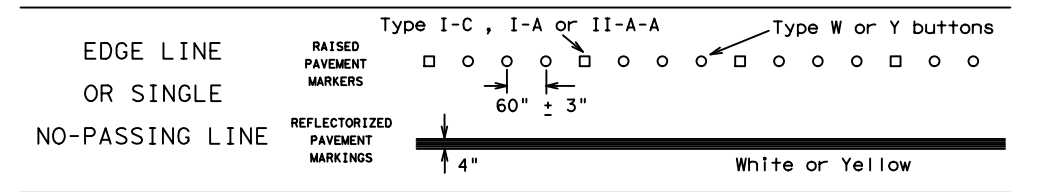
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

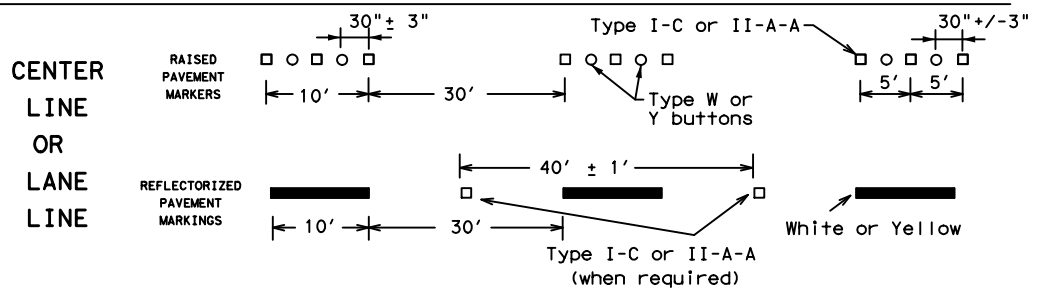
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



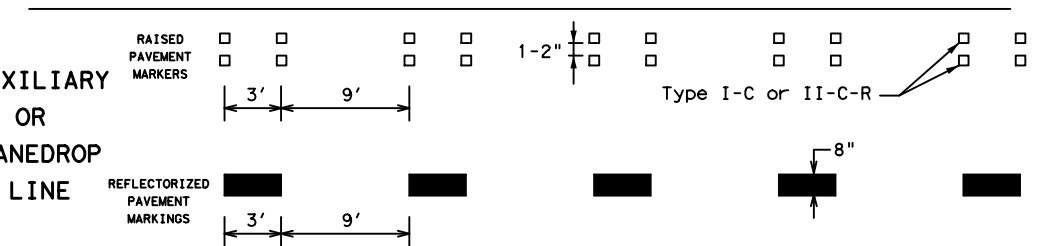
### SOLID LINES



### BROKEN LINES

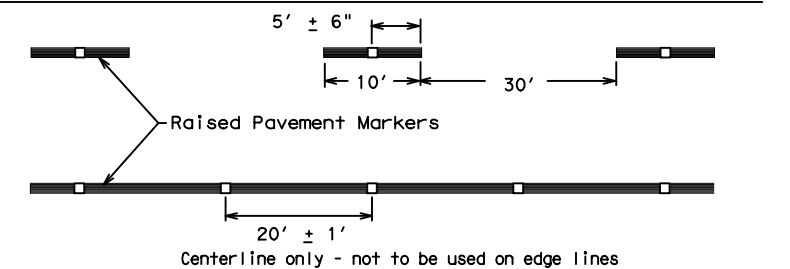


### AUXILIARY OR LANEDROP LINE



### 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.



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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

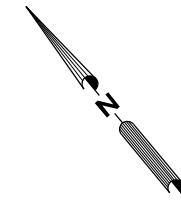
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
1-97 9-07 5-21				
2-98 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	LFK	POLK		20

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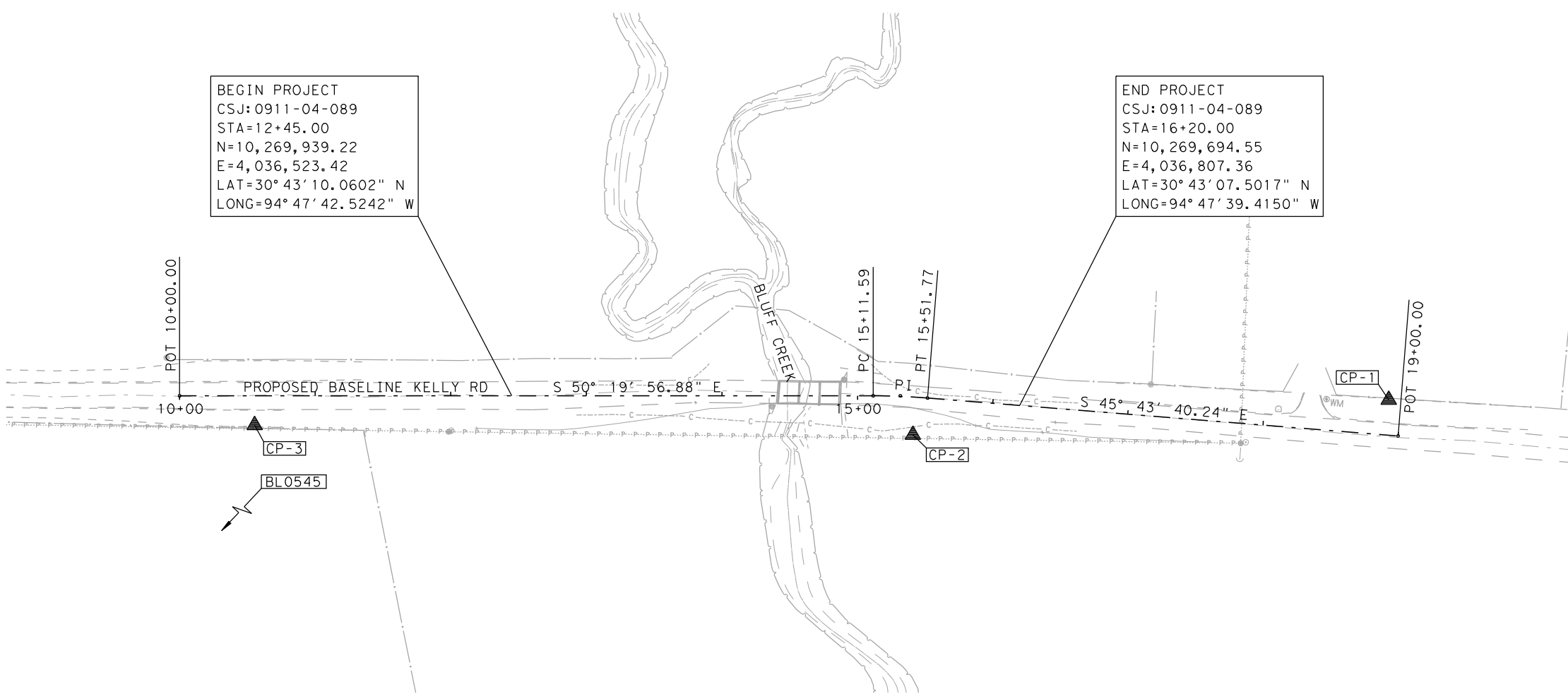
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 DRAWING DATE: 2/3/2022

PI STATION = 15+31.69  
 DELTA = 4° 36' 16.64" (RT)  
 DEGREE OF CURVE = 11° 27' 32.96"  
 TANGENT = 20.10  
 LENGTH = 40.18  
 RADIUS = 500.00  
 PC STATION = 15+11.59  
 PT STATION = 15+51.77



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 STA=12+45.00  
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 E=4,036,523.42  
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 LONG=94° 47' 42.5242" W

END PROJECT  
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 STA=16+20.00  
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 E=4,036,807.36  
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 LONG=94° 47' 39.4150" W

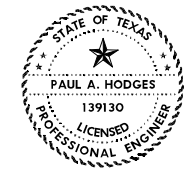
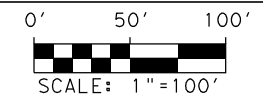


- NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.).
  2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID 12B).
  3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE TxDOT COMBINED ADJUSTMENT FACTOR (CAF) FOR POLK COUNTY, CAF = 1.00012, USING THE FORMULA: SURFACE / CAF = GRID
  4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXGN ON NOVEMBER 9, 2020.
  5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS AND ADJUSTED WITH DIGITAL LEVELING CONSTRAINED TO THE GPS DERIVED ELEVATION FOR CP-1.

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



*Jimmy D. Walton*



From	To	Direction	Distance
CP-3	CP-2	S 49° 28' 39.16" E	485.57'
CP-2	CP-1	S 54° 32' 11.43" E	351.94'

Point	North	East	Elevation	Station	Offset	Description
CP-3	10,270,043.70	4,036,363.71	274.45'	10+55.37	21.53' RT	SET 5/8" IR W/RODS CAP
CP-2	10,269,728.20	4,036,732.82	274.33'	15+42.63	27.86' RT	SET 5/8" IR W/RODS CAP
CP-1	10,269,524.01	4,037,019.47	287.36'	18+90.93	25.96' LT	SET 5/8" IR W/RODS CAP
BL0545	10,264,595.76	3,993,207.56	179.74'	Off Chain	Off Chain	FND USGS DISK IN CONC (180.279 10M 1926)
TXGN	10,277,330.62	3,996,340.07	184.84'	Off Chain	Off Chain	TXGN

Control Name	Published: NAD83 (varies) Coordinate Information			Measured: NAD83 (2011) Coordinate Information			Deferent (Published - Measured)		
	N. Coord.	E. Coord.	Elev.	N. Coord.	E. Coord.	Elev.	North	East	Elev.
BL0545	10,264,599	3,993,196	180.2	10,264,595.76	3,993,207.56	179.74	2.8	-11.7	0.46

Notes: Measured values were determined with redundant GPS measurements, conventional surveying methods and digital leveling; BL0545 is of Second Vertical Order, Class Zero; published values are based on NAD83 (1986 Adj), NAVD88 (VERTCON); coordinates were determined with hand-held GPS.

FOR ROADWAY GEOMETRY

**RODS** Surveying, Inc. 6810 LEE RD, STE 100 SPRING, TEXAS 77379  
 TEL (281) 257-4020 FAX (281) 257-4021  
 TBPELS SURVEYING FIRM REG. No. 10030700



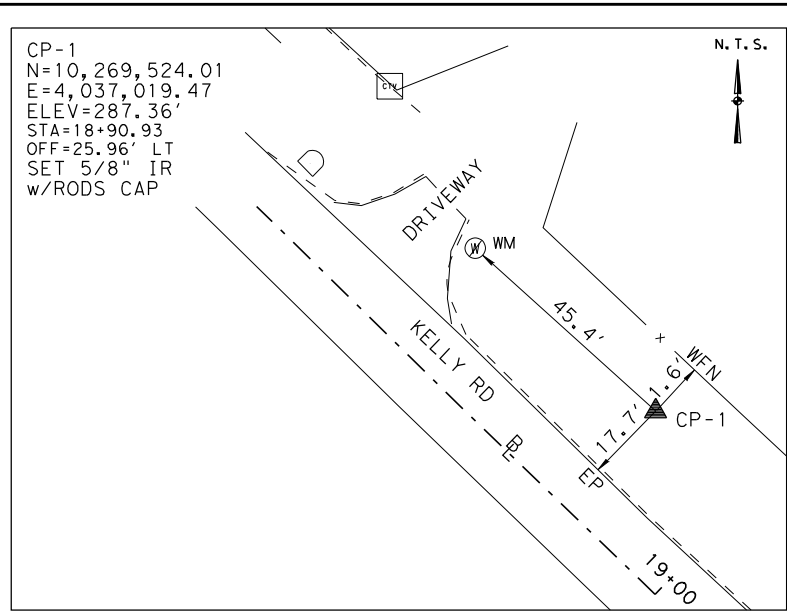
**HORIZONTAL & VERTICAL CONTROL INDEX**  
 (KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LKF	POLK	21
CONTROL	SECTION	JOB	
0911	04	089	

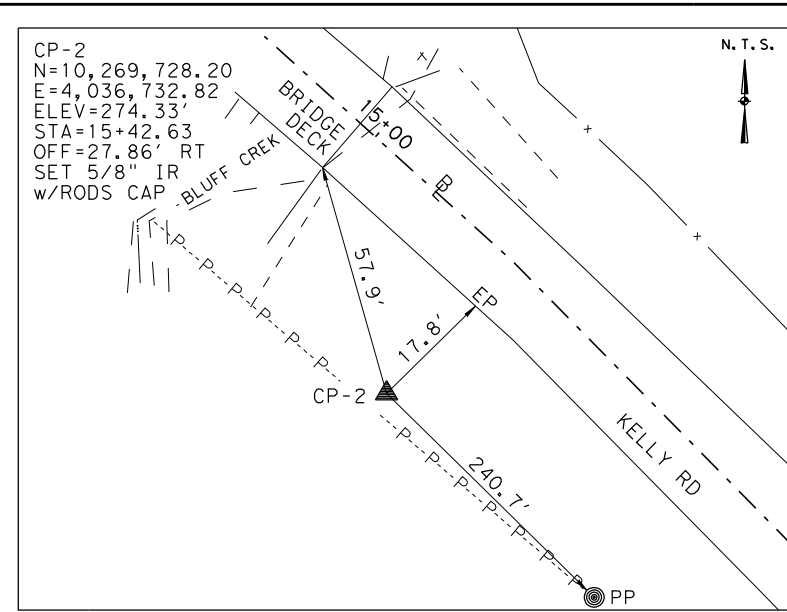


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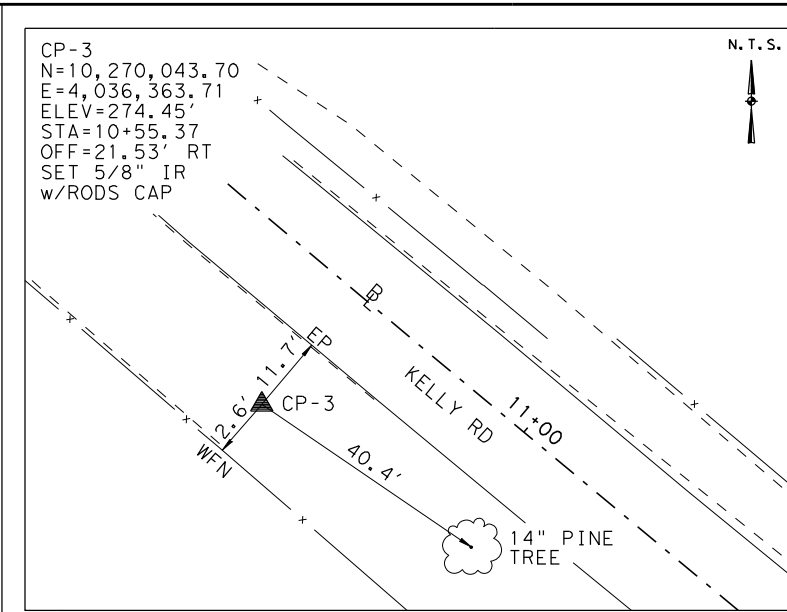
DRAWING DATE: 2/3/2022



STATION IS LOCATED ON THE NORTH SIDE OF KELLY RD, AND LYING 0.20 MILE WEST OF DARDEN RD.

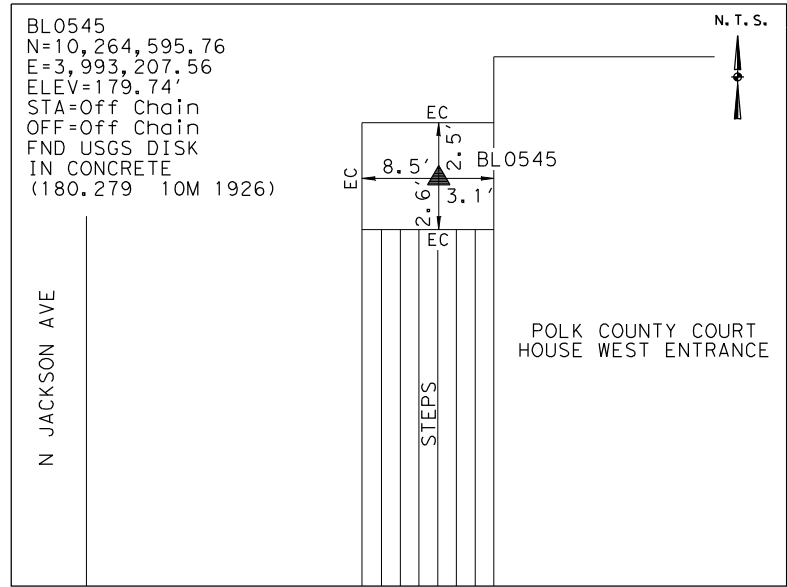


STATION IS LOCATED ON THE SOUTH SIDE OF KELLY RD, AND LYING 0.27 MILE WEST OF DARDEN RD.



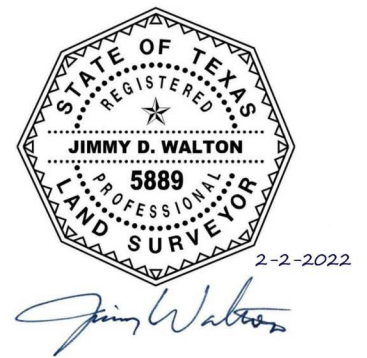
STATION IS LOCATED ON THE SOUTH SIDE OF KELLY RD, AND LYING 0.36 MILE WEST OF DARDEN RD.

- NOTES:
1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.).
  2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID 12B).
  3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE TxDOT COMBINED ADJUSTMENT FACTOR (CAF) FOR POLK COUNTY, CAF = 1.00012, USING THE FORMULA: SURFACE / CAF = GRID
  4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXGN ON NOVEMBER 9, 2020.
  5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS AND ADJUSTED WITH DIGITAL LEVELING CONSTRAINED TO THE GPS DERIVED ELEVATION FOR CP-1.

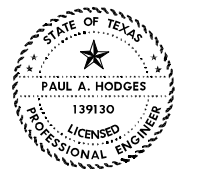


STATION IS LOCATED ON THE EAST SIDE OF N JACKSON AVE, AND LYING 128' SOUTH OF SH 190.

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



SCALE: N. T. S.



FOR ROADWAY GEOMETRY

**RODS** Surveying, Inc. 6810 LEE RD, STE 100 SPRING, TEXAS 77379 TEL (281) 257-4020 FAX (281) 257-4021 TBPELS SURVEYING FIRM REG. No. 10030700



HORIZONTAL & VERTICAL CONTROL SHEET (KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		CR
STATE	DISTRICT	COUNTY
TEXAS	LFK	POLK
CONTROL	SECTION	JOB
0911	04	089
SHEET NO.		
22		

Chain KELLY contains:  
 KELLY01 CUR KELLY-1 KELLY02

Beginning chain KELLY description

Point KELLY01 N 10,270,095.61 E 4,036,334.83 Sta 10+00.00

Course from KELLY01 to PC KELLY-1 S 50° 19' 56.88" E Dist 511.59

Curve Data  
 \*-----\*

Curve KELLY-1  
 P.I. Station = 15+31.69 N 10,269,756.22 E 4,036,744.11  
 Delta = 4° 36' 16.64" (RT)  
 Degree = 11° 27' 32.96"  
 Tangent = 20.10  
 Length = 40.18  
 Radius = 500.00  
 External = 0.40  
 Long Chord = 40.17  
 Mid. Ord. = 0.40  
 P.C. Station = 15+11.59 N 10,269,769.05 E 4,036,728.63  
 P.T. Station = 15+51.77 N 10,269,742.18 E 4,036,758.50  
 C.C. = N 10,269,384.17 E 4,036,409.47  
 Back = S 50° 19' 56.88" E  
 Ahead = S 45° 43' 40.24" E  
 Chord Bear = S 48° 01' 48.56" E

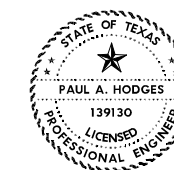
Course from PT KELLY-1 to KELLY02 S 45° 43' 40.24" E Dist 348.23

Point KELLY02 N 10,269,499.10 E 4,037,007.84 Sta 19+00.00

Ending chain KELLY description

FILENAME: ... \KELLY\*HAD01.dgn

DRAWING DATE: 2/2/2022

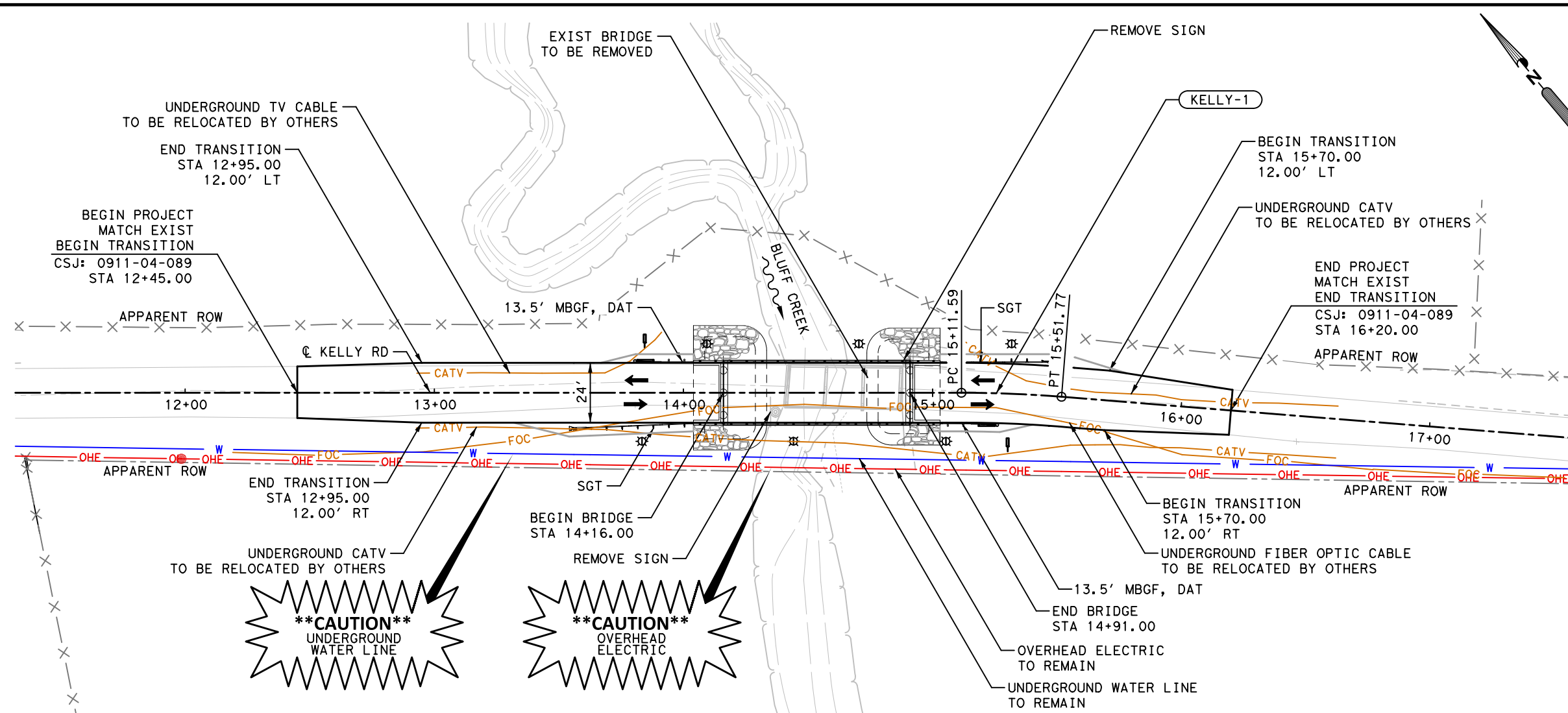


**CG** CIVIL CONSULTING GROUP  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**HORIZONTAL ALIGNMENT DATA**  
 (KELLY RD AT BLUFF CREEK)

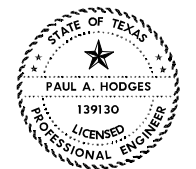
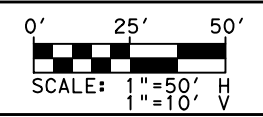
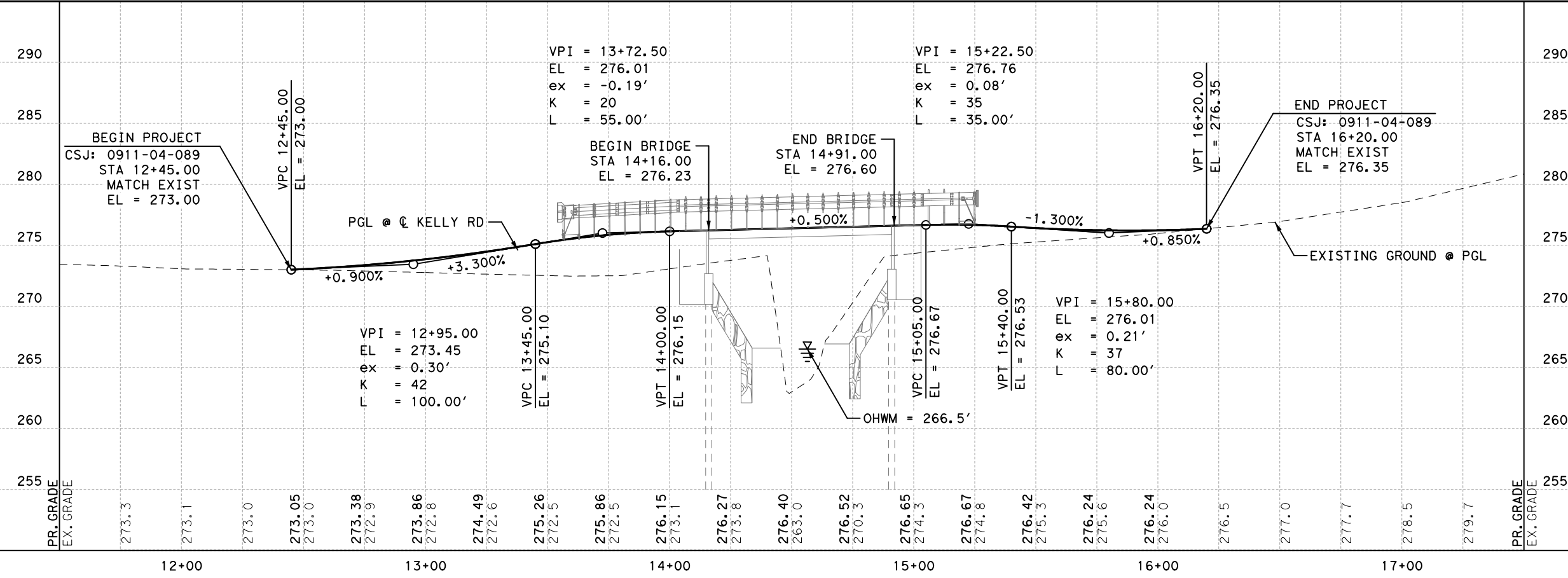
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6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	23
CONTROL	SECTION	JOB	
0911	04	089	



### LEGEND

- PROPOSED TRAFFIC DIRECTION
- CHANNEL FLOW DIRECTION
- HORIZONTAL CURVE #
- STONE PROTECTION
- EXISTING FENCE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND CATV
- UNDERGROUND FIBER OPTIC CABLE
- WATER LINE
- DEL ASSM (D-SW) SZ (BRF) (GF1) (BI)
- INSTL OM ASSM (OM-3L) (TWT) GND

- ### NOTES:
1. APPARENT RIGHT OF WAY SHOWN IS A PRESCRIBED WIDTH BASED ON EXISTING FENCE LINES AND UTILITY MARKERS. A BOUNDARY SURVEY WAS NOT PERFORMED, NO CONVEYANCE OR EASEMENT OF THE PUBLIC ROAD TO THE COUNTY COULD BE FOUND.
  2. ALL UTILITIES TO BE LOCATED AND CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.
  3. WHEN BRIDGE IS REMOVED, REMOVE EXISTING LOAD ZONE SIGNS APPROACHING THE BRIDGE.



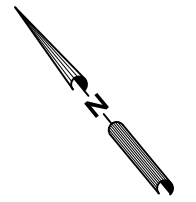
**CIVIL CONSULTING GROUP**  
1575 HERITAGE DRIVE, STE. 308  
MCKINNEY, TEXAS 75069  
P 972.569.9193 F 972.569.9197  
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



## PLAN & PROFILE (KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	SHEET NO.
6		CR	24
STATE	DISTRICT	COUNTY	JOB
TEXAS	LFK	POLK	089
CONTROL	SECTION		
0911	04		

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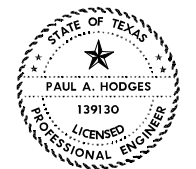


**LEGEND**

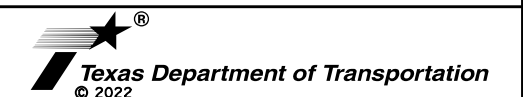
- PROP 5' CONTOUR
- PROP 1' CONTOUR
- EXIST 5' CONTOUR
- EXIST 1' CONTOUR
- STONE PROTECTION
- CATV OVERHEAD ELECTRIC LINE
- FOC UNDERGROUND CATV
- OHE UNDERGROUND FIBER OPTIC CABLE
- W WATER LINE

**NOTES:**

1. ALL UTILITIES TO BE LOCATED AND CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.



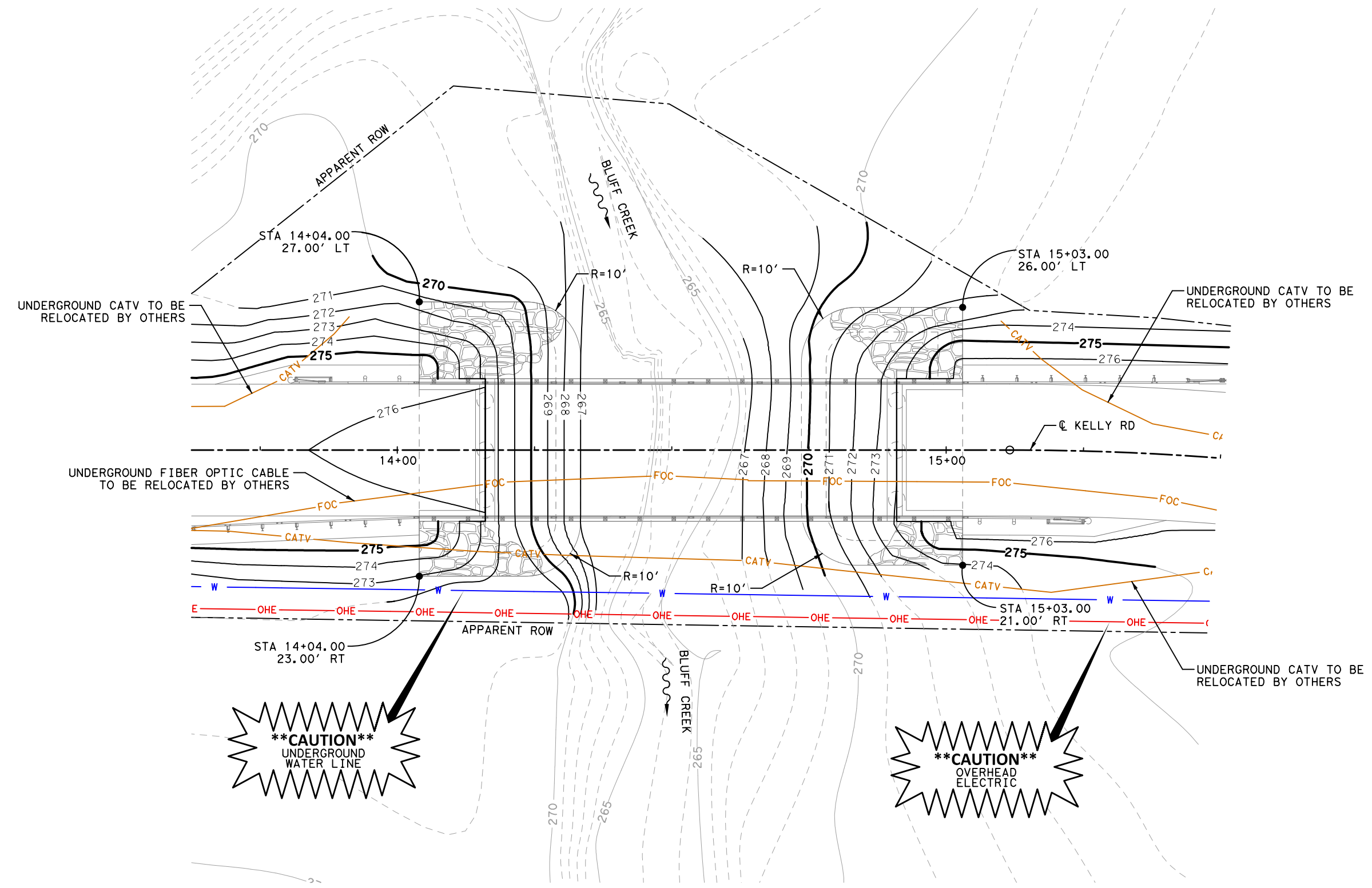
**CIVIL CONSULTING GROUP**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**GRADING LAYOUT**  
 (KELLY RD AT BLUFF CREEK)

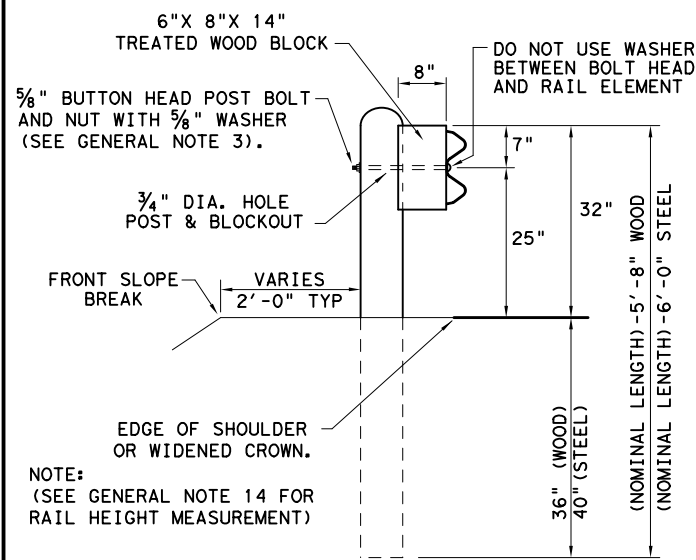
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6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	25
CONTROL	SECTION	JOB	
0911	04	089	

FILENAME: ... \KELLY\*GLO1.dgn  
 DRAWING DATE: 2/2/2022



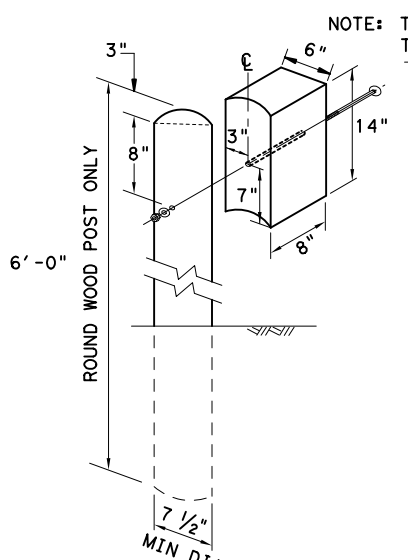
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FILE: ...Standards\gf3119.dgn



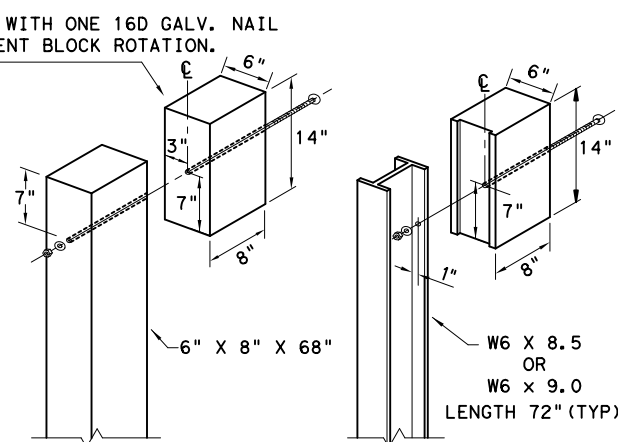
**TYPICAL POST PLACEMENT**

NOTE: (SEE GENERAL NOTE 14 FOR RAIL HEIGHT MEASUREMENT)



**WOOD BLOCK TO ROUND WOOD POST**

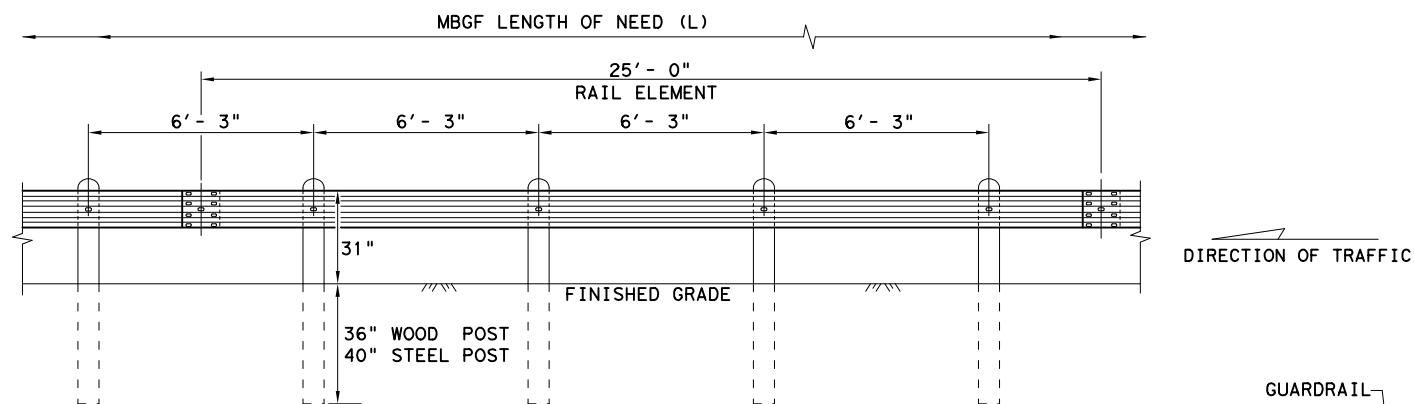
NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



**WOOD BLOCK TO RECTANGULAR WOOD POST**

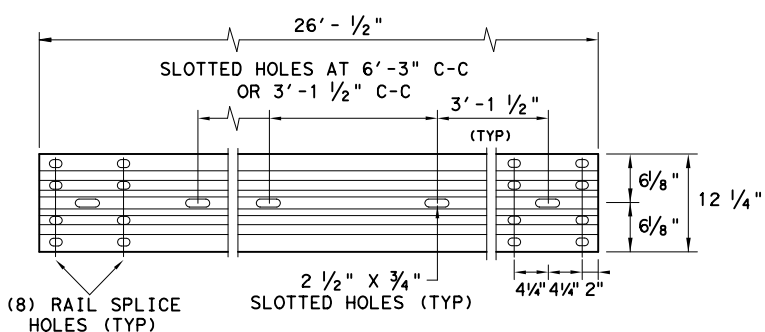
**ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

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



**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.

NOTE: FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECESSED NUT.

SPLICE BOLT LENGTH VARIES

FBB01 = 1 1/4"

FBB02 = 2"

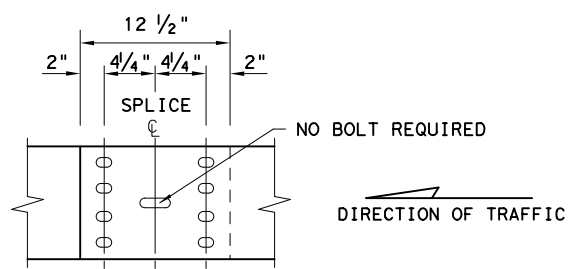
POST & BLOCK LENGTH

FBB03 = 10"

FBB04 = 18"

**BUTTON HEAD BOLT**

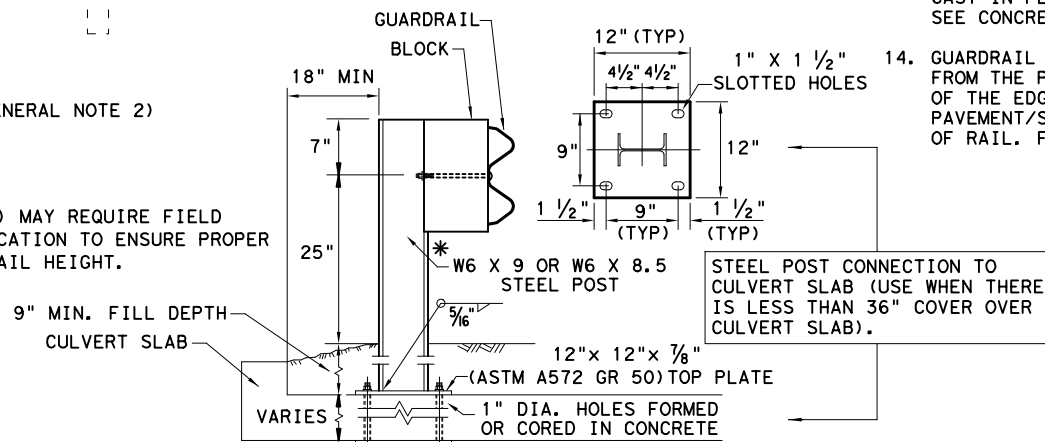
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



**MID-SPAN RAIL SPLICE DETAIL**

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

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



**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. 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 1/4" MIN. BEYOND NUT.

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

**GENERAL NOTES**

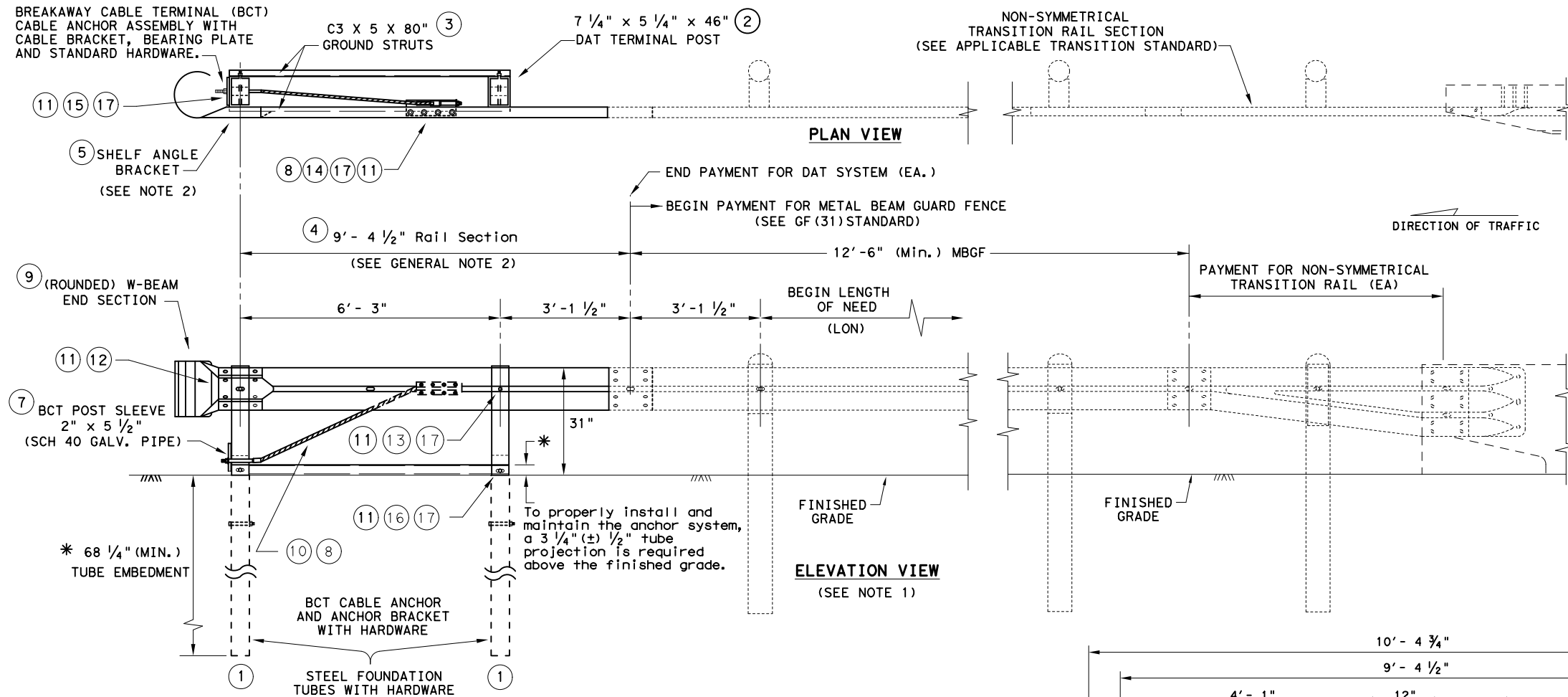
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

NOTE: TRANSITIONS 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.

				Design Division Standard
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>				
FILE: gf3119.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CGL/AG
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
	DIST	COUNTY	SHEET NO.	
	LFK	POLK	26	

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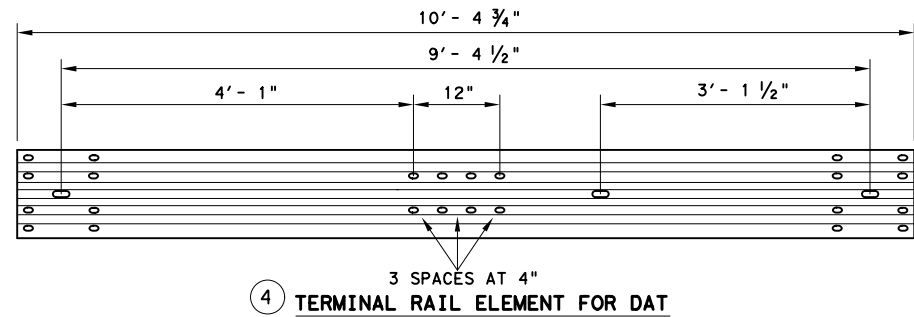
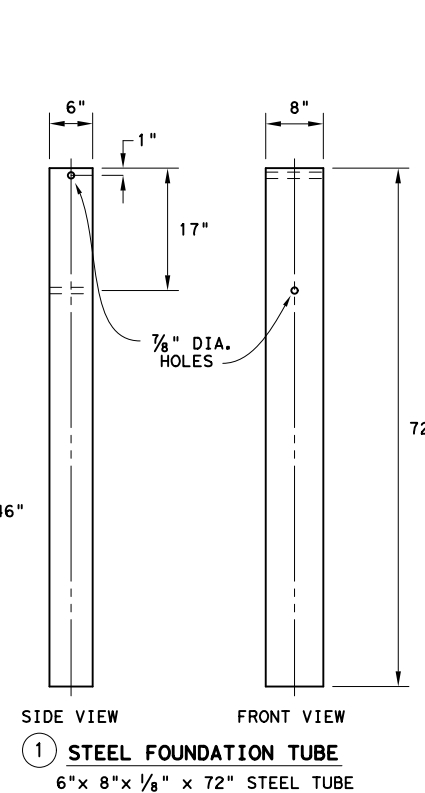
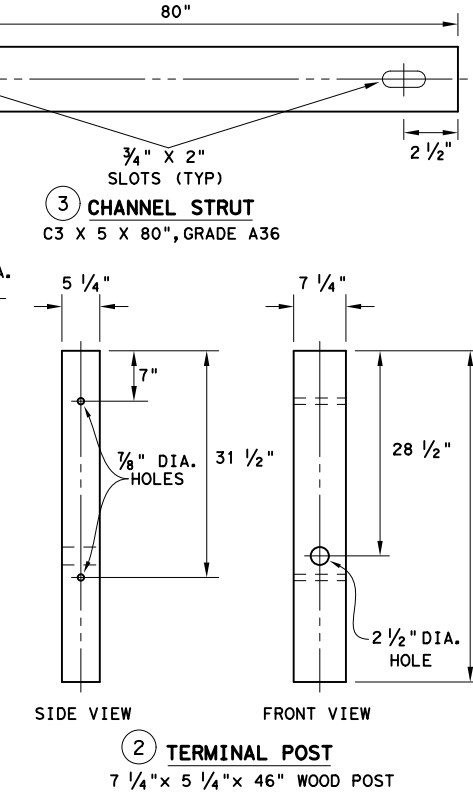
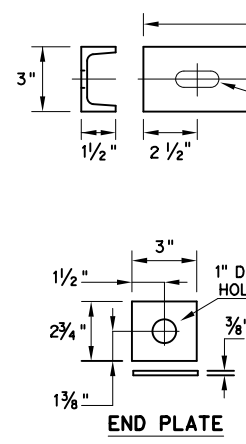
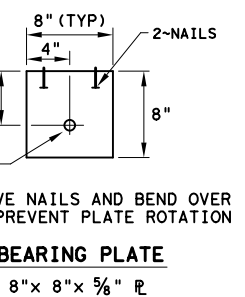
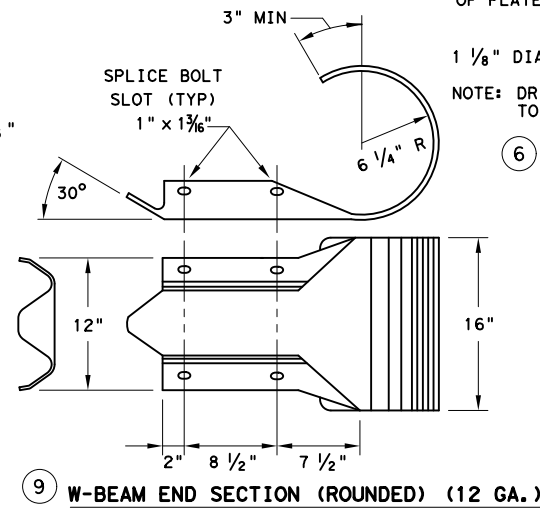
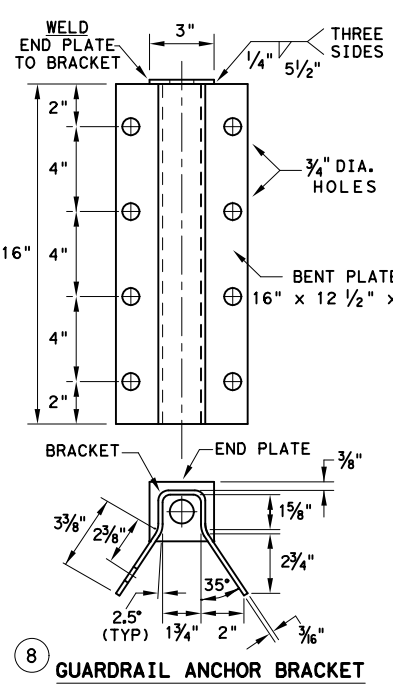


**DOWNSTREAM ANCHOR TERMINAL (DAT)**  
 NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

- 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



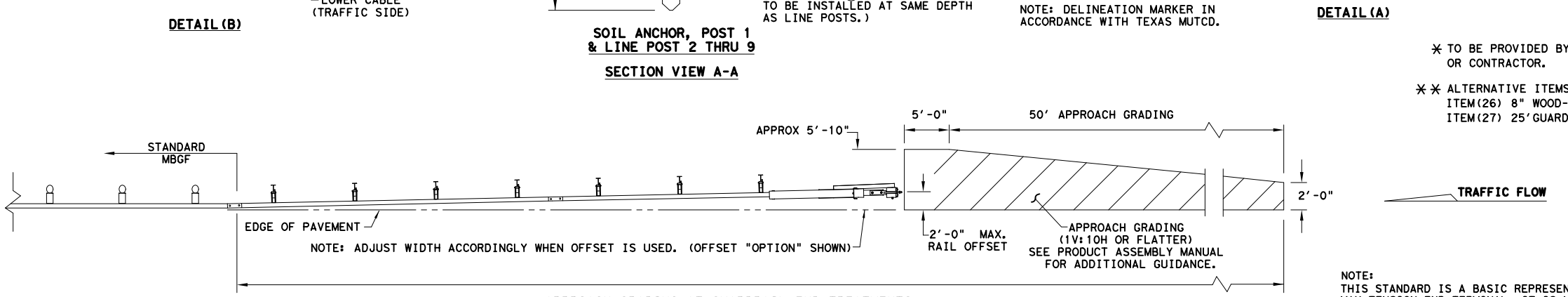
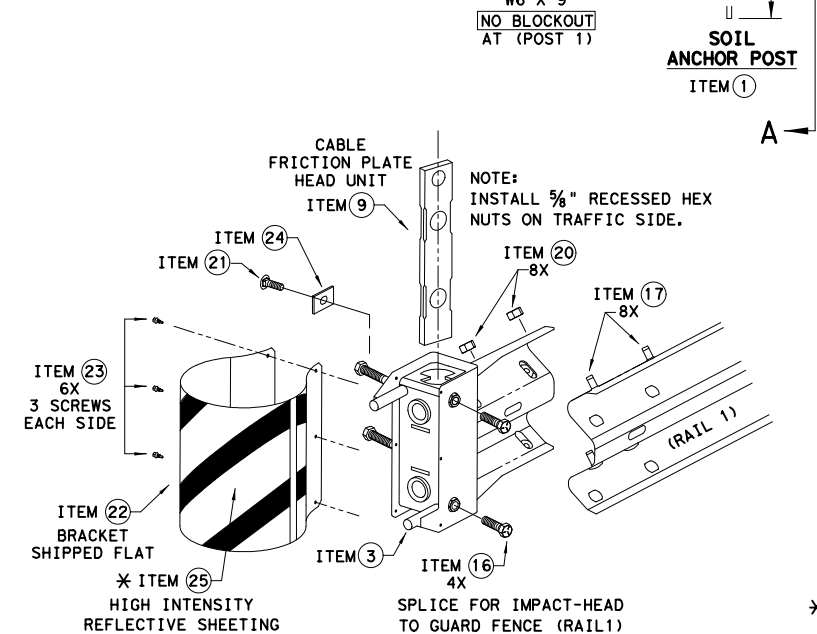
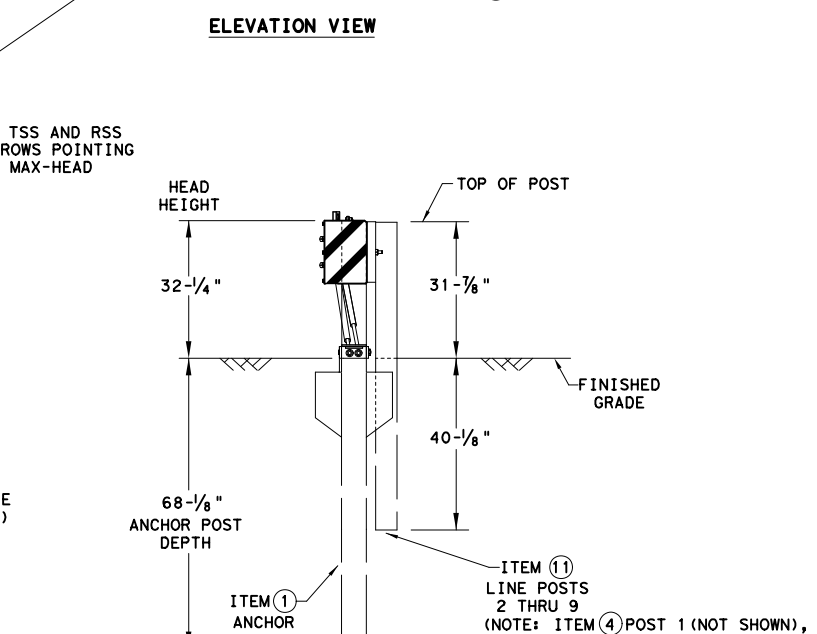
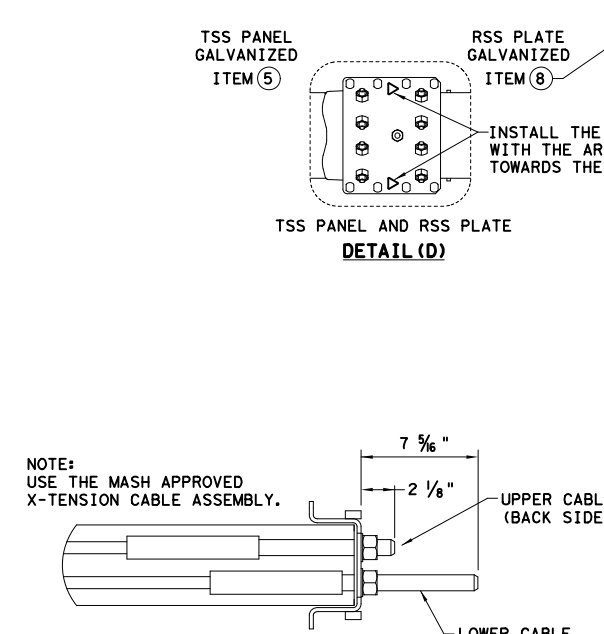
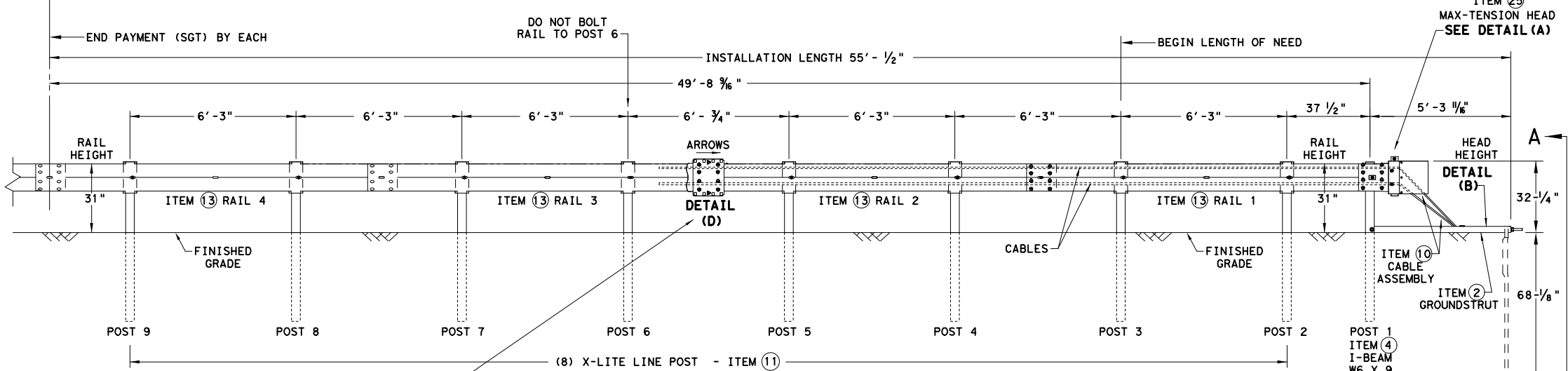
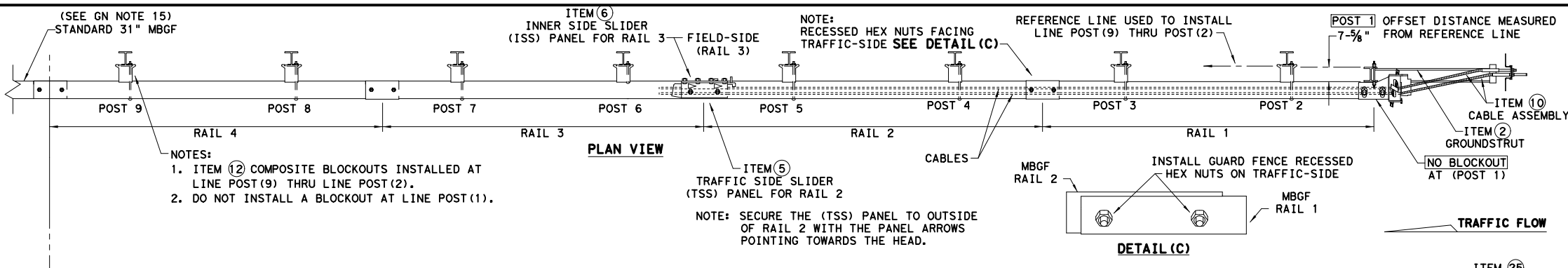
Texas Department of Transportation  
 Design Division Standard

**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 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0911	04	089	CR
	DIST	COUNTY	SHEET NO.	
	LFK	POLK	27	

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**GENERAL NOTES**

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

ITEM#	PART NUMBER	DESCRIPTION	QTY
1	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	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

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

**Texas Department of Transportation**  
Design Division Standard

## MAX-TENSION END TERMINAL MASH - TL-3

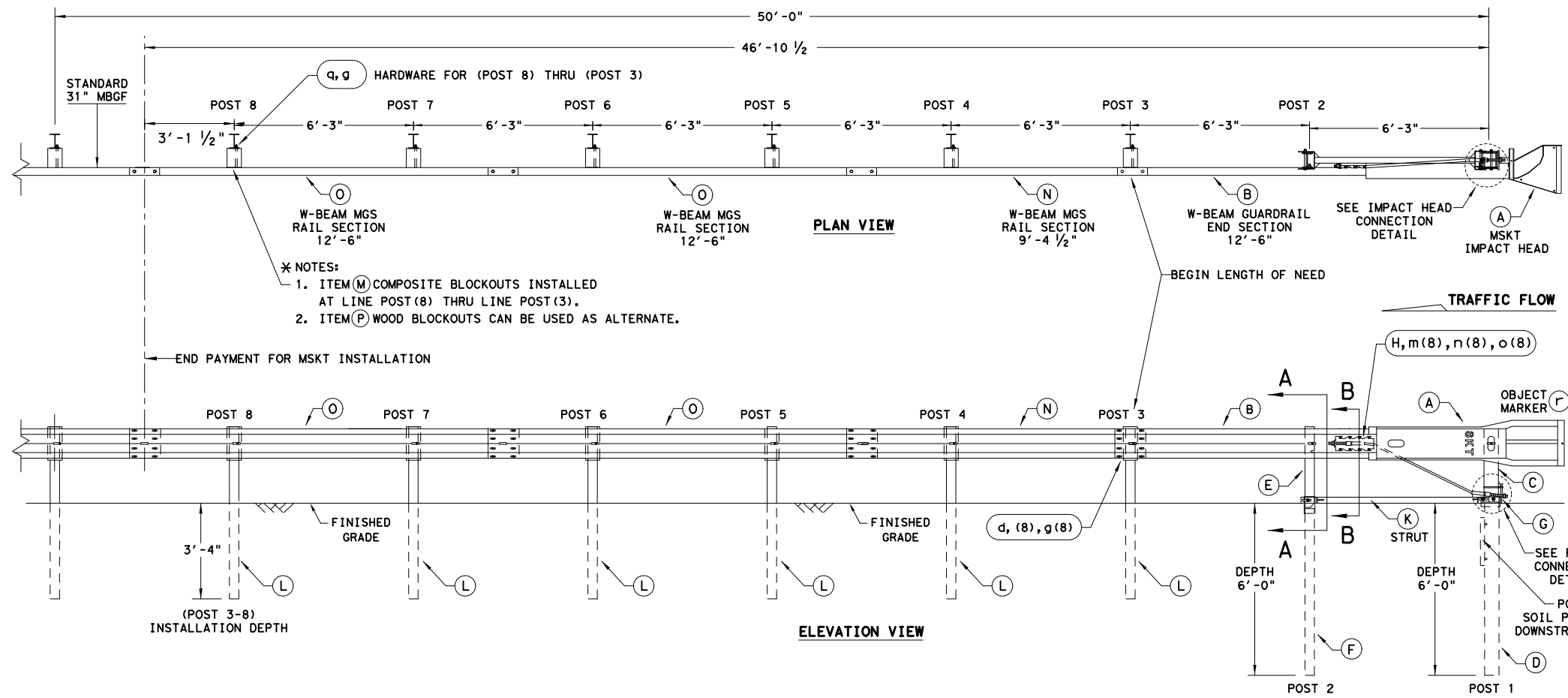
### SGT (11S) 31-18

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© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
	DIST	COUNTY		SHEET NO.
	LFK	POLK		28

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

DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. THE USE OF THIS STANDARD ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

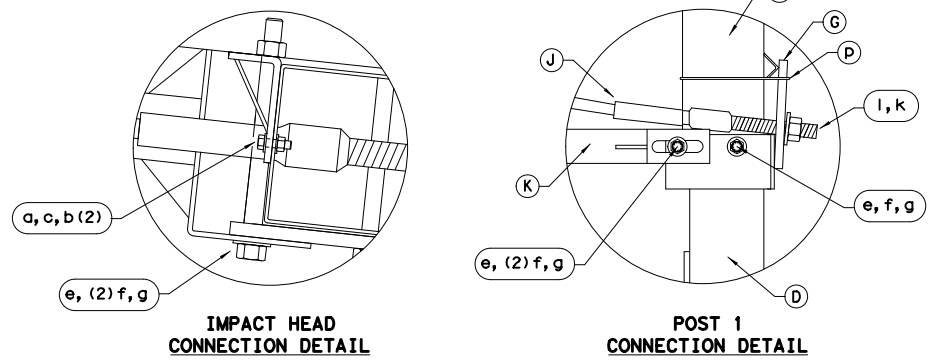
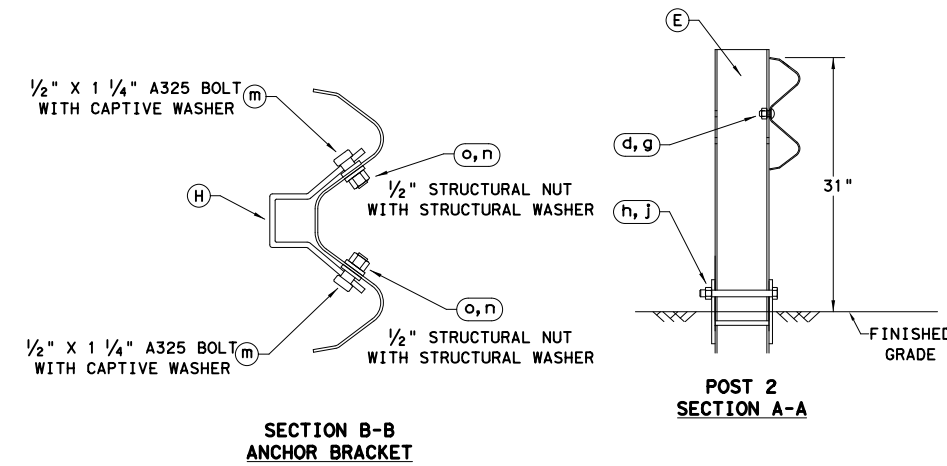
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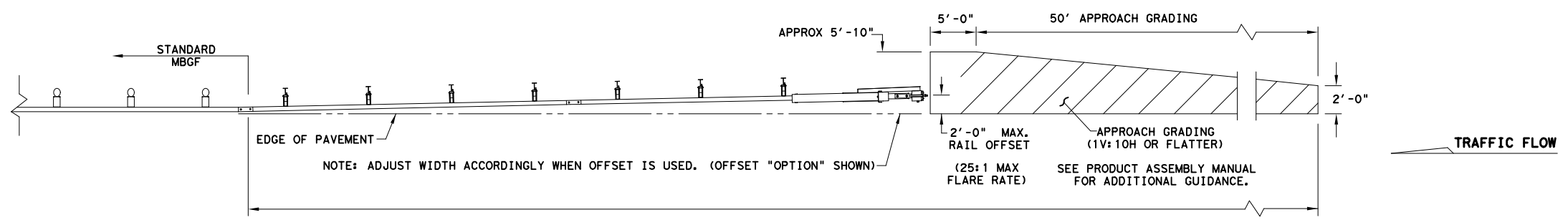
- NOTES:
- ITEM (M) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (8) THRU LINE POST (3).
  - ITEM (P) WOOD BLOCKOUTS CAN BE USED AS ALTERNATE.

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6X9 OR W6X8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
a	2	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



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



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.

Design Division Standard

## SINGLE GUARDRAIL TERMINAL

### MSKT-MASH-TL-3

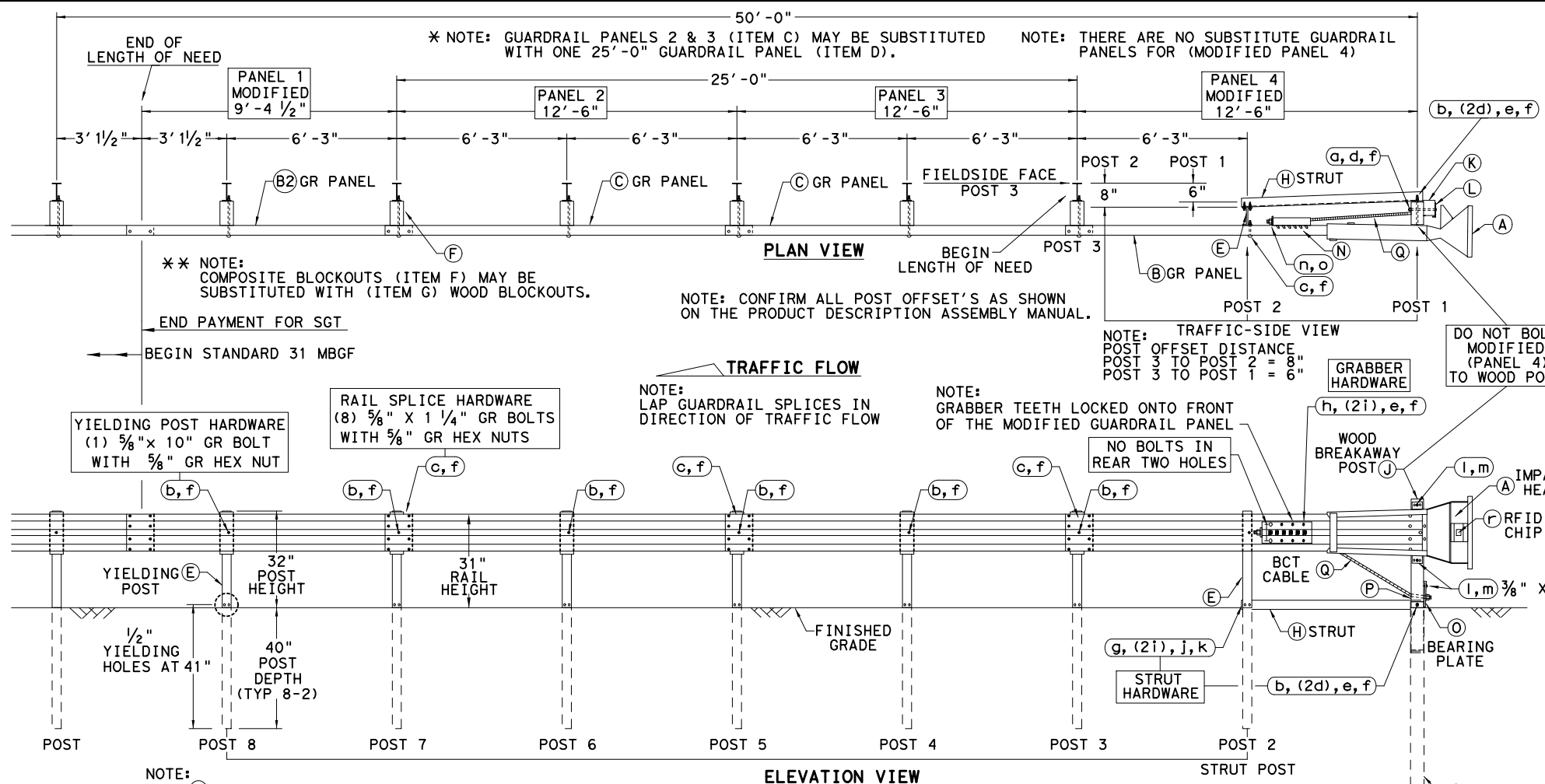
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© TXDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
	DIST	COUNTY		SHEET NO.
	LFK	POLK		29



DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

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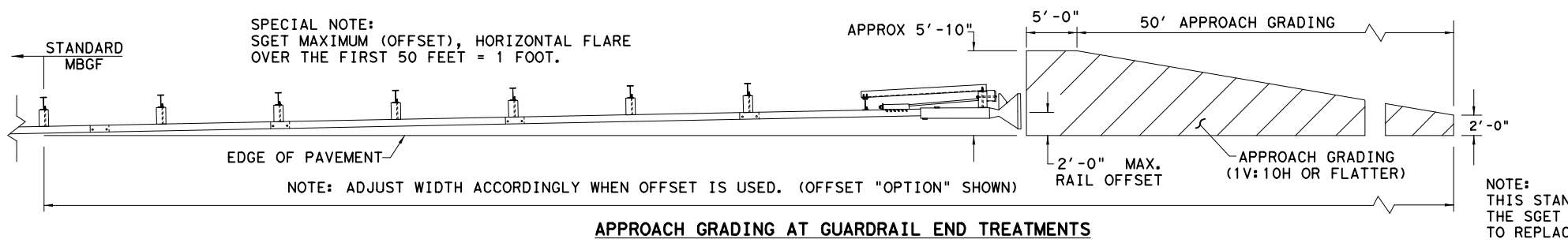
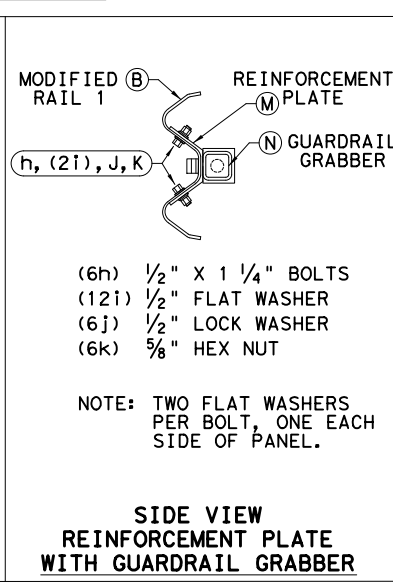
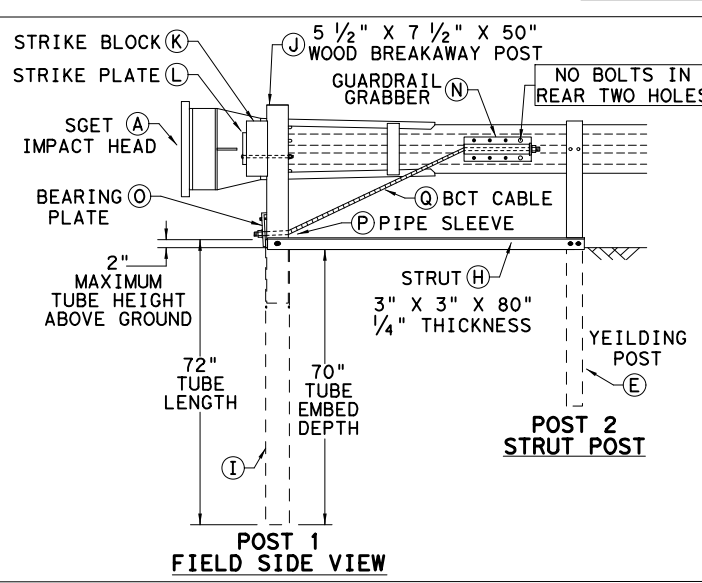
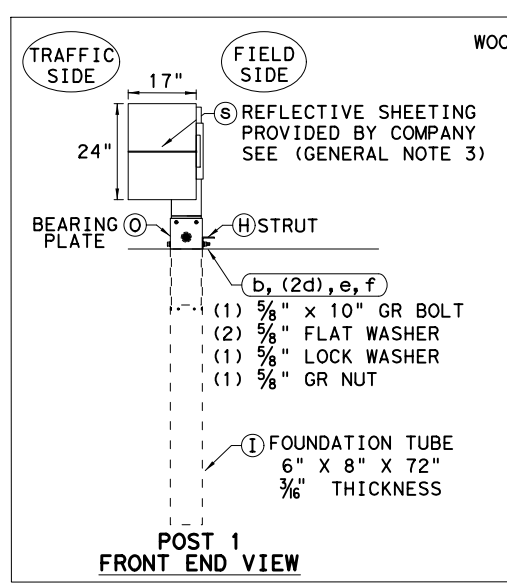
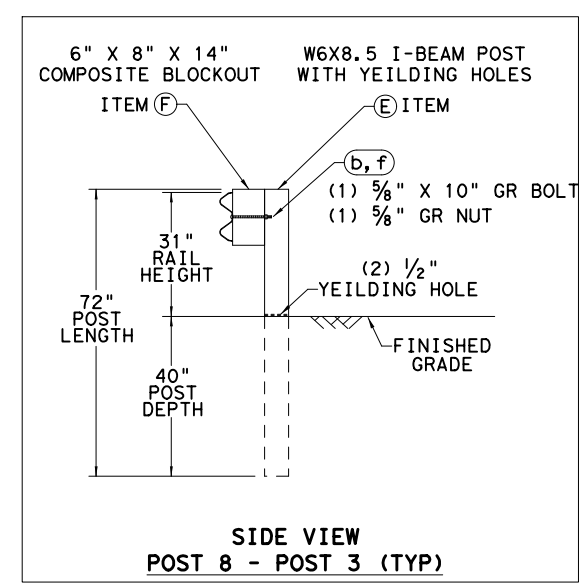


- ### GENERAL NOTES
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
  - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
  - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
  - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CB08
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WB08
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81

ITEM	QTY	SMALL HARDWARE	ITEM #
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563HD HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M



NOTE: TRAFFIC-SIDE VIEW POST OFFSET DISTANCE POST 2 TO POST 2 = 8" POST 3 TO POST 1 = 6"

NOTE: CONFIRM ALL POST OFFSET'S AS SHOWN ON THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

NOTE: GRABBER TEETH LOCKED ONTO FRONT OF THE MODIFIED GUARDRAIL PANEL

NOTE: NO BOLTS IN REAR TWO HOLES

NOTE: YIELDING POST 8 THRU 2 ARE MODIFIED W6X8.5 STEEL POST WITH FOUR 1/2" YIELDING HOLES, TWO HOLES PER FLANGE.

NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

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

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Design Division Standard

## SPIG INDUSTRY, LLC

### SINGLE GUARDRAIL TERMINAL

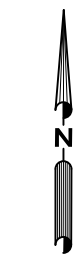
### SGET - TL-3 - MASH

### SGT (15) 31-20

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© TXDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
	DIST	COUNTY	SHEET NO.	
	LFK	POLK	30	



OMEGA EM REGRESSION EQUATION PARAMETERS (DESIGN METHOD)	
DRAINAGE AREA (A)	3.07 SQ MI
ANNUAL PRECIPITATION (P)	52.00 INCHES
CHANNEL SLOPE (S)	0.0063 FT/FT
OMEGA EM ( $\Omega$ )	-0.253
OMEGA EM REGRESSION EQUATIONS	
$Q_2 = p^{1.398} s^{0.270} \times 10^{0.776 \Omega} + 50.98 - 50.30A^{-0.0058}$	411.4
$Q_5 = p^{1.308} s^{0.372} \times 10^{0.885 \Omega} + 16.62 - 15.32A^{-0.0215}$	735.6
$Q_{10} = p^{1.203} s^{0.403} \times 10^{0.918 \Omega} + 13.62 - 11.97A^{-0.0289}$	947.6
$Q_{25} = p^{1.140} s^{0.446} \times 10^{0.945 \Omega} + 11.79 - 9.819A^{-0.0374}$	1287.2
$Q_{50} = p^{1.105} s^{0.476} \times 10^{0.961 \Omega} + 11.17 - 8.997A^{-0.0424}$	1570.3
$Q_{100} = p^{1.071} s^{0.507} \times 10^{0.969 \Omega} + 10.82 - 8.448A^{-0.0467}$	1903.9
$Q_{500} = p^{0.988} s^{0.569} \times 10^{0.976 \Omega} + 10.40 - 7.605A^{-0.0554}$	2812.2



**LEGEND**

- ID XXX
- DRAINAGE AREA BOUNDARY
- STREAM CENTERLINE
- DIRECTION OF FLOW

TOPOGRAPHY SOURCE - USGS QUAD MAPS  
 QUAD MAPS: LEGGETT, SODA

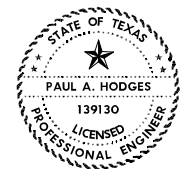
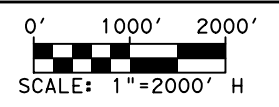
**HYDROLOGIC COMPUTATIONS (CHECK METHOD)**

HYDROLOGIC CHECK METHOD: SCS UNIT HYDROGRAPH  
 DRAINAGE AREA: 3.07 SQ MI  
 DESIGN FREQUENCY: MEET OR EXCEED EXISTING, 100-YR CHECK  
 SUMMARY OF SOIL CONDITIONS AND LAND USE:  
 CONDITIONS OF THE WATERSHED CONSISTED OF RURAL UNDEVELOPED WOODLANDS AND MEADOWS.  
 THE SOIL CONDITIONS WITHIN THE WATERSHED CONSISTED OF PREDOMINATELY SOIL TYPE B. SOILS DATA WAS OBTAINED FROM THE NRCS WEB SOIL SURVEY.  
 SUMMARY OF INPUT PARAMETERS:  
 DRAINAGE AREA -- LAND USE REMAINED CONSISTENT THROUGHOUT THE BASIN. THE 3.07 SQ MI WATERSHED WAS ANALYZED AS A SINGLE BASIN WITH A COMPOSITE RCN VALUE OF 58. THE TIME OF CONCENTRATION WAS CALCULATED USING THE KIRBY-KIRPICH METHOD. THE CALCULATED TIME OF CONCENTRATION AT THE STREAM CROSSING IS 2.21 HOURS.  
 AN RCN ADJUSTMENT WAS NOT NECESSARY BASED ON THE TXDOT HYDRAULIC DESIGN MANUAL, FIGURE 4-20.  
 PRECIPITATION -- THE STORM FREQUENCIES ANALYZED INCLUDE THE 2, 5, 10, 25, 50, AND 100-YEAR RETURN PERIOD STORM EVENTS. FREQUENCY STORM RAINFALL DEPTHS ARE INPUT FOR EACH OF THESE RETURN PERIODS FOR A 24 HOUR EVENT. THE RAINFALL DEPTH-DURATION FREQUENCY DATA WAS TAKEN FROM NOAA'S PRECIPITATION FREQUENCY DATA SERVER (ATLAS 14) FOR 5 MIN, 15 MIN, 1 HR, 2 HR, 3 HR, 6 HR, 12 HR, AND 24 HR DURATION. THE STORM DISTRIBUTION USED WAS A BALANCED STORM.

BASIN	AREA (SQ MI)	Tc (HR)	LAG TIME (MIN)	BASE RCN	IMPERVIOUS (%)
KELLY	3.07	2.21	79.5	58	1%

RUNOFF DISCHARGES AT THE CROSSING WERE CALCULATED FROM THE INPUT PARAMETERS USING HEC-HMS (VER. 4.3).

SUMMARY OF DISCHARGES						
ANNUAL RECURRENCE INTERVAL (ARI)	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
Q (CFS)	271.7	645.4	1005.3	1569.3	2059.0	2607.0



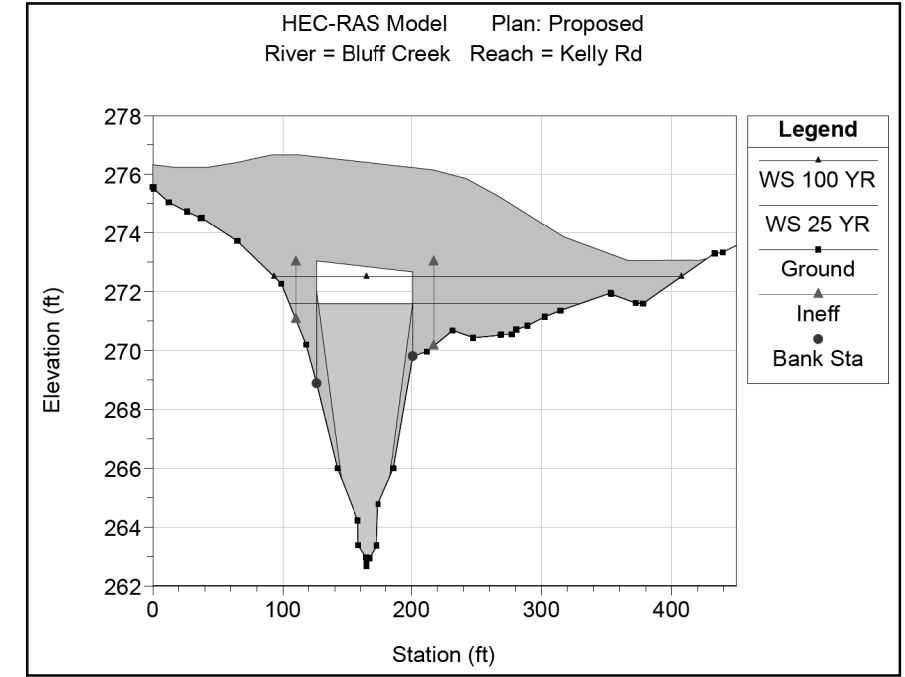
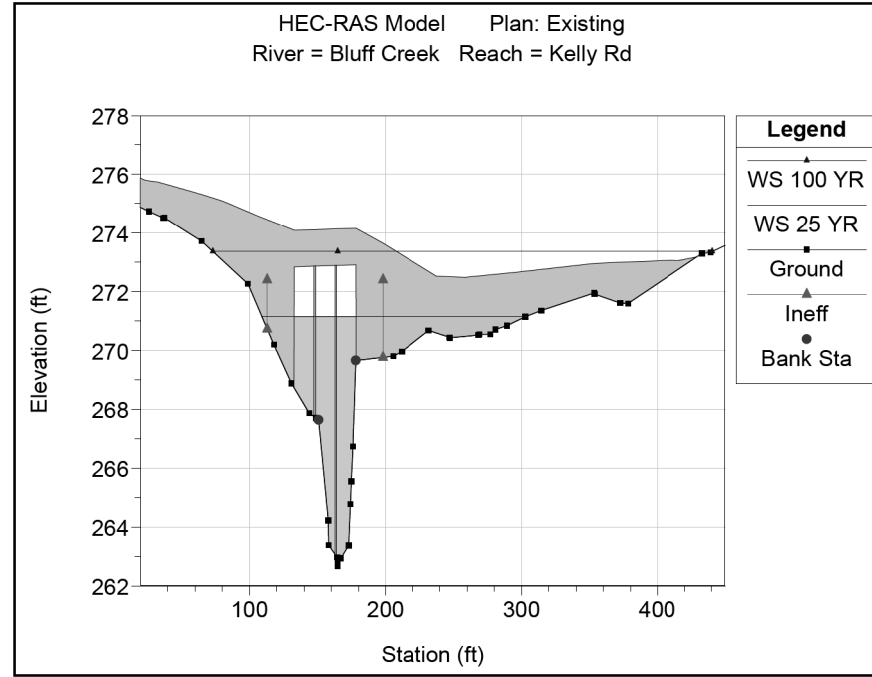
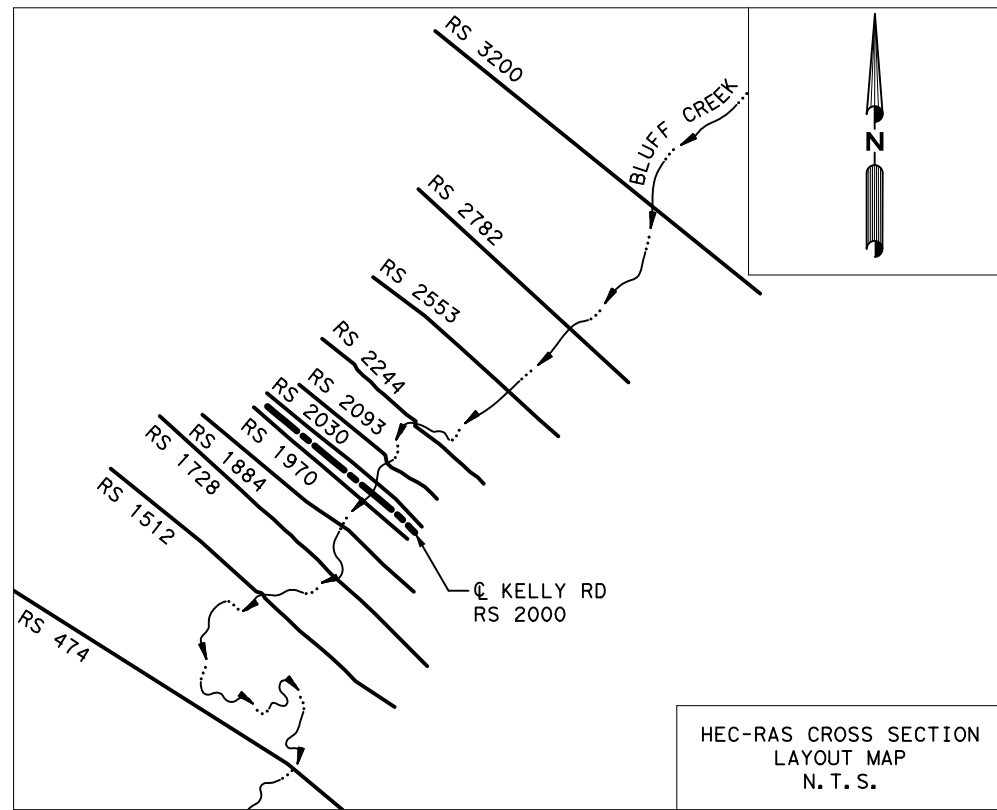
**CIVIL CONSULTING GROUP**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**DRAINAGE AREA MAP**  
 (KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		CR
STATE	DISTRICT	COUNTY
TEXAS	LFK	POLK
CONTROL	SECTION	JOB
0911	04	089
		SHEET NO.
		31

FILENAME: ...KELLY\*DMAP01.dgn  
 DRAWING DATE: 2/2/2022



EXISTING

PROPOSED

**NOTES:**

1. PROPOSED BRIDGE IS LOCATED AT HEC-RAS STA 2000. UPSTREAM CROSS SECTION IS AT HEC-RAS STA 2030 & DOWNSTREAM CROSS SECTION IS AT HEC-RAS STA 1970.
2. PROPOSED OVERALL BRIDGE WIDTH IS 26 FEET.
3. PROPOSED BRIDGE LENGTH IS 75 FEET.
4. EXISTING BRIDGE STRUCTURE CONVEYS THE CALCULATED 50-YR ARI STORM FREQUENCY.

**HYDRAULIC METHOD:**

WATER SURFACE ELEVATIONS COMPUTED USING A HEC-RAS (V.5.0.7) MODEL CREATED FOR BLUFF CREEK, FILE: KELLYHECRAS.PRJ. THE HEC-RAS MODEL WAS DEVELOPED USING FIELD SURVEY, TNRIS LIDAR AND PROPOSED BRIDGE GEOMETRY.

EXISTING CONDITION WATER SURFACE ELEVATIONS COMPUTED FROM HEC-RAS MODEL PLAN "EXISTING".

PROPOSED CONDITION WATER SURFACE ELEVATIONS COMPUTED FROM HEC-RAS MODEL PLAN "PROPOSED".

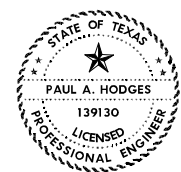
BOUNDARY CONDITIONS BASED ON NORMAL DEPTH WITH A SLOPE OF 0.0063 FT/FT.

**FLOOD HAZARD AREA:**

BLUFF CREEK IS IDENTIFIED ON FEMA FIRM PANEL 48373C0500C, DATED SEPTEMBER 3, 2010. KELLY RD CROSSES A FLOOD HAZARD AREA WITH ZONE "X" DESIGNATION.

THE LOCAL FLOODPLAIN ADMINISTRATOR, HOLLIE OLIVER  
 WAS NOTIFIED OF THE PROJECT ON 09/13/2021. FINAL H&H REPORT WILL  
 BE SUBMITTED TO FLOOD PLAIN ADMINISTRATOR WHEN DESIGN IS COMPLETED.

HEC-RAS SUMMARY TABLE												
STA	FLOWS (CFS)	DESIGN FREQUENCY (25-YR ARI)					CHECK FREQUENCY (100-YR ARI)					
		WATER SURFACE ELEVATIONS (FT)			VELOCITIES (FPS)		FLOWS (CFS)	WATER SURFACE ELEVATION (FT)			VELOCITIES (FPS)	
		EXIST	PROP	DIFFERENCE	EXIST	PROP		EXIST	PROP	DIFFERENCE	EXIST	PROP
3200	1287.20	273.72	273.72	0.00	2.76	2.76	1903.90	274.34	274.21	-0.13	2.63	2.84
2782	1287.20	272.58	272.56	-0.02	4.29	4.37	1903.90	273.84	273.51	-0.33	2.94	3.48
2553	1287.20	272.35	272.32	-0.03	2.66	2.70	1903.90	273.75	273.37	-0.38	2.21	2.52
2244	1287.20	272.17	272.13	-0.04	2.92	3.01	1903.90	273.65	273.23	-0.42	2.69	3.02
2093	1287.20	272.03	271.99	-0.04	3.58	3.56	1903.90	273.59	273.10	-0.49	2.78	3.68
2030	1287.20	271.48	271.47	-0.01	5.80	5.69	1903.90	273.37	272.37	-1.00	4.51	6.93
KELLY RD @ BLUFF CREEK (HEC-RAS STA 2000)												
1970	1287.20	270.94	270.94	0.00	7.44	7.68	1903.90	271.33	271.32	-0.01	9.94	10.33
1884	1287.20	270.73	270.73	0.00	6.05	6.05	1903.90	271.09	271.08	-0.01	7.67	7.69
1728	1287.20	270.54	270.54	0.00	4.77	4.78	1903.90	270.81	270.81	0.00	6.00	5.99
1512	1287.20	269.78	269.78	0.00	3.73	3.73	1903.90	270.15	270.15	0.00	4.27	4.26
474	1287.20	267.74	267.74	0.00	7.70	7.70	1903.90	268.14	268.14	0.00	8.24	8.24



**CIVIL CONSULTING GROUP**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**HYDRAULIC DATA SHEET**  
 (KELLY RD AT BLUFF CREEK)

FED. RD. DIST. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	SHEET NO.
6		CR	
STATE	DISTRICT	COUNTY	
TEXAS	LFK	POLK	32
CONTROL	SECTION	JOB	
0911	04	089	

FILENAME: ...KELLY\*HD01.dgn

DRAWING DATE: 2/2/2022

**SCOUR ANALYSIS - 50-YR (DESIGN)**

SCOUR ANALYSIS DETERMINED BY UTILIZING EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION COMPUTED USING HYDRAULIC TOOLBOX VERSION 4.2

LIVE-BED CONTRACTION SCOUR EQUATIONS (EQNS. 6.1 & 6.2)

D50 = 0.200 mm  
K1 = 0.69

SCOUR DEPTH  $Y_s$  (CHANNEL) = 1.89 FT

**SCOUR ANALYSIS - 100-YR (CHECK)**

SCOUR ANALYSIS DETERMINED BY UTILIZING EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION COMPUTED USING HYDRAULIC TOOLBOX VERSION 4.2

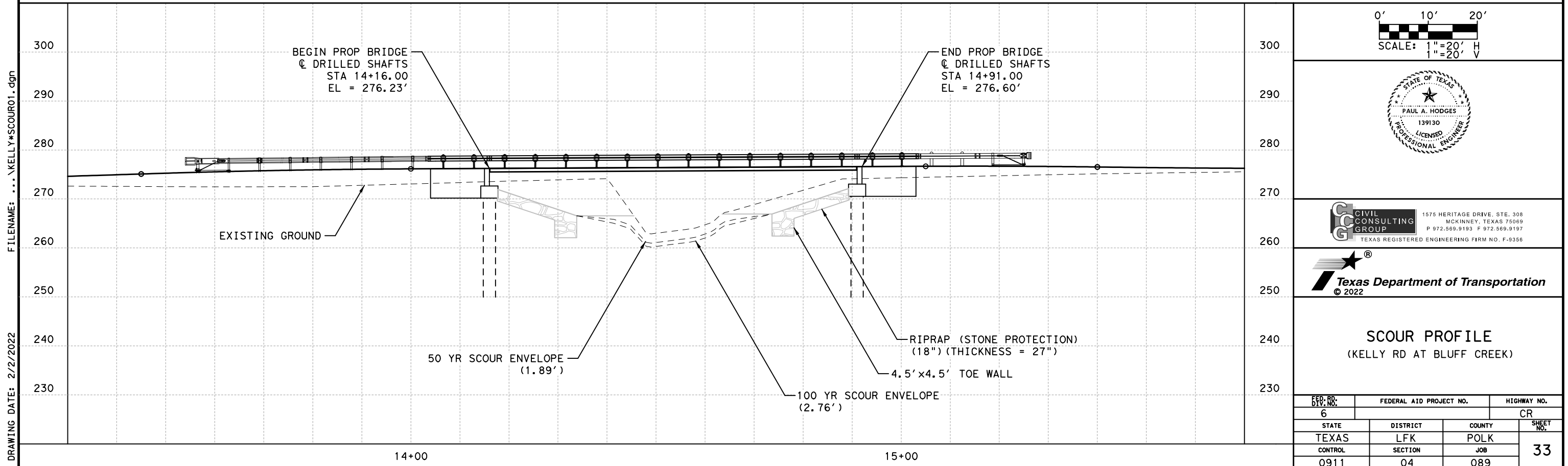
LIVE-BED CONTRACTION SCOUR EQUATIONS (EQNS. 6.1 & 6.2)

D50 = 0.200 mm  
K1 = 0.69

SCOUR DEPTH  $Y_s$  (CHANNEL) = 2.76 FT

**NOTES:**

1. THERE IS NO EVIDENCE OF SCOUR FOR THE EXISTING BRIDGE.
2. ABUTMENTS TO BE PROTECTED WITH RIPRAP (STONE PROTECTION). ABUTMENT SCOUR IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL.
3. POLK COUNTY SHOULD REGULARLY INSPECT THE STONE RIPRAP PROTECTION TO ENSURE SLOPE STABILITY.

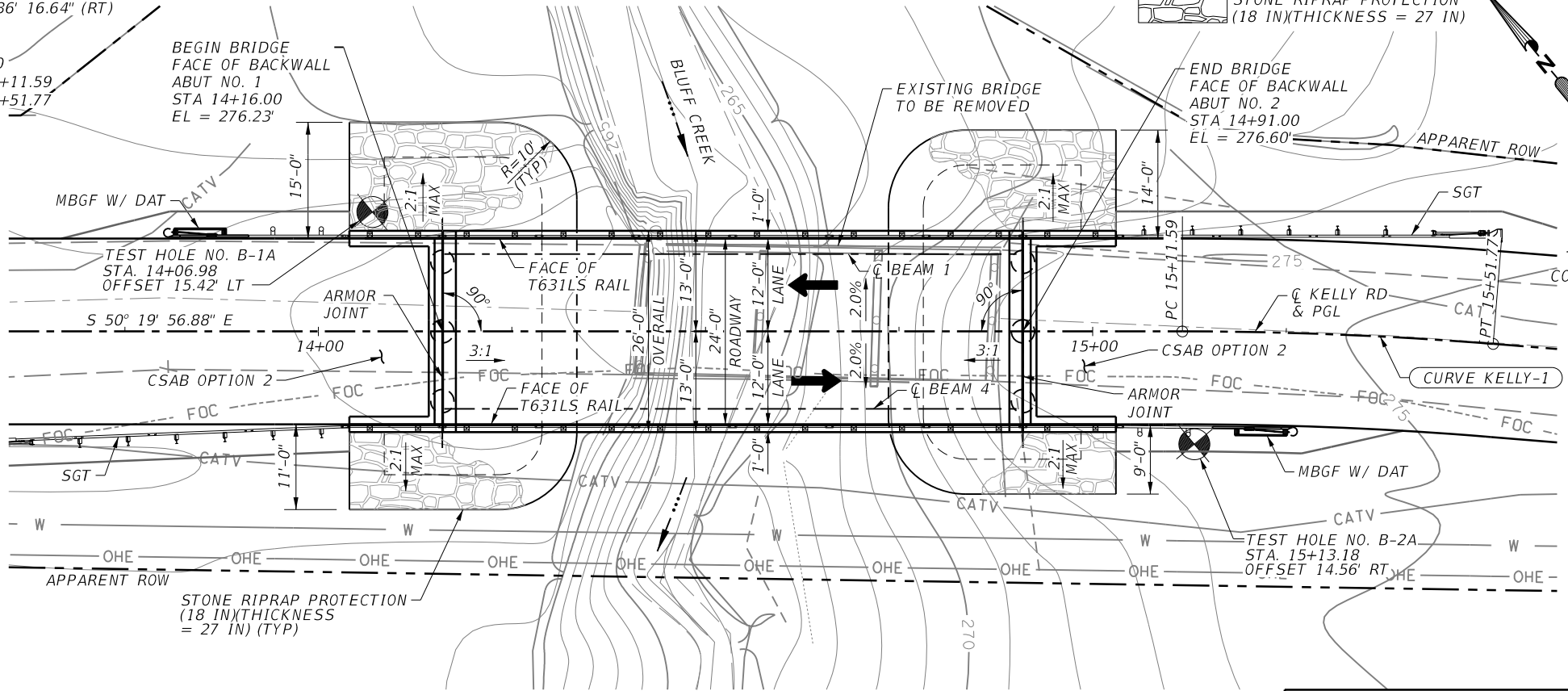


FILENAME: ...KELLY\*SCOUR01.dgn

DRAWING DATE: 2/2/2022

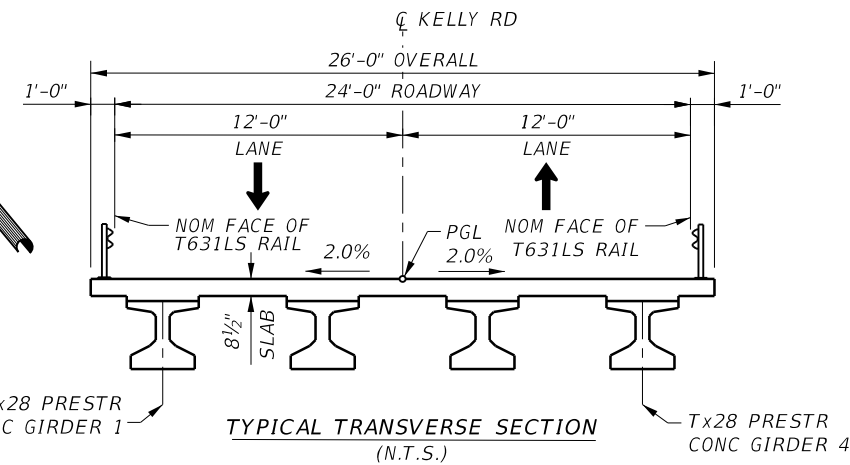
**CURVE KELLY-1 DATA**

PI STA = 15+31.69  
 DELTA = 4° 36' 16.64" (RT)  
 T = 20.1023  
 L = 40.1829  
 R = 500.0000  
 PC STA = 15+11.59  
 PT STA = 15+51.77



**PLAN**

**LEGEND**



**TYPICAL TRANSVERSE SECTION (N.T.S.)**

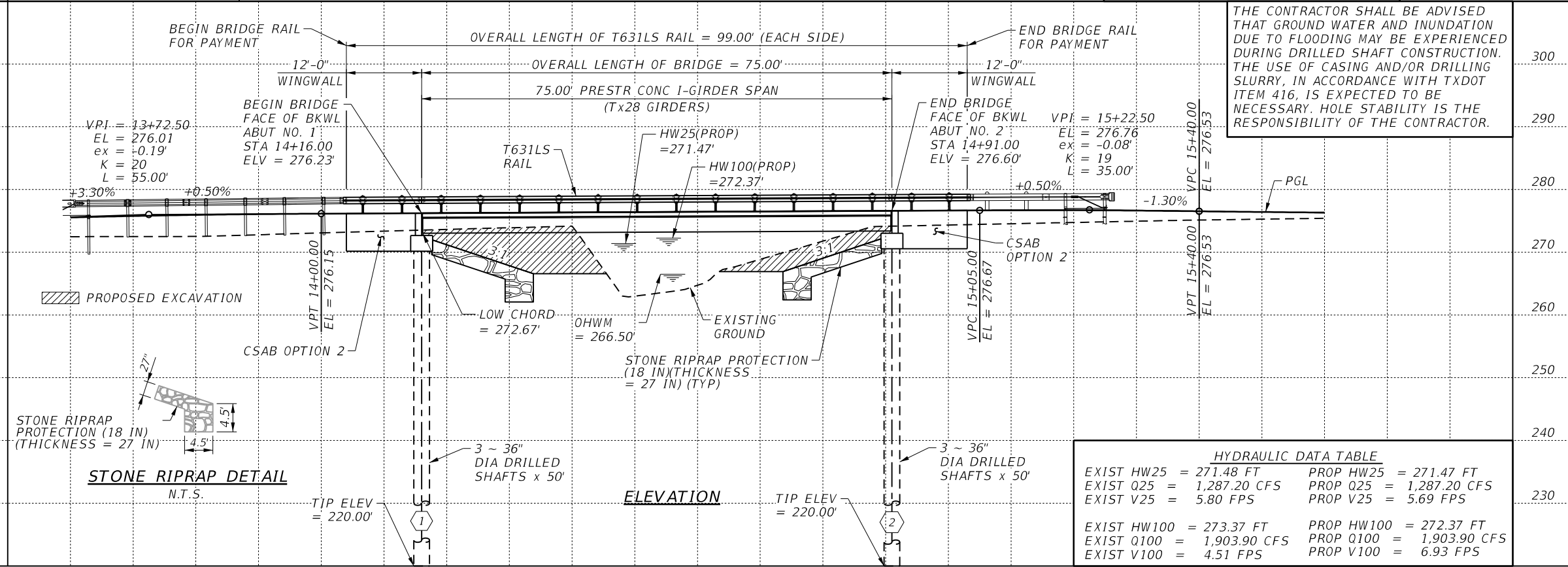
**GENERAL NOTES:**

- DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
- ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATIONS.
- SEE BORING LOGS SHEET FOR TEST HOLE INFORMATION.
- CONTRACTOR SHALL VERIFY LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.
- SEE HORIZONTAL AND VERTICAL CONTROL SHEETS FOR LOCATION OF BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL.
- DRILLED SHAFTS HAVE BEEN DESIGNED FOR BOTH END BEARING AND SKIN FRICTION.
- NO FILL (E.G. PIPE, CULVERT, ROCK, DIRT, OR TIMBER MATS) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 266.5 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 266.5 FT TO CREATE WORK PLATFORMS, HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMPs.
- STONE RIPRAP PROTECTION (18 INCH) SHALL HAVE A MINIMUM THICKNESS OF 27 INCHES.

EXIST NBI NO.: 11-187-0-AA03-29-004  
 PROP NBI NO.: 11-187-0-AA03-29-007  
 DESIGN SPEED: MEET OR EXCEED EXISTING CONDITIONS  
 EXIST ADT: (2015)=62  
 FUNCTIONAL CLASSIFICATION: LOCAL ROAD  
 TERRAIN: ROLLING

HL 93 LOADING

ABUTMENTS ARE ON A BEARING OF S 39° 40' 3.12" W



**ELEVATION**

THE CONTRACTOR SHALL BE ADVISED THAT GROUND WATER AND INUNDATION DUE TO FLOODING MAY BE EXPERIENCED DURING DRILLED SHAFT CONSTRUCTION. THE USE OF CASING AND/OR DRILLING SLURRY, IN ACCORDANCE WITH TXDOT ITEM 416, IS EXPECTED TO BE NECESSARY. HOLE STABILITY IS THE RESPONSIBILITY OF THE CONTRACTOR.



STATE OF TEXAS  
 REGISTERED PROFESSIONAL ENGINEER  
 JAMES B. HALL II  
 62722  
 2/22/2022

**BGE, Inc.**  
 1701 Directors Blvd., Suite 1000, Austin, TX 78744  
 Tel: 512-879-0400 • www.bgeinc.com  
 TBPE Registration No. F-1046

**Texas Department of Transportation**  
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**BRIDGE LAYOUT (KELLY RD AT BLUFF CREEK)**

HYDRAULIC DATA TABLE			
EXIST HW25 = 271.48 FT	PROP HW25 = 271.47 FT	EXIST Q25 = 1,287.20 CFS	PROP Q25 = 1,287.20 CFS
EXIST V25 = 5.80 FPS	PROP V25 = 5.69 FPS	EXIST HW100 = 273.37 FT	PROP HW100 = 272.37 FT
EXIST Q100 = 1,903.90 CFS	PROP Q100 = 1,903.90 CFS	EXIST V100 = 4.51 FPS	PROP V100 = 6.93 FPS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	34
CONTROL	SECTION	JOB	
0911	04	089	

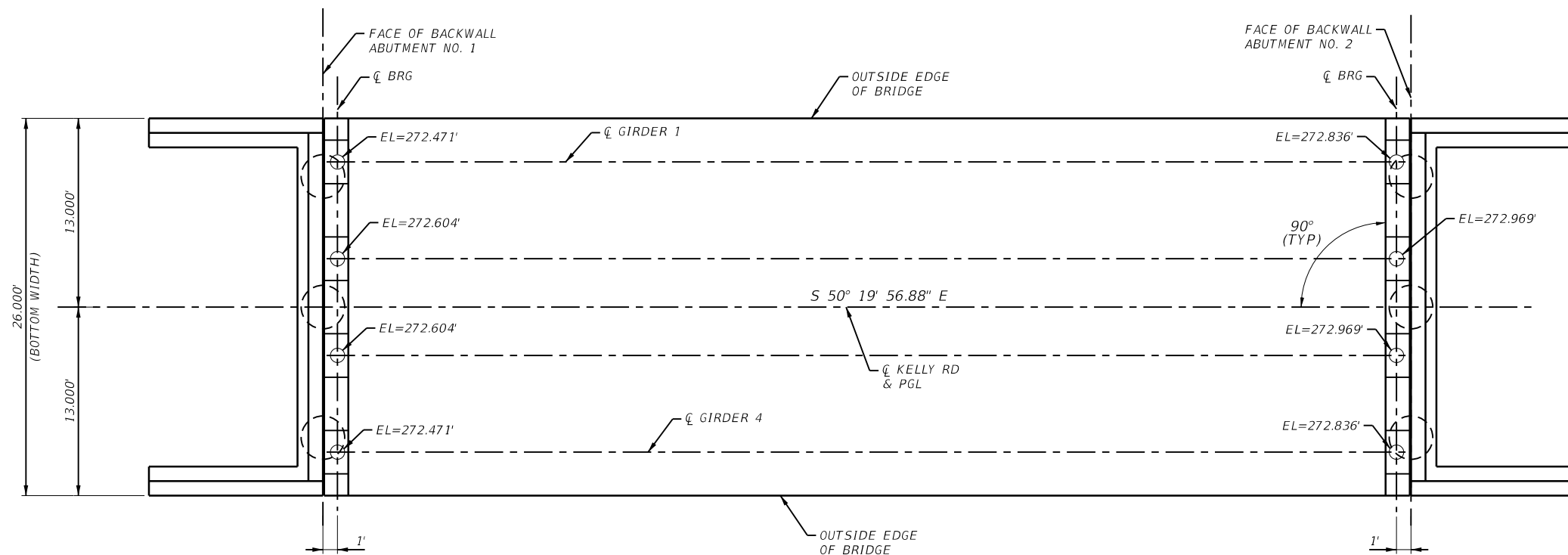
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 DRAWING DATE: 2/22/2022



FILENAME: G:\TxC\Projects\TXDOT\6071-05\*WA5\*4CRBridges\03\*CADD\01\*Shts\07-BRDG\KELLYRD\*EQ\*01.dgn

DRAWING DATE: 2/1/2022

KELLY RD AT BLUFF CREEK NBI: 11-187-0-AA03-29-007	SUMMARY OF BRIDGE ITEMS									
	400 6005	416 6004	420 6013	422 6001	422 6023	425 6035	432 6033	450 6019	454 6003	496 6009
	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	REINF CONC SLAB	SHEAR KEY	PRESTR CONC GIRDER (TX28)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)	ARMOR JOINT	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	CY	LF	CY	SF	CY	LF	CY	LF	LF	EA
2 ~ ABUTMENTS	81	300	37.6					48.0		
1 ~ 75' PRESTR CONC TX GIRDERS				1,950	0.4	298.00	304	150.0	44	
<b>PROJECT TOTALS</b>	<b>81</b>	<b>300</b>	<b>37.6</b>	<b>1,950</b>	<b>0.4</b>	<b>298.00</b>	<b>304</b>	<b>198.0</b>	<b>44</b>	<b>1</b>



BEARING SEAT ELEVATIONS

HL 93 LOADING



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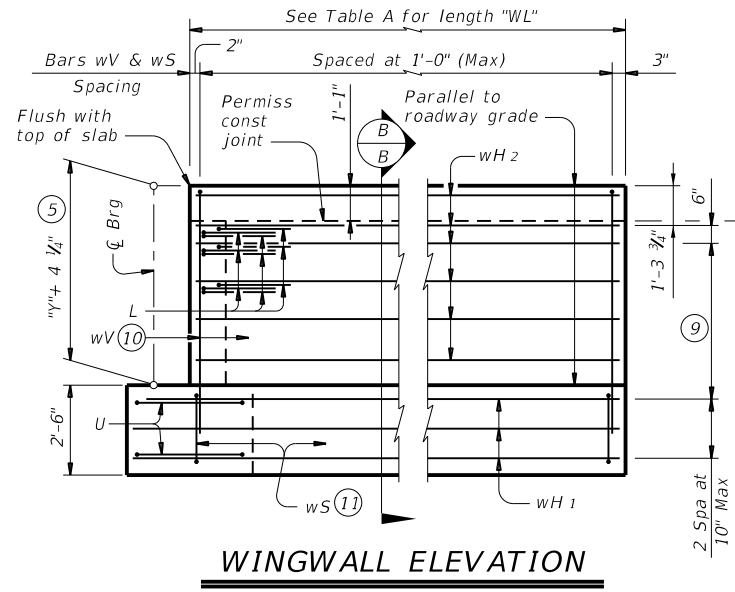
ESTIMATED QUANTITIES AND  
BEARING SEAT ELEVATIONS  
(KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	36
CONTROL	SECTION	JOB	
0911	04	089	

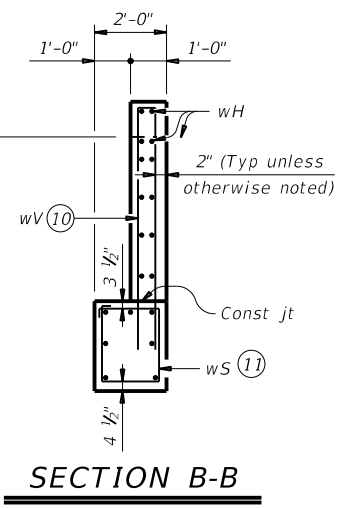




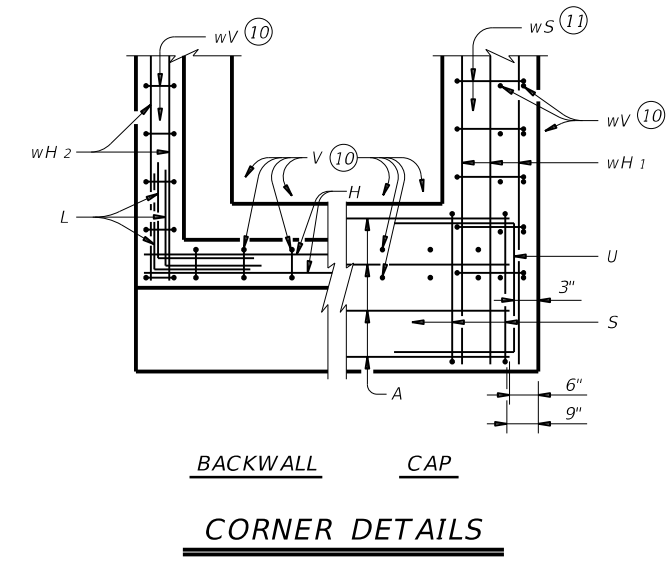
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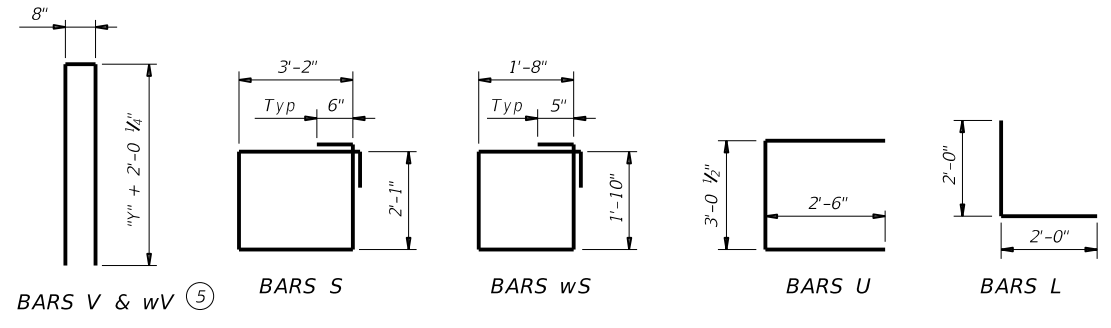
**WINGWALL ELEVATION**



**SECTION B-B**



**BACKWALL CAP CORNER DETAILS**



- (5) See Span details for "y" value.
- (9) Spacing based on girder type:  
 Tx28 ~ 3 spaces at 1'-0" Max  
 Tx34 ~ 3 spaces at 1'-0" Max  
 Tx40 ~ 4 spaces at 1'-0" Max  
 Tx46 ~ 4 spaces at 1'-0" Max  
 Tx54 ~ 5 spaces at 1'-0" Max
- (10) Field bend as needed to clear piles.
- (11) Adjust as required to avoid piling.

		Bridge Division Standard	
<b>ABUTMENTS</b> TYPE TX28 THRU TX54 PRESTR CONC I-GIRDERS 24' ROADWAY  <b>AIG-24</b>			
FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR
©TXDOT August 2017	CONT	SECT	JOB
REVISIONS	0911	04	089
	DIST	COUNTY	SHEET NO.
	LFK	POLK	38

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TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE <sup>(12)</sup>


TYPE Tx28 Girders					TYPE Tx34 Girders					TYPE Tx40 Girders					TYPE Tx46 Girders					TYPE Tx54 Girders									
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight					
A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328					
D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11					
H	8	#6	25'-8"	308	H	8	#6	25'-8"	308	H	10	#6	25'-8"	386	H	10	#6	25'-8"	386	H	12	#6	25'-8"	463					
L	18	#6	4'-0"	108	L	18	#6	4'-0"	108	L	18	#6	4'-0"	108	L	18	#6	4'-0"	108	L	18	#6	4'-0"	108					
S	22	#5	11'-6"	264	S	22	#5	11'-6"	264	S	22	#5	11'-6"	264	S	22	#5	11'-6"	264	S	22	#5	11'-6"	264					
U	4	#6	8'-1"	49	U	4	#6	8'-1"	49	U	4	#6	8'-1"	49	U	4	#6	8'-1"	49	U	4	#6	8'-1"	49					
V	25	#5	11'-4"	296	V	25	#5	12'-4"	322	V	25	#5	13'-4"	348	V	25	#5	14'-4"	374	V	25	#5	15'-8"	409					
wH1	14	#6	9'-5"	198	wH1	14	#6	10'-5"	219	wH1	14	#6	11'-5"	240	wH1	14	#6	12'-5"	261	wH1	14	#6	13'-5"	282					
wH2	20	#6	7'-8"	230	wH2	20	#6	8'-8"	260	wH2	24	#6	9'-8"	348	wH2	24	#6	10'-8"	385	wH2	28	#6	11'-8"	491					
wS	18	#4	7'-10"	94	wS	20	#4	7'-10"	105	wS	22	#4	7'-10"	115	wS	24	#4	7'-10"	126	wS	26	#4	7'-10"	136					
wV	18	#5	11'-4"	213	wV	20	#5	12'-4"	257	wV	22	#5	13'-4"	306	wV	24	#5	14'-4"	359	wV	26	#5	15'-8"	425					
Reinforcing Steel				Lb	3,099	Reinforcing Steel				Lb	3,231	Reinforcing Steel				Lb	3,503	Reinforcing Steel				Lb	3,651	Reinforcing Steel				Lb	3,966
Class "C" Concrete				CY	15.2	Class "C" Concrete				CY	16.6	Class "C" Concrete				CY	18.1	Class "C" Concrete				CY	19.7	Class "C" Concrete				CY	21.6

TABLES OF ESTIMATED QUANTITIES WITH 3:1 HEADER SLOPE <sup>(12)</sup>

TYPE Tx28 Girders					TYPE Tx34 Girders					TYPE Tx40 Girders					TYPE Tx46 Girders					TYPE Tx54 Girders									
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight					
A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328	A	10	#11	25'-0"	1,328					
D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11	D <sup>(7)</sup>	2	#9	1'-8"	11					
H	8	#6	25'-8"	308	H	8	#6	25'-8"	308	H	10	#6	25'-8"	386	H	10	#6	25'-8"	386	H	12	#6	25'-8"	463					
L	18	#6	4'-0"	108	L	18	#6	4'-0"	108	L	18	#6	4'-0"	108	L	18	#6	4'-0"	108	L	18	#6	4'-0"	108					
S	22	#5	11'-6"	264	S	22	#5	11'-6"	264	S	22	#5	11'-6"	264	S	22	#5	11'-6"	264	S	22	#5	11'-6"	264					
U	4	#6	8'-1"	49	U	4	#6	8'-1"	49	U	4	#6	8'-1"	49	U	4	#6	8'-1"	49	U	4	#6	8'-1"	49					
V	25	#5	11'-4"	296	V	25	#5	12'-4"	322	V	25	#5	13'-4"	348	V	25	#5	14'-4"	374	V	25	#5	15'-8"	409					
wH1	14	#6	13'-5"	282	wH1	14	#6	14'-5"	303	wH1	14	#6	16'-5"	345	wH1	14	#6	17'-5"	366	wH1	14	#6	19'-5"	408					
wH2	20	#6	11'-8"	350	wH2	20	#6	12'-8"	381	wH2	24	#6	14'-8"	529	wH2	24	#6	15'-8"	565	wH2	28	#6	17'-8"	743					
wS	26	#4	7'-10"	136	wS	28	#4	7'-10"	147	wS	32	#4	7'-10"	167	wS	34	#4	7'-10"	178	wS	38	#4	7'-10"	199					
wV	26	#5	11'-4"	307	wV	28	#5	12'-4"	360	wV	32	#5	13'-4"	445	wV	34	#5	14'-4"	508	wV	38	#5	15'-8"	621					
Reinforcing Steel				Lb	3,439	Reinforcing Steel				Lb	3,581	Reinforcing Steel				Lb	3,980	Reinforcing Steel				Lb	4,137	Reinforcing Steel				Lb	4,603
Class "C" Concrete				CY	17.8	Class "C" Concrete				CY	19.3	Class "C" Concrete				CY	21.7	Class "C" Concrete				CY	23.4	Class "C" Concrete				CY	26.4

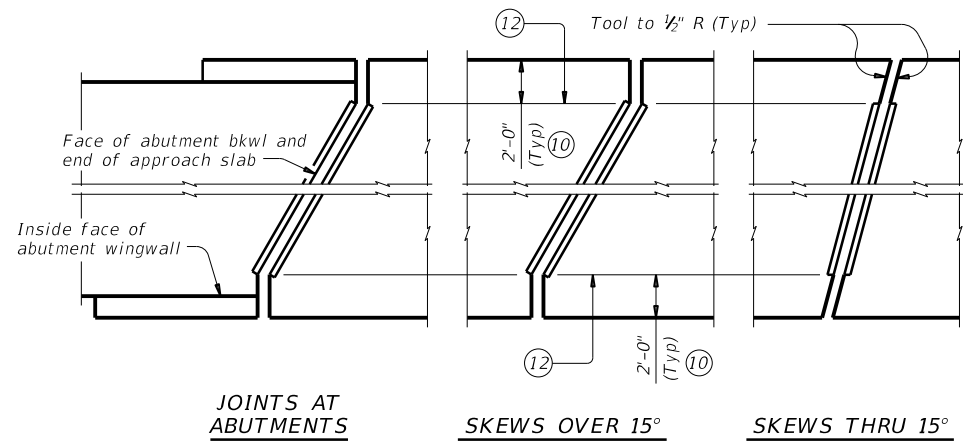
<sup>(7)</sup> Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

<sup>(12)</sup> Quantities shown are for one abutment only (with approach slab). With no approach slab, add 1.0 CY Class "C" concrete and 154 lbs reinforcing steel for 4 additional Bars H.

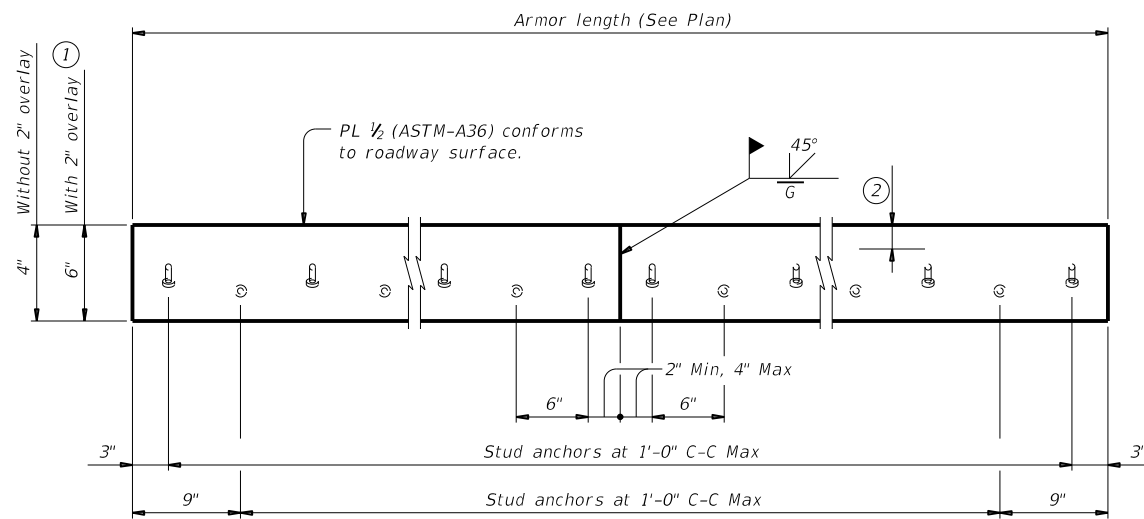
		<b>Bridge Division Standard</b>	
<b>ABUTMENTS</b> <b>TYPE TX28 THRU TX54</b> <b>PRESTR CONC I-GIRDERS</b> <b>24' ROADWAY</b>			
<b>AIG-24</b>			
FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR
©TxDOT August 2017	CONT	SECT	HIGHWAY
REVISIONS	0911	04	089
	DIST	COUNTY	SHEET NO.
	LFK	POLK	39

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DATE: 2/1/2022 5:15:33 PM  
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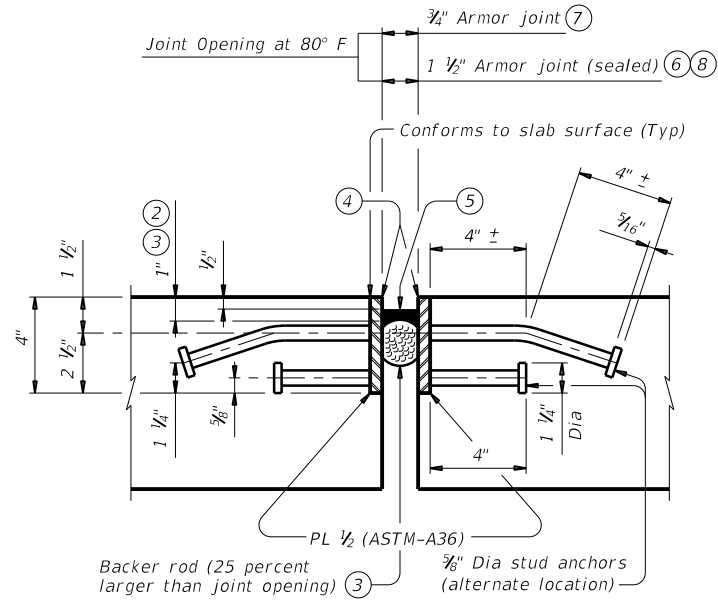


**JOINTS AT ABUTMENTS**  
**SKEWS OVER 15°**  
**SKEWS THRU 15°**  
**PLANS OF ARMOR PLATES**

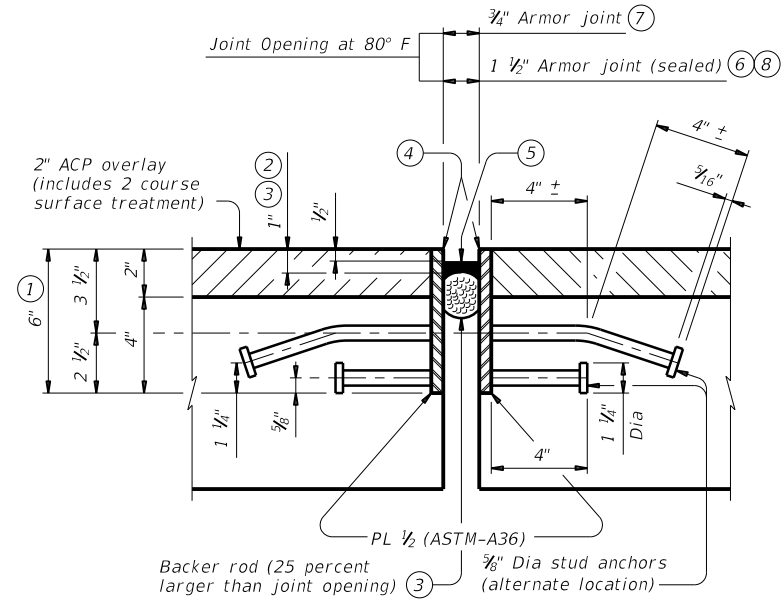


**ELEVATION OF BASIC ARMOR PLATE**

- ① Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each 1/2" variation in thickness.
- ② Do not paint top 1/2" of plate if using sealed armor joint.
- ③ Set top of backer rod 1" below top of armor plate. 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.
- ④ Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
- ⑤ Use Class 7 joint sealant that conforms to DMS-6310.
- ⑥ Place sealant while ambient temperature is between 55°F and 80°F and is rising.
- ⑦ Armor joint does not include joint sealant or backer rod.
- ⑧ Armor joint (sealed) includes Class 7 joint sealant and backer rod.
- ⑨ Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
- ⑩ Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
- ⑪ See "Plans of Armor Plates".
- ⑫ At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
- ⑬ Align shipping angle perpendicular to joint.



**SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION**



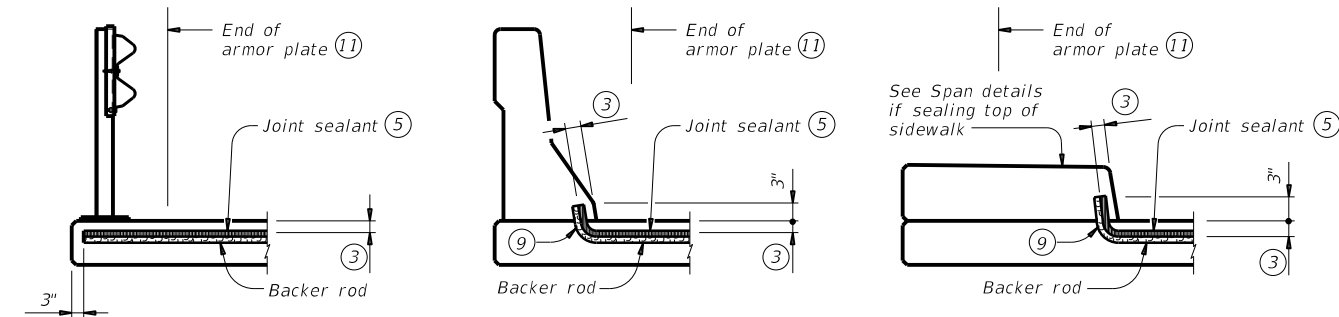
**SHOWN WITH 2" OVERLAY AT JOINT LOCATION**

**ARMOR JOINT SECTIONS**  
 Showing Armor Joint (Sealed)

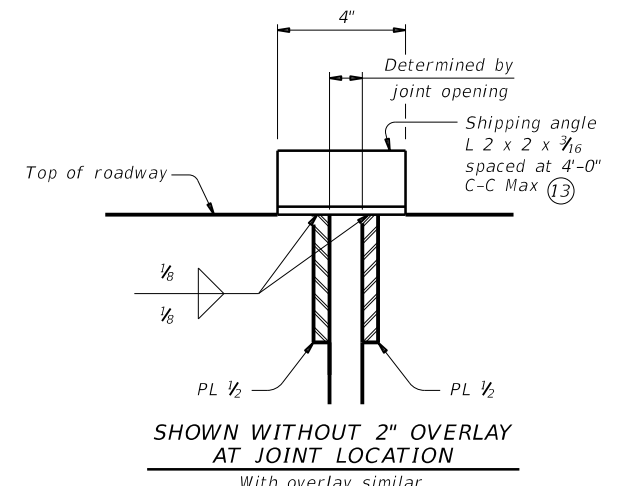
**FABRICATION NOTES:**  
 Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.  
 Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.  
 Weld studs in accordance with AWS D1.1.  
 Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.  
 Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.  
 Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

**CONSTRUCTION NOTES:**  
 Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.  
 Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

**GENERAL NOTES:**  
 Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 3/8" ( 3/4" opening movement and 5/8" closure movement).  
 Payment for armor joint, with or without seal, is based on length of armor plate.



**JOINT SEALANT TERMINATION DETAILS**  
 Armor joint (sealed) only. Armor plate is not shown for clarity.



**SHIPPING ANGLE**

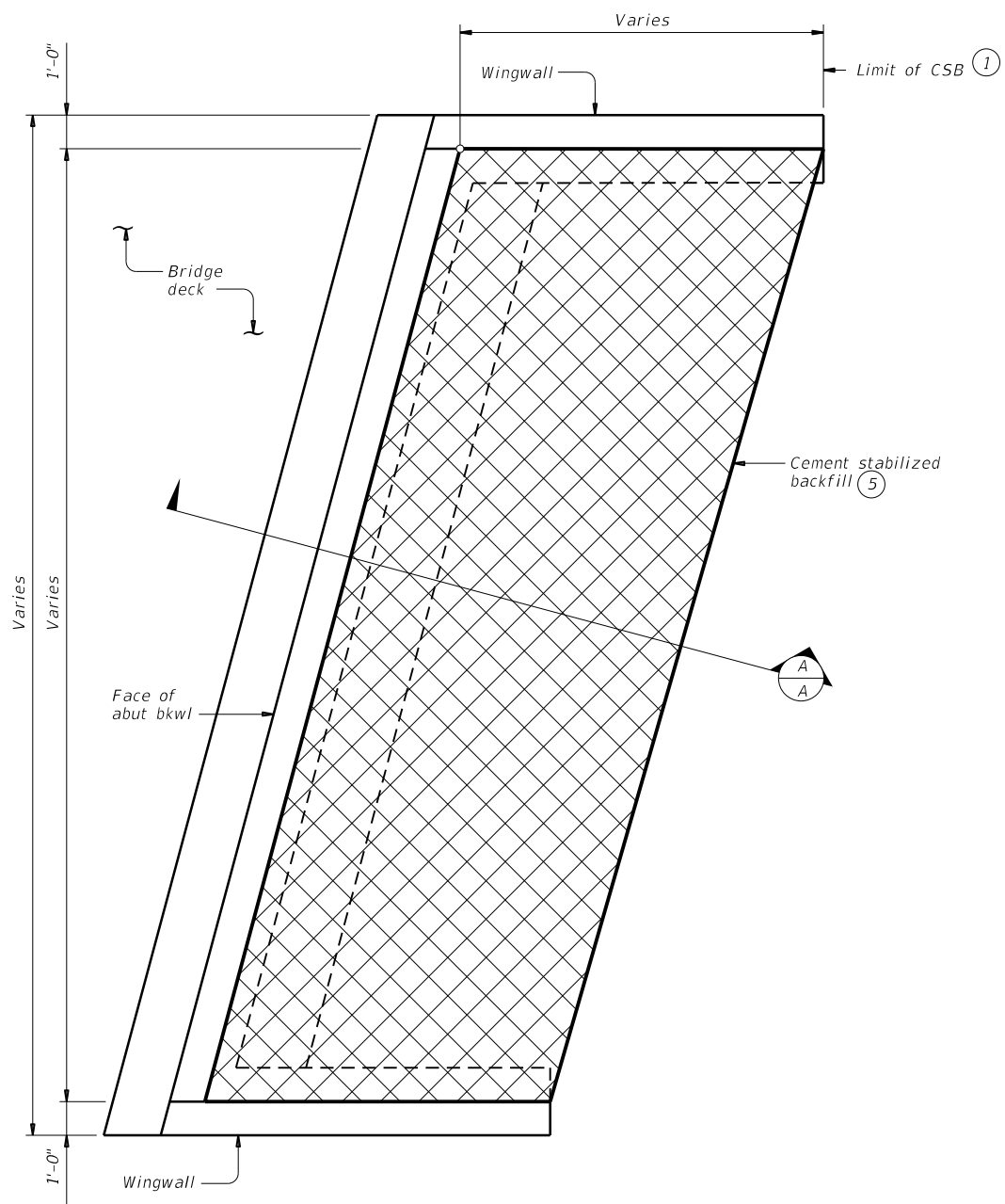
An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY ①	22.90 plf

				<b>Bridge Division Standard</b>	
<b>ARMOR JOINT DETAILS</b>					
<b>AJ</b>					
FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT	April 2019	CONTRACT	SECTION	JOB	HIGHWAY
	REVISIONS	0911	04	089	CR
		DIST	COUNTY	SHEET NO.	
		LFK	POLK	40	

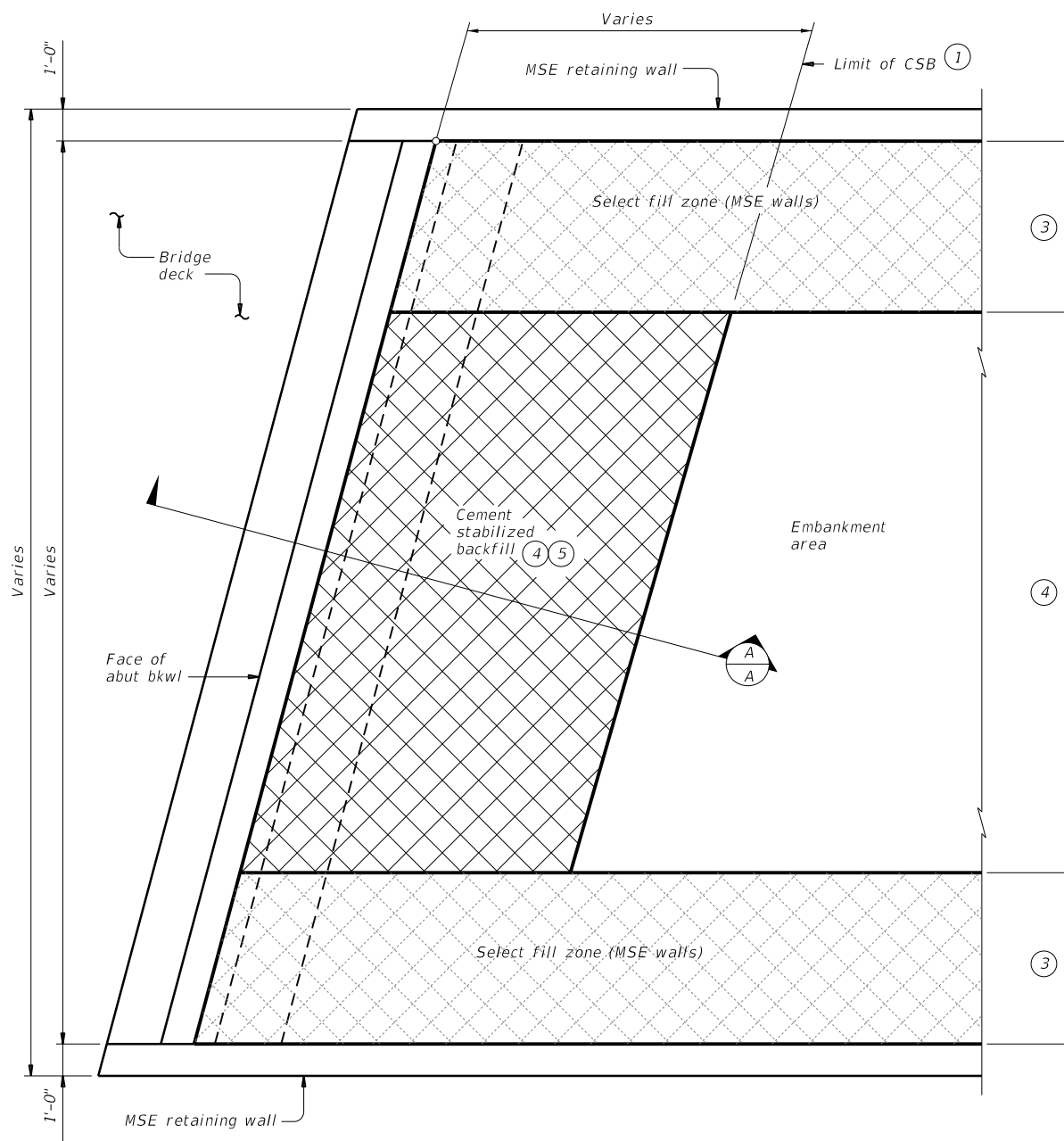
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of units or for incorrect results or damages resulting from its use.

DATE: 2/11/2022 5:15:34 PM  
 FILE: G:\TXDOT\Projects\TxDOT\6071-05\_WA5\_4CRBR\ldges\03\_CADD\01\_Shts\07-BRDG\03-Plan\01-20.dgn



**OPTION 1 ~ PLAN WITH WINGWALLS**

Cast-in-place retaining walls similar.

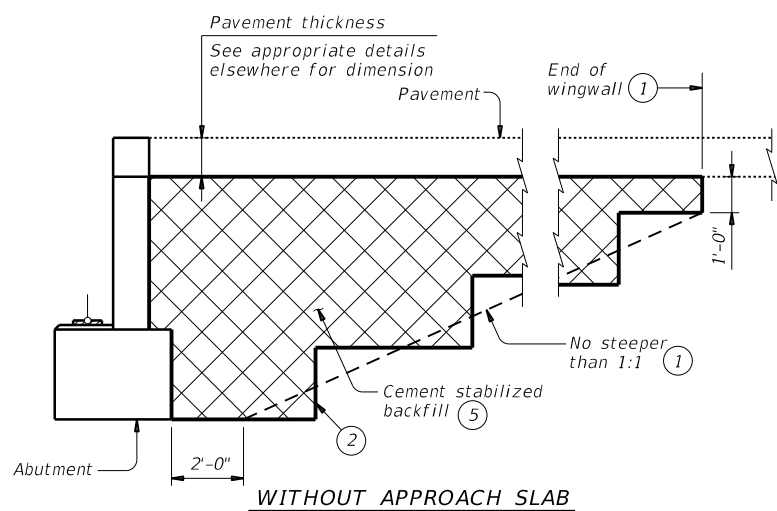


**OPTION 1 ~ PLAN WITH MSE RETAINING WALLS**

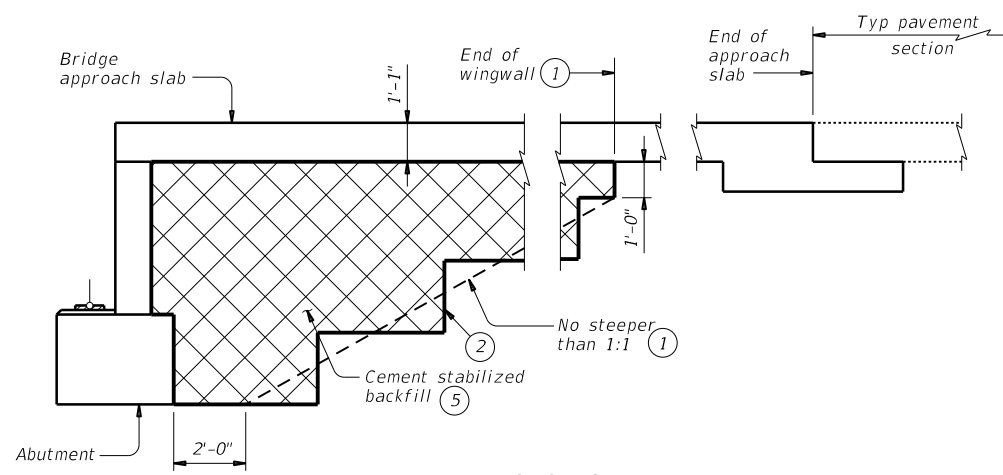
- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a) If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the flowable fill; and
  - b) Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

**GENERAL NOTES:**

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments. If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments. Details are drawn showing left forward skew. See Bridge Layout for actual skew direction. These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.



**WITHOUT APPROACH SLAB**



**WITH APPROACH SLAB**  
 (Showing BAS-C, BAS-A similar.)

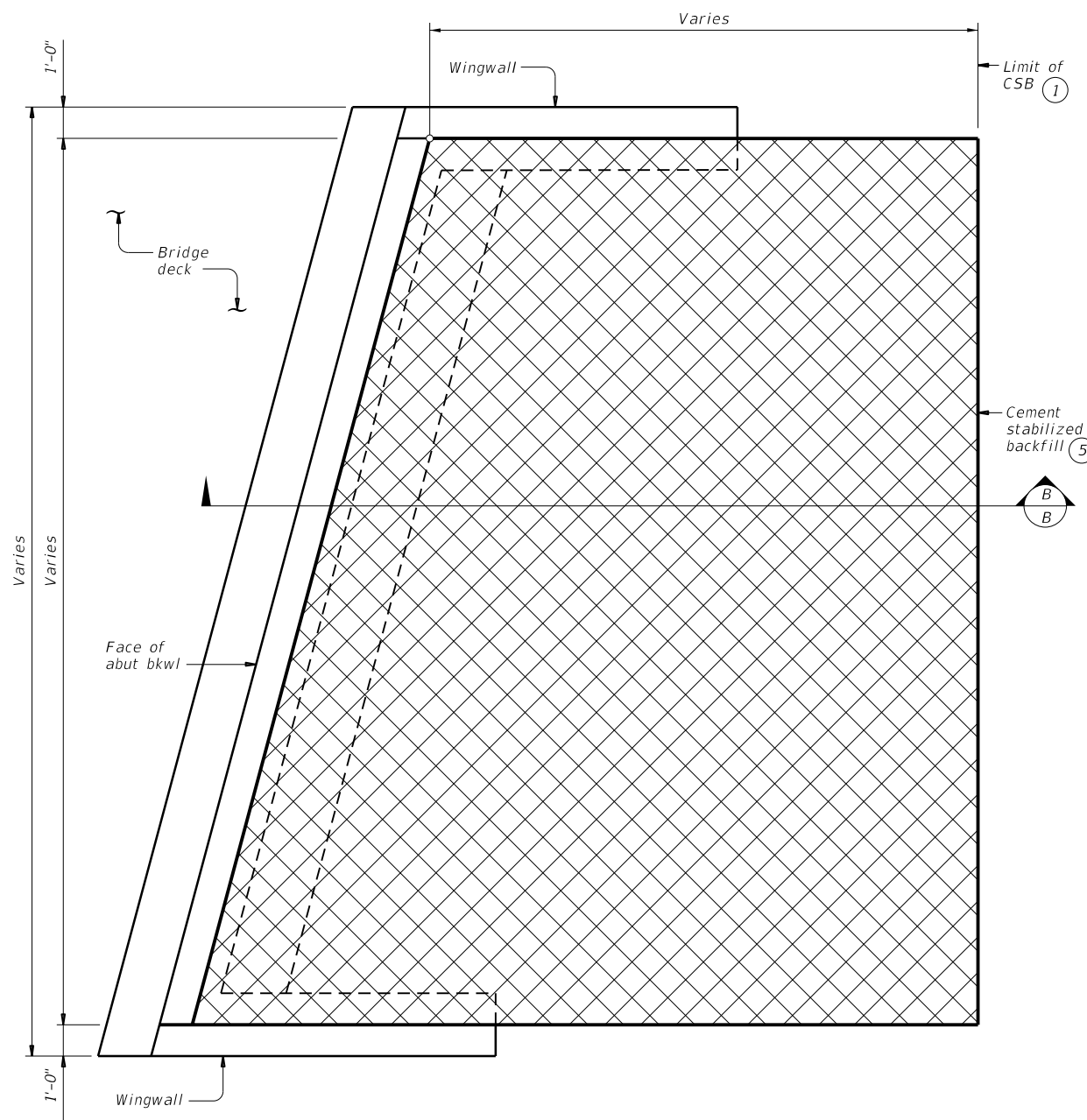
**SECTION A-A**

SHEET 1 OF 2

		<b>Bridge Division Standard</b>	
<b>CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT</b>			
<b>CSAB</b>			
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT	April 2019	CONV	SECT
0911	04	089	CR
02-20: Added Option 2.	DIST:	COUNTY:	SHEET NO.
	LFK	POLK	41

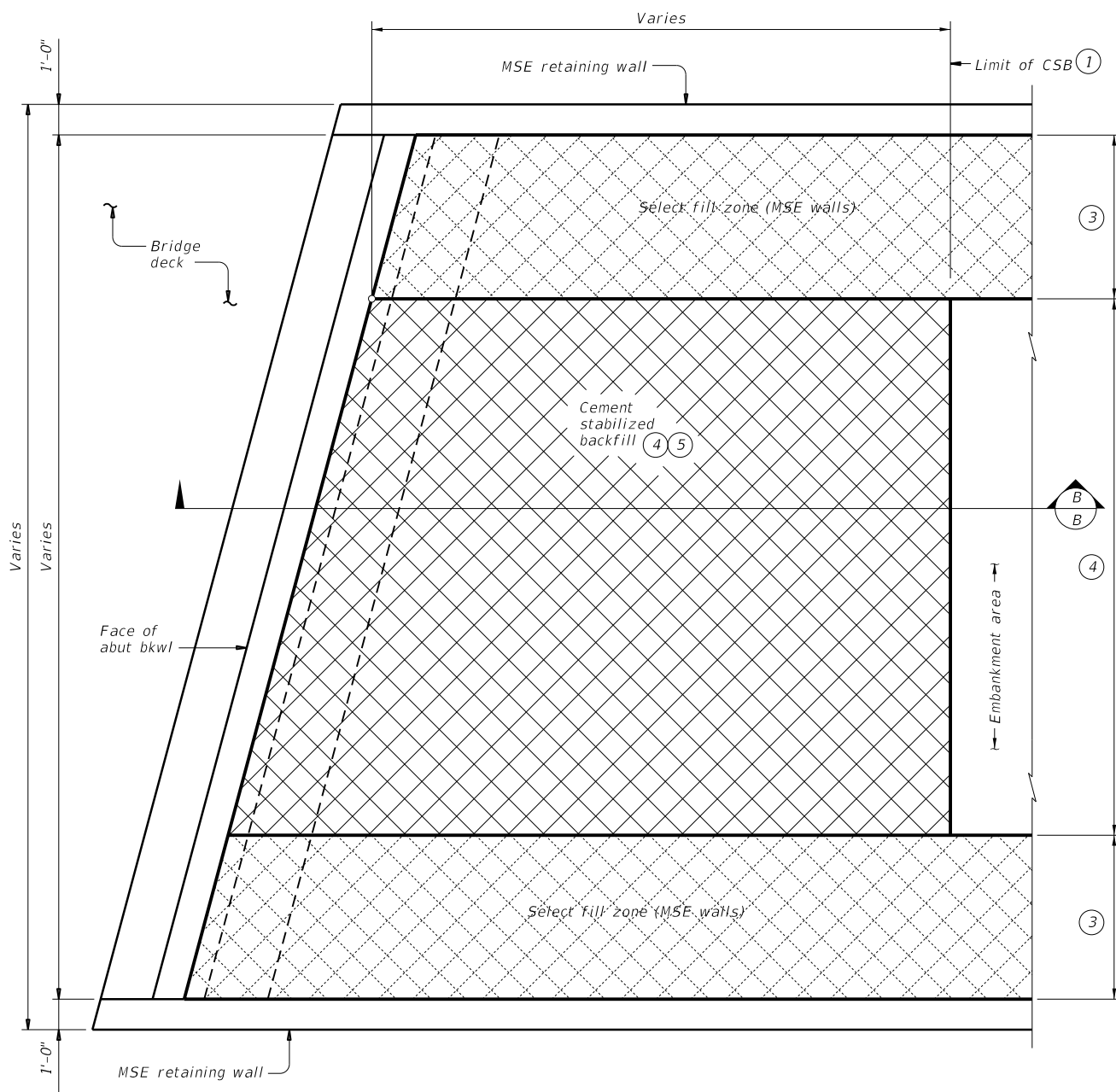
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of units or for incorrect results or damages resulting from its use.

DATE: 2/1/2022 5:15:34 PM  
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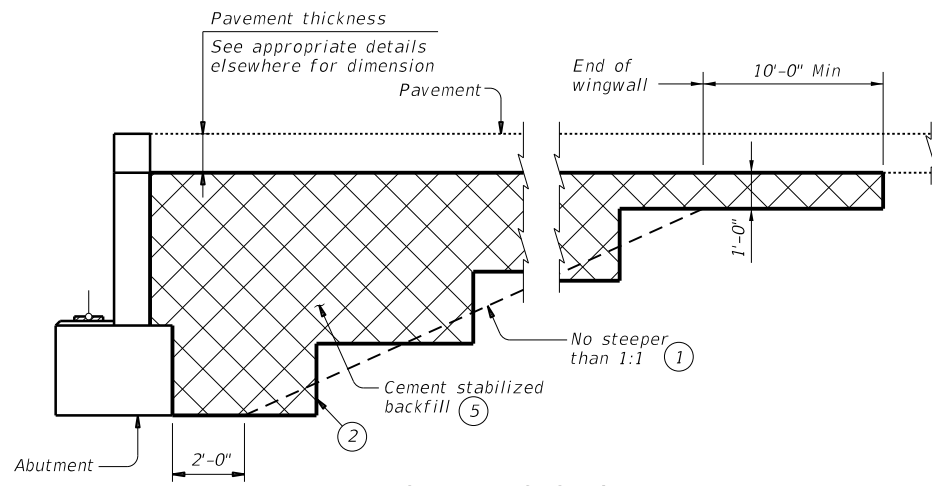
**OPTION 2 ~ PLAN WITH WINGWALLS**

Cast-in-place retaining walls similar.

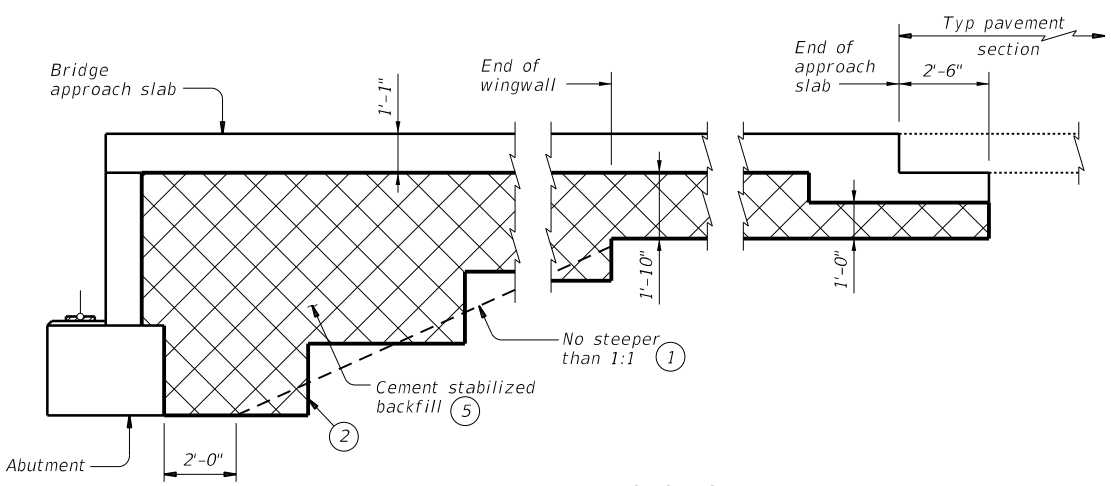


**OPTION 2 ~ PLAN WITH MSE RETAINING WALLS**

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
  - b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



**WITHOUT APPROACH SLAB**



**SECTION B-B**

**WITH APPROACH SLAB**  
 (Showing BAS-C, BAS-A similar.)

SHEET 2 OF 2



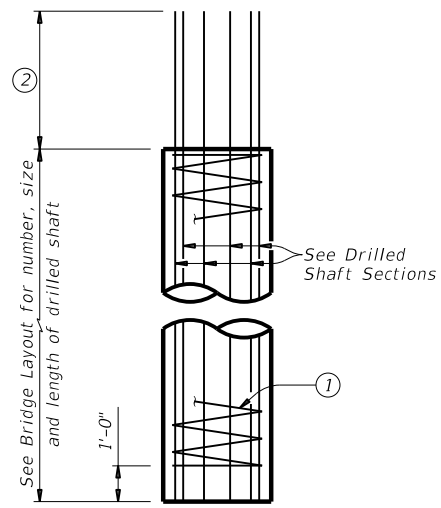
**CEMENT STABILIZED  
 ABUTMENT BACKFILL  
 BRIDGE ABUTMENT**

**CSAB**

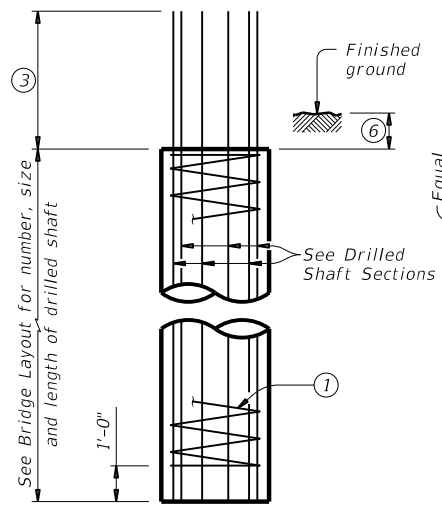
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
02-20: Added Option 2.	DIST	COUNTY	SHEET NO.	
	LFK	POLK	42	

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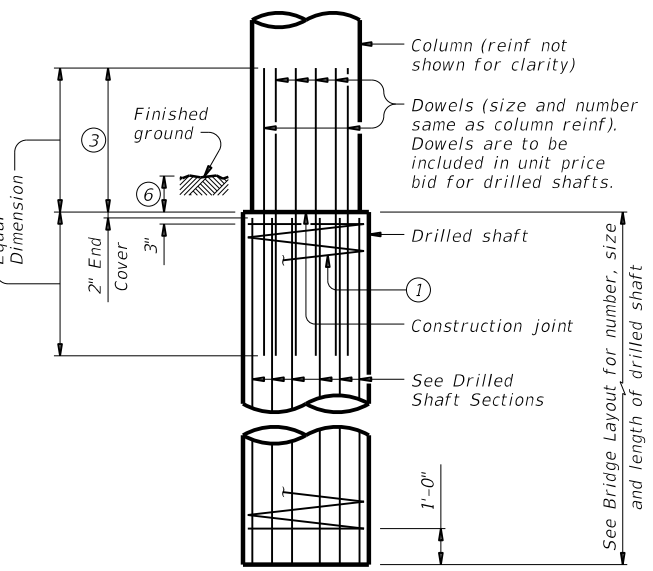
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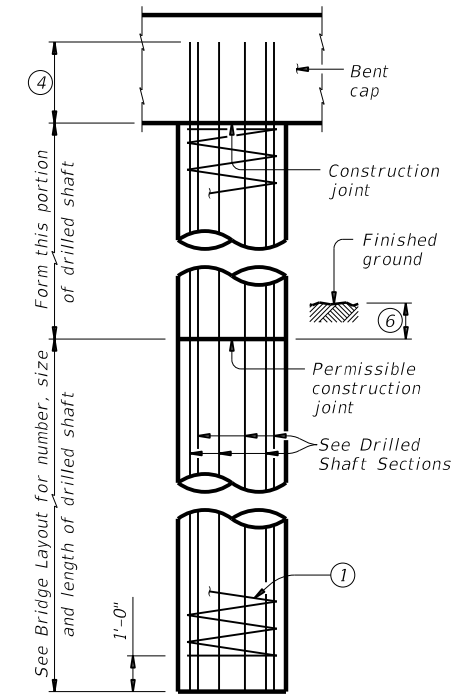
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



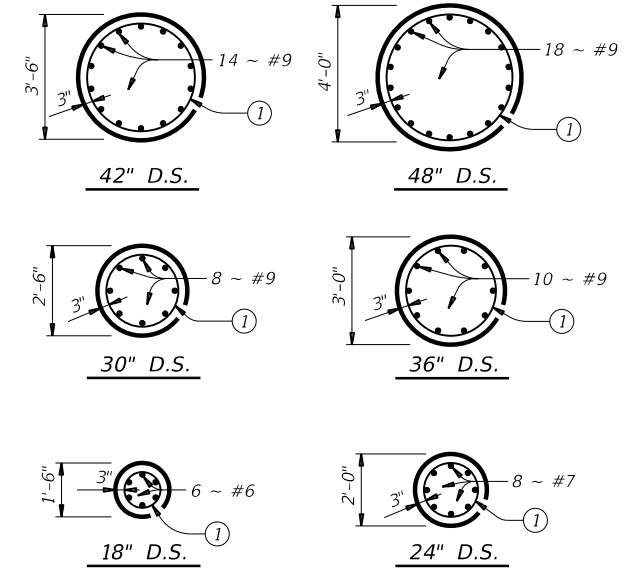
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

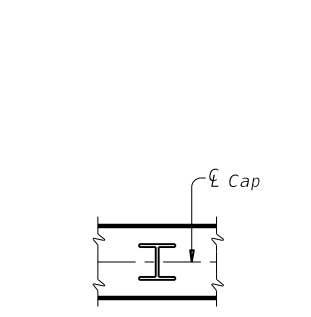


DRILLED SHAFT SECTIONS

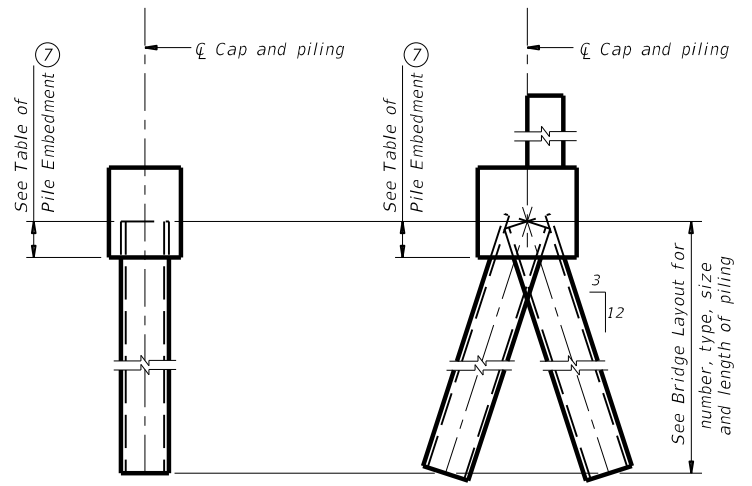
**DRILLED SHAFT DETAILS**

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"

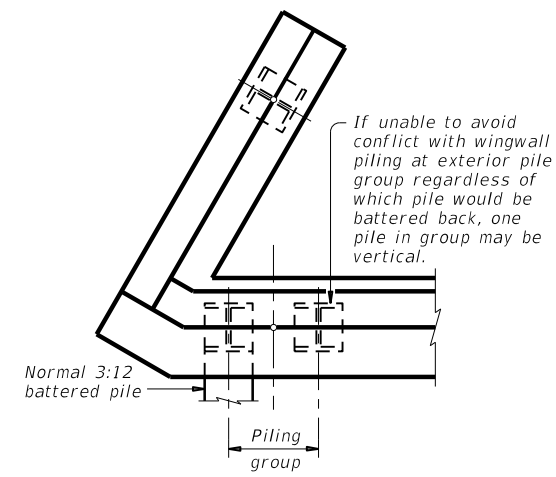
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



ORIENTATION OF STEEL H-PIILING

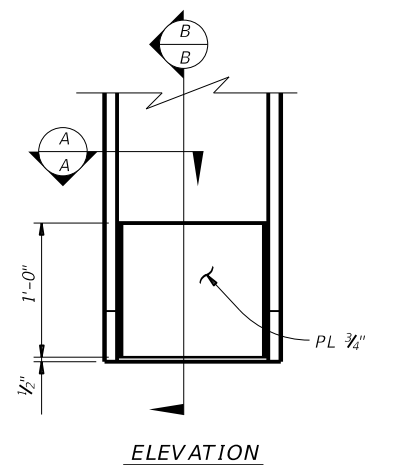


PIILING DETAILS  
(Concrete or steel H)

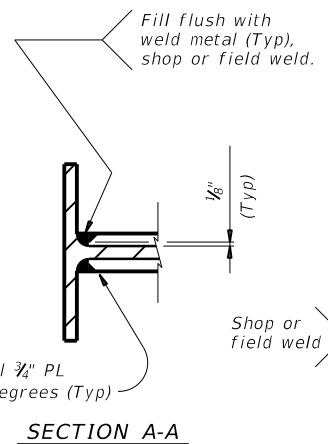


DETAIL "A"  
(Showing plan view of a 30° skewed abutment)

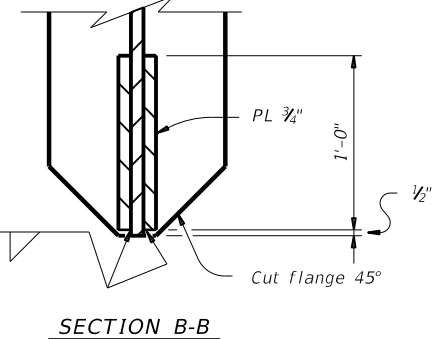
- ① #3 spiral at 6" pitch (one and a half flat turns top and bottom).
- ② Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-0"  
#9 Bars = 2'-3"
- ③ Min lap with column reinf:  
#7 Bars = 2'-11"  
#9 Bars = 3'-9"  
#11 Bars = 4'-8"
- ④ Min extension into supported element:  
#6 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.



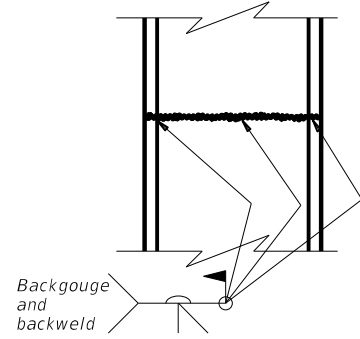
ELEVATION



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.



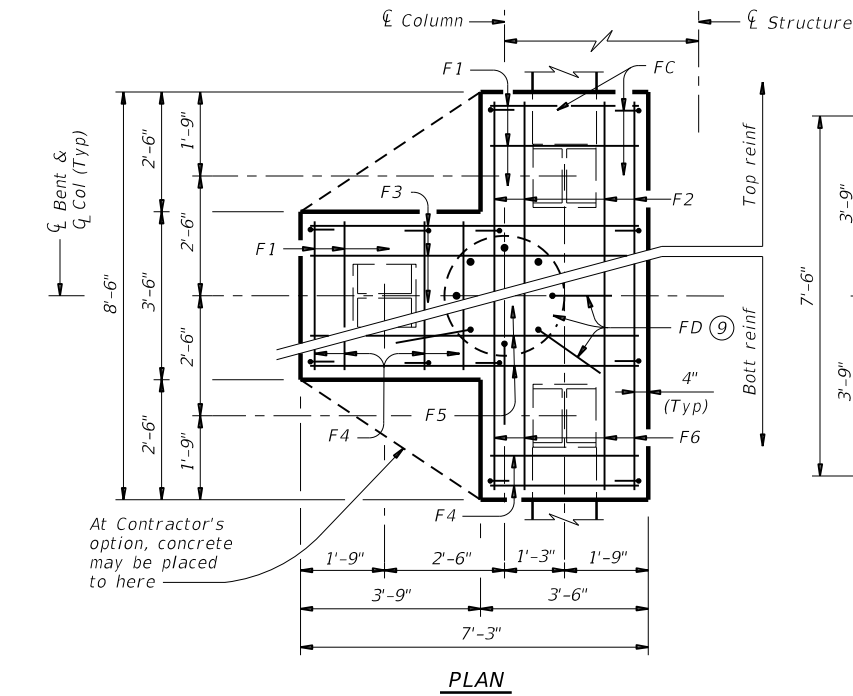
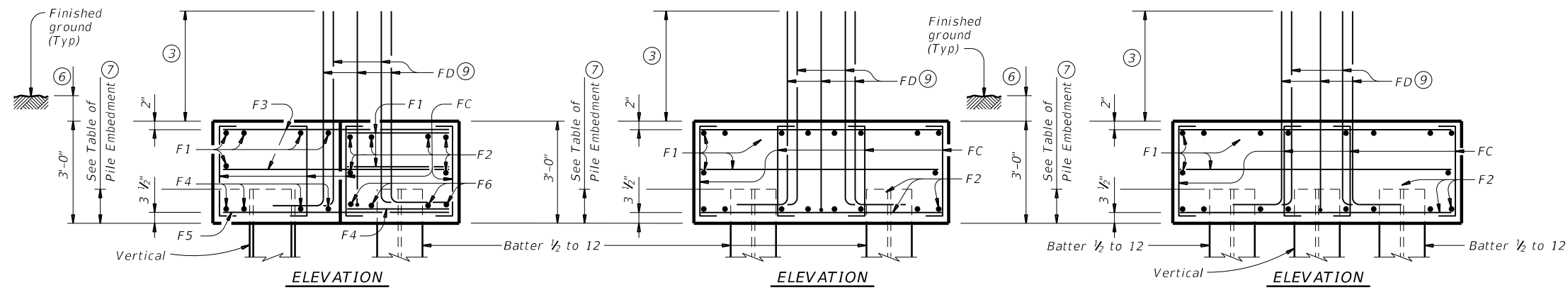
**COMMON FOUNDATION DETAILS**

FD

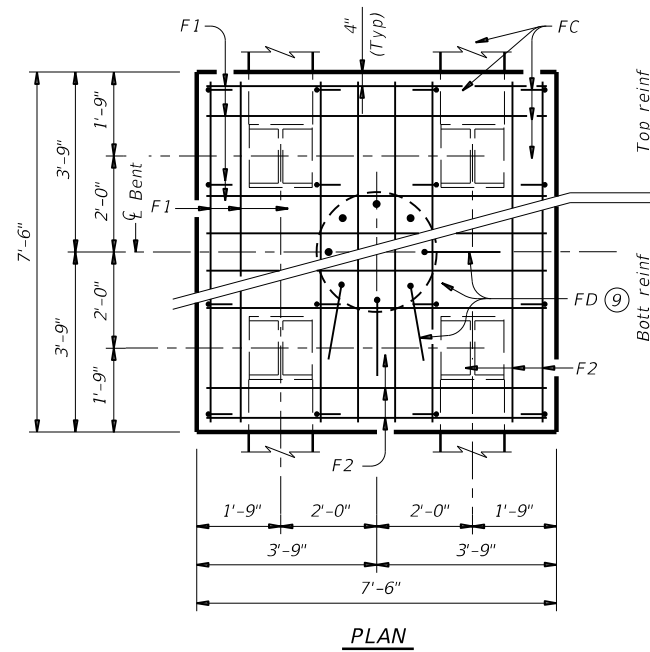
FILE: fstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
	LFK	POLK	43	

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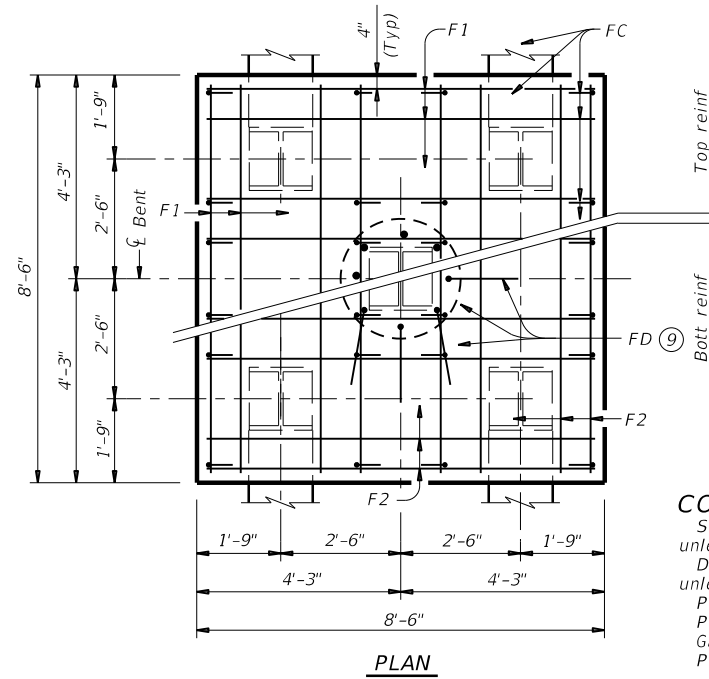
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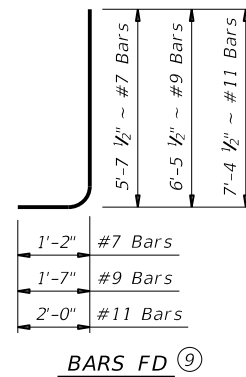
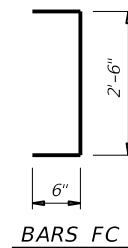
**THREE PILE FOOTING**<sup>⑧</sup>  
 For 36" Dia and smaller columns.



**FOUR PILE FOOTING**<sup>⑧</sup>  
 For 42" Dia and smaller columns.



**FIVE PILE FOOTING**<sup>⑧</sup>  
 For 42" Dia and smaller columns.



- 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 <sup>⑩</sup>	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 <sup>⑩</sup>	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 <sup>⑩</sup>	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

SHEET 2 OF 2

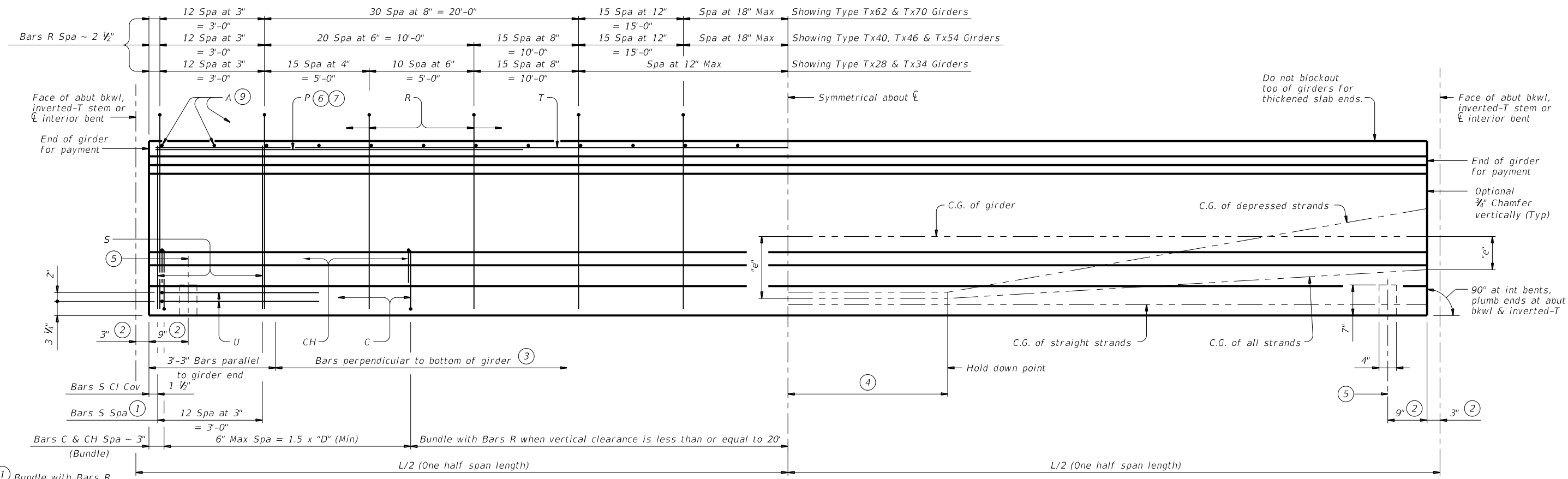


**COMMON FOUNDATION DETAILS**

FD

FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
	LFK	POLK	44	

DATE: 2/1/2022 5:15:36 PM  
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 DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TXDOT for any purpose whatsoever. TXDOT assumes no responsibility for the conversion of units or for incorrect results or damages resulting from its use.



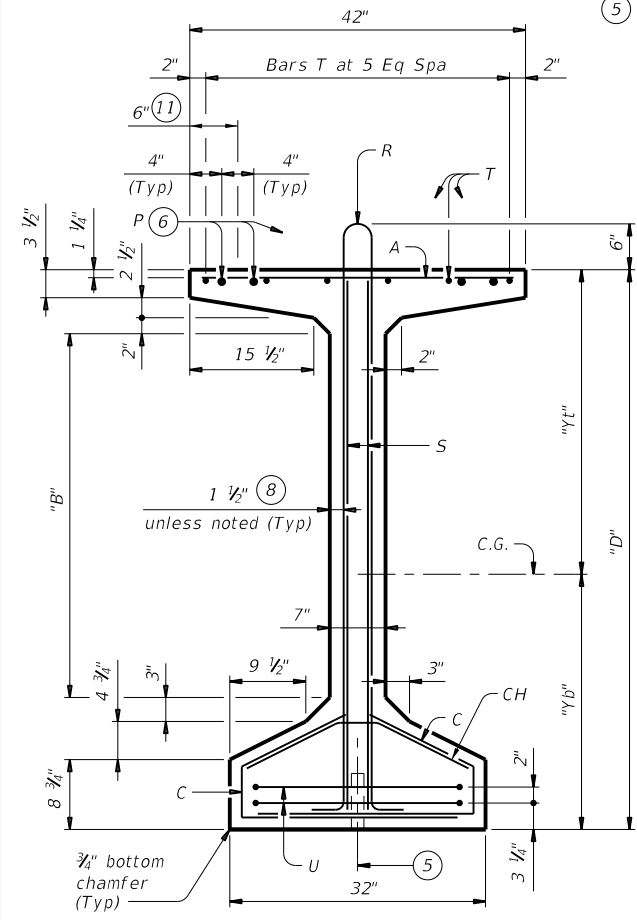
- ① Bundle with Bars R.
- ② Measured along  $\xi$  Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.
- ③ The average of the top and bottom spacing of Bars R cannot exceed the required spacing.
- ④ L/20, but not less than 5'-0" (-0,+2').

**GIRDER ELEVATION**

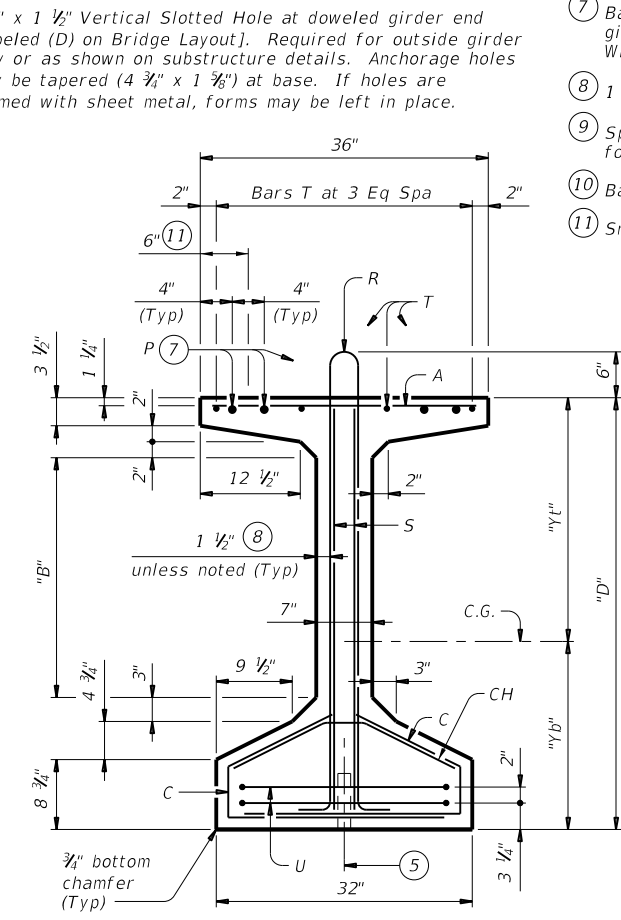
- ⑥ Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.
- ⑦ Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.
- ⑧ 1 3/8" Clear Cover to Bars S.
- ⑨ Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".
- ⑩ Based on 155 pcf total weight of concrete and reinforcing steel.
- ⑪ Smooth trowel finish on the slab overhang side of exterior girder.

GIRDER DIMENSIONS AND SECTION PROPERTIES								
Girder Type	"D"	"B"	"yt"	"yb"	Area	"Ix"	"Iy"	Weight (10)
	(in.)	(in.)	(in.)	(in.)	(in. <sup>2</sup> )	(in. <sup>4</sup> )	(in. <sup>4</sup> )	(plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 1/2"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 1/2"	38.09	31.91	966	628,747	57,579	1,040

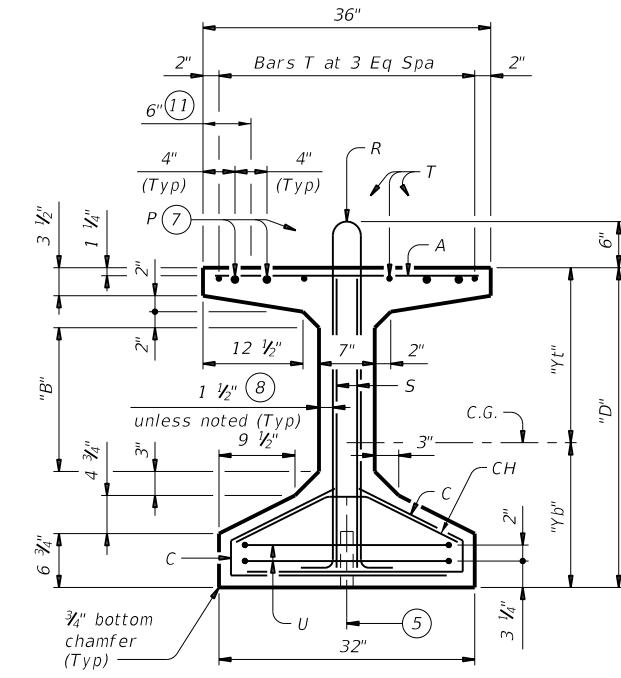
**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Provide Class H concrete. Provide Grade 60 reinforcing steel. An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted. It is permissible for bars or strands to come in contact with materials used in forming anchor holes.  
 Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



**TYPE Tx62 & Tx70**



**TYPE Tx46 & Tx54**



**TYPE Tx28, Tx34 & Tx40**



**PRESTRESSED CONCRETE I-GIRDER DETAILS**

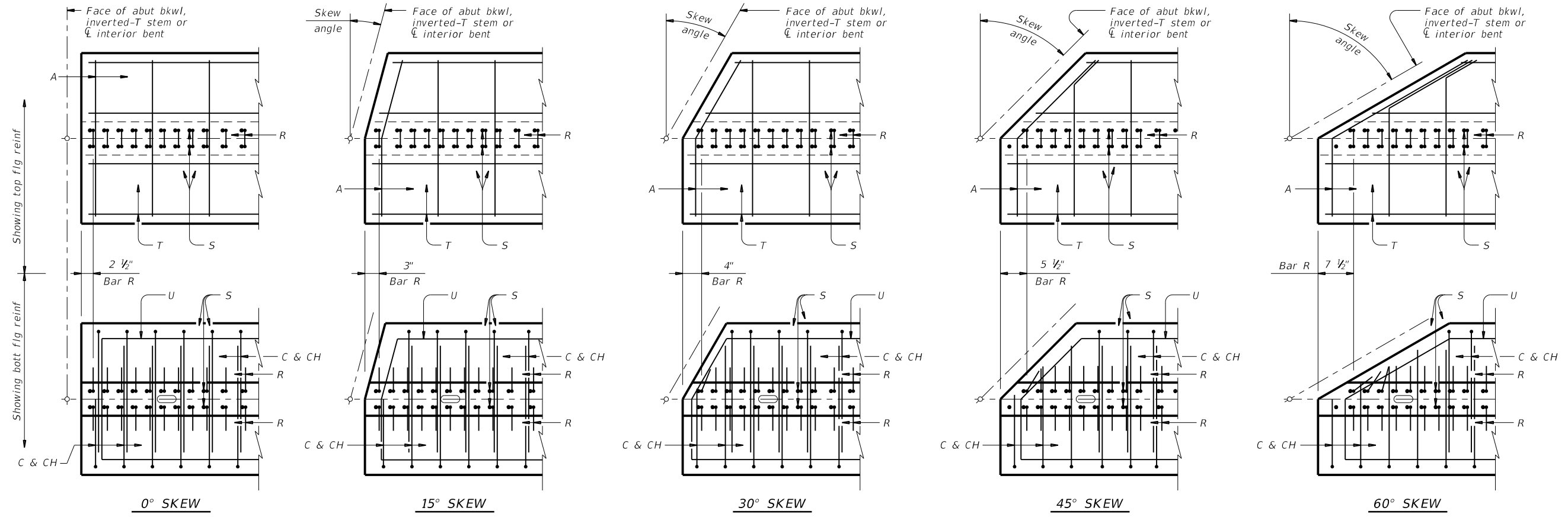
IGD

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©TXDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
10-19: Added Bars C and CH full length for VC <= 20'	DIST	COUNTY	SHEET NO.	
	LFK	POLK	45	



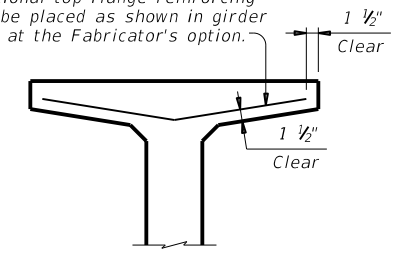
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of units or for incorrect results or damages resulting from its use.

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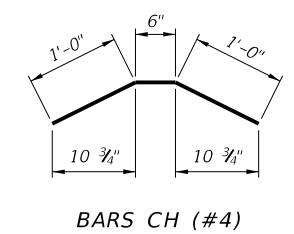


**PLAN OF GIRDER ENDS (12)**

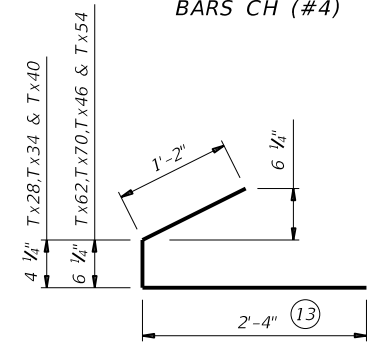
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



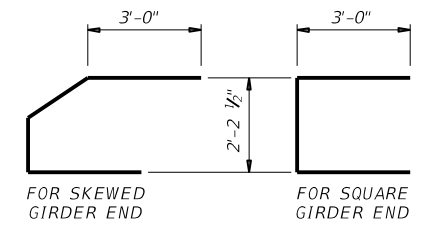
**OPTIONAL TOP FLANGE REINFORCING DETAIL**



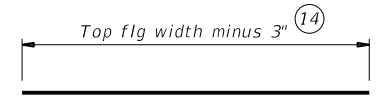
BARS CH (#4)



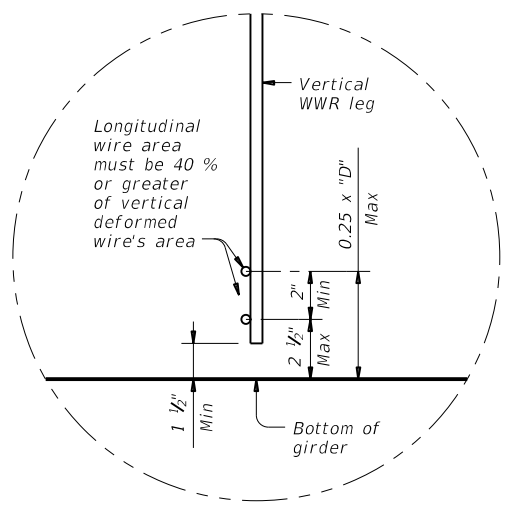
BARS C (#4)



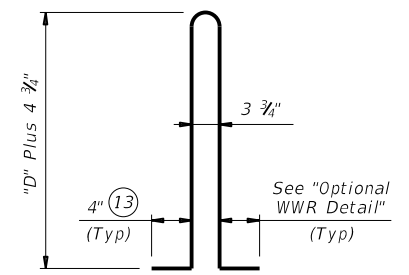
BARS U (#5)



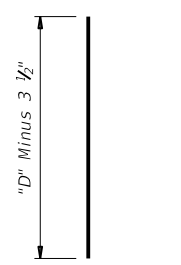
BARS A (#3)



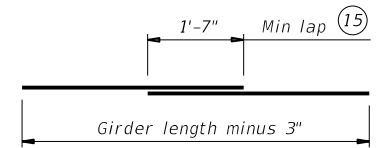
**OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL**



BARS R (#4) (16)



BARS S (#6)



BARS T (#4)

- (12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.
- (13) Bars may be cut or bent at skewed end as required.
- (14) Increase as necessary for bars at skewed end.
- (15) No portion of bar less than 10 ft.
- (16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.



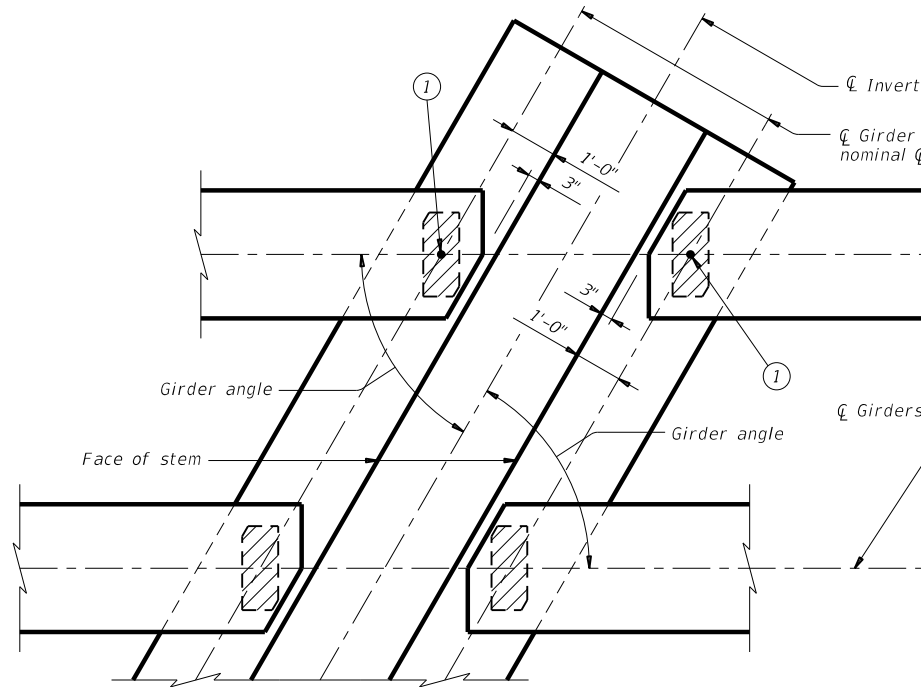
**PRESTRESSED CONCRETE I-GIRDER DETAILS**

IGD

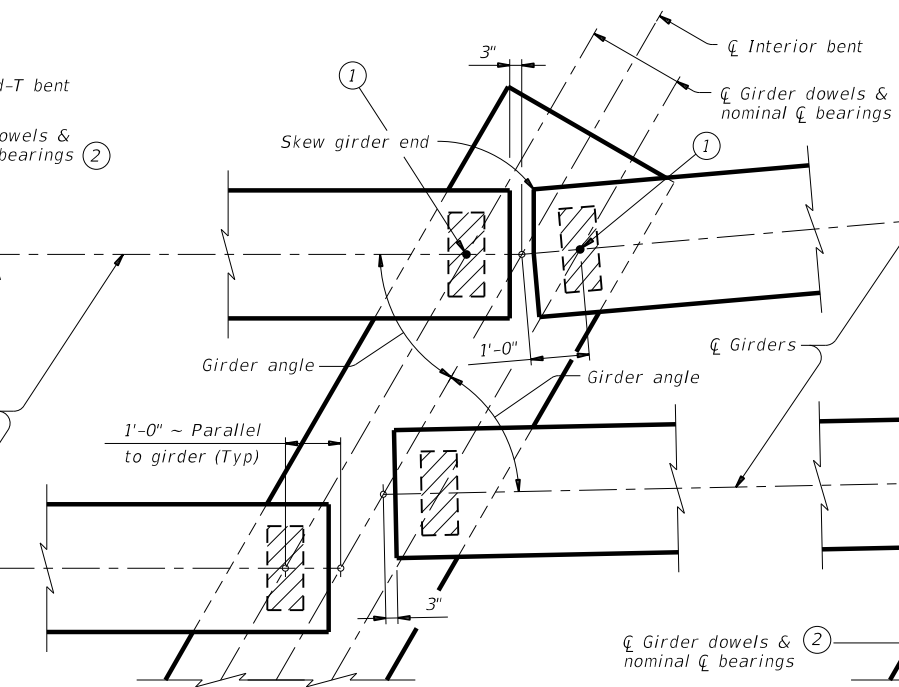
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
10-19: Added Bars C and CH full length for VC <= 20'	DIST	COUNTY	SHEET NO.	
	LFK	POLK	46	

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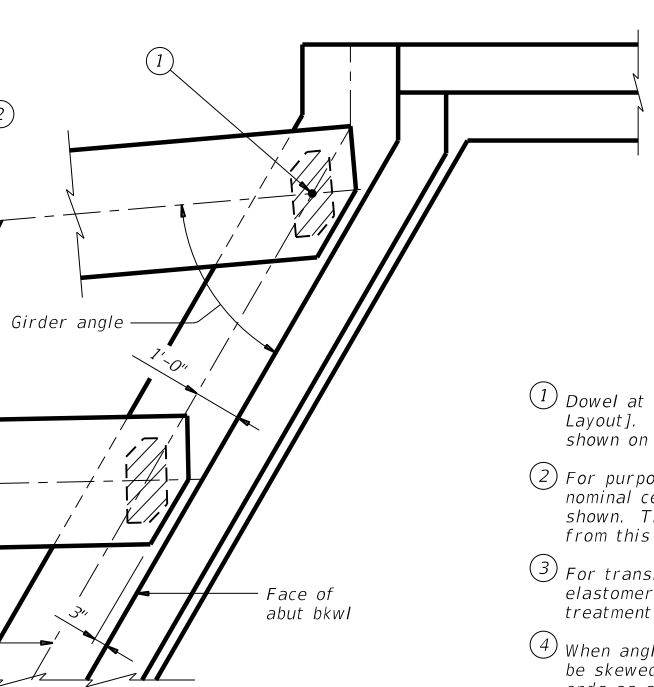
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AT INVERTED-T BENT W/SKEW

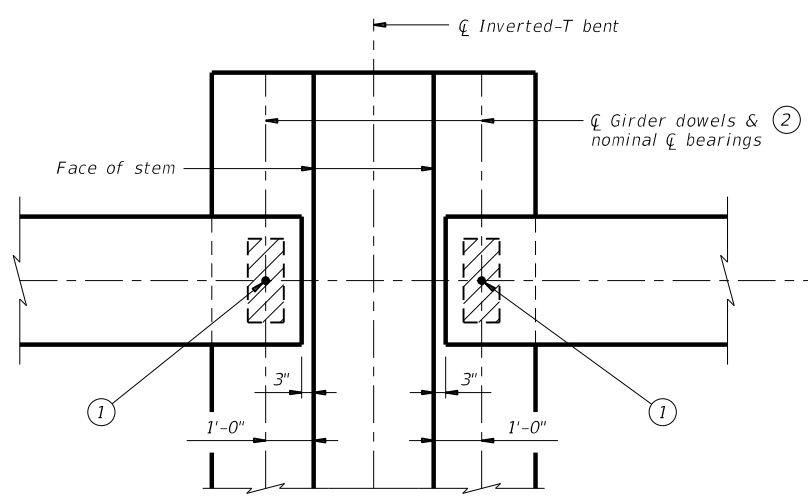


AT CONVENTIONAL INTERIOR BENT W/SKEW

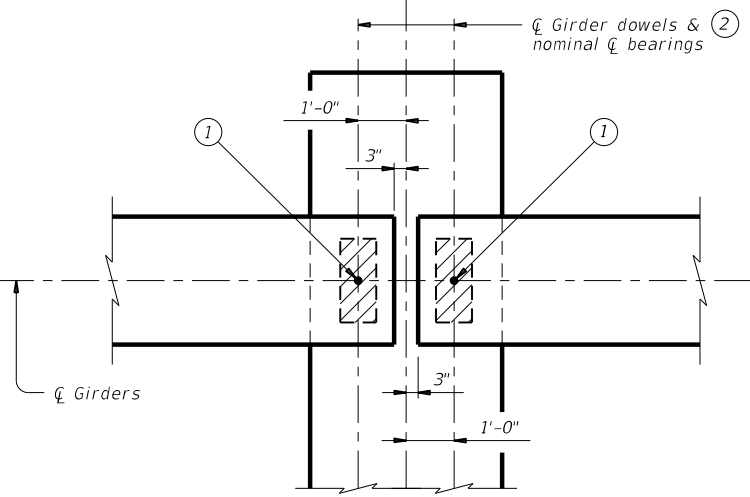


AT ABUTMENT W/SKEW

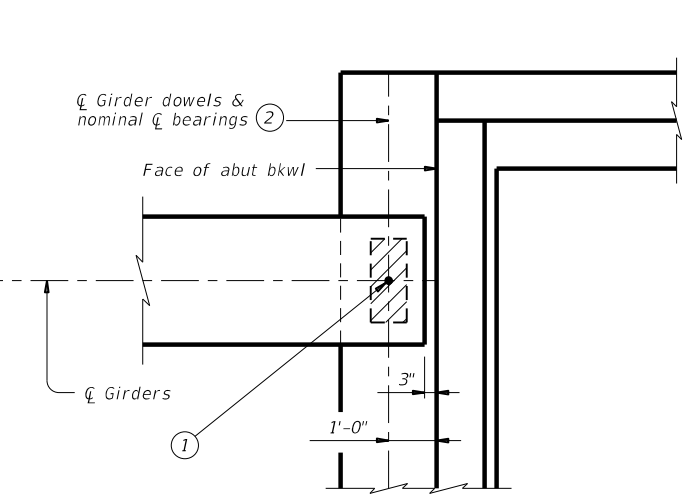
- ① Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.
- ② For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- ③ For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.
- ④ When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.
- ⑤ See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.



AT INVERTED-T BENT



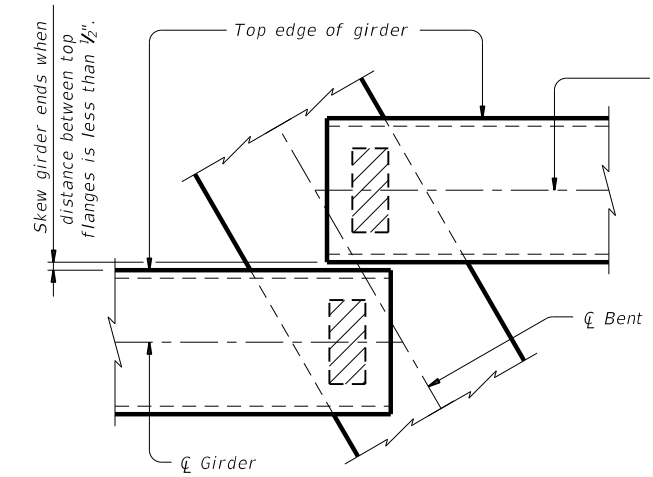
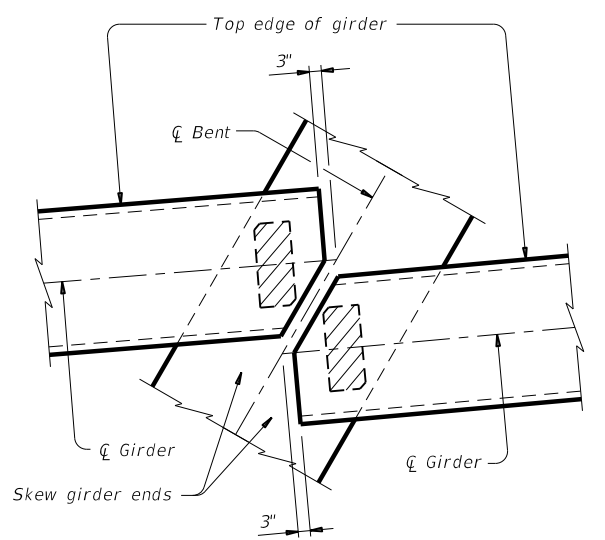
AT CONVENTIONAL INTERIOR BENT



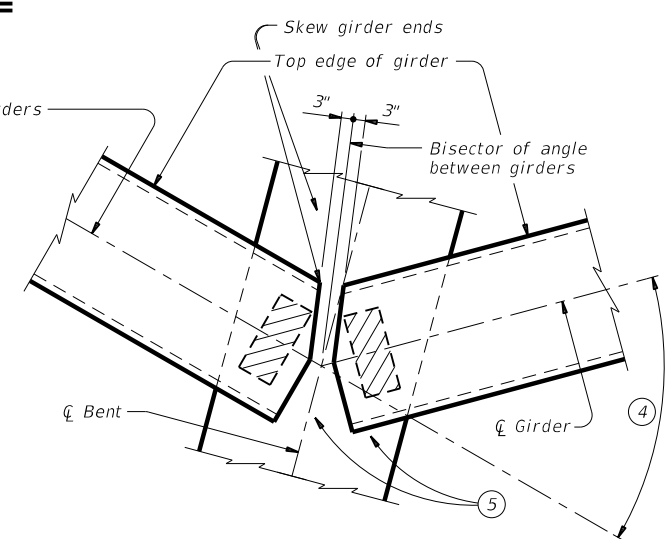
AT ABUTMENT

**GIRDER END DETAILS**

**GENERAL NOTES:**  
 These details accommodate skew angles up to 60°. 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, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".



**GIRDER CONFLICT DETAILS**



HL93 LOADING SHEET 1 OF 3

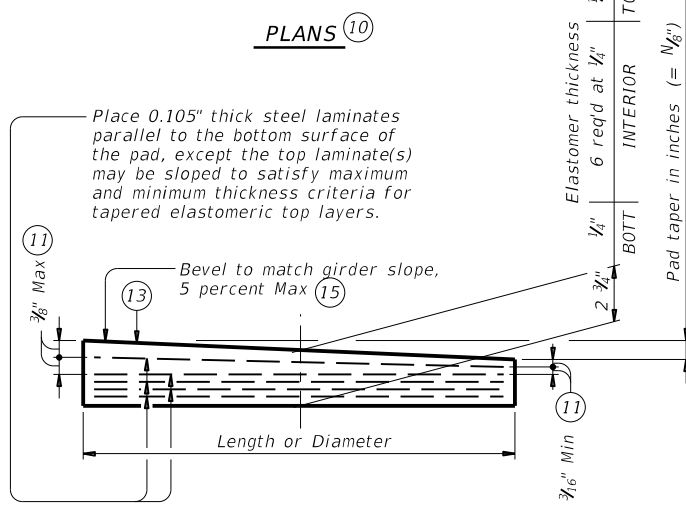
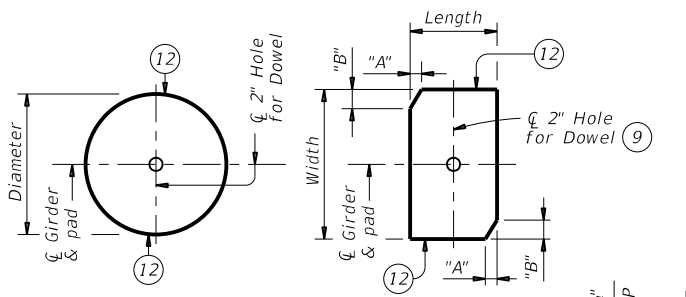
**Texas Department of Transportation** Bridge Division Standard

**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
 PRESTR CONCRETE I-GIRDERS

**IGEB**

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	LFK	POLK	47	

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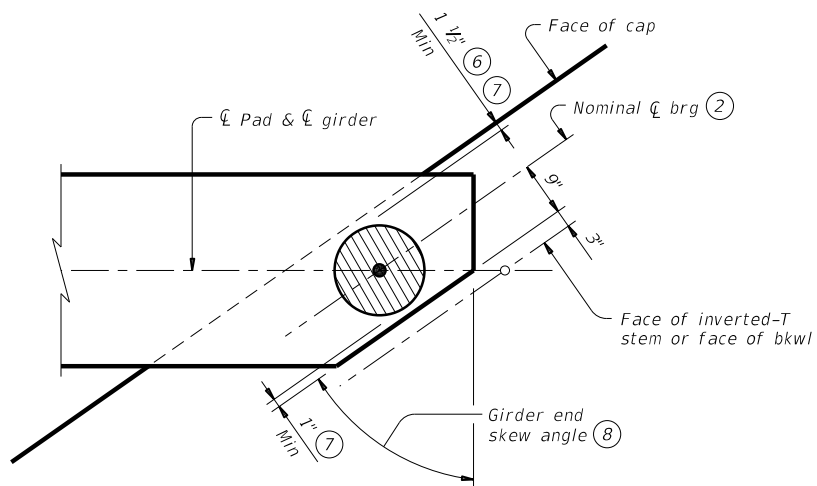
**LAMINATED ELASTOMERIC BEARING PAD**  
(50 DUROMETER)

**TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)**

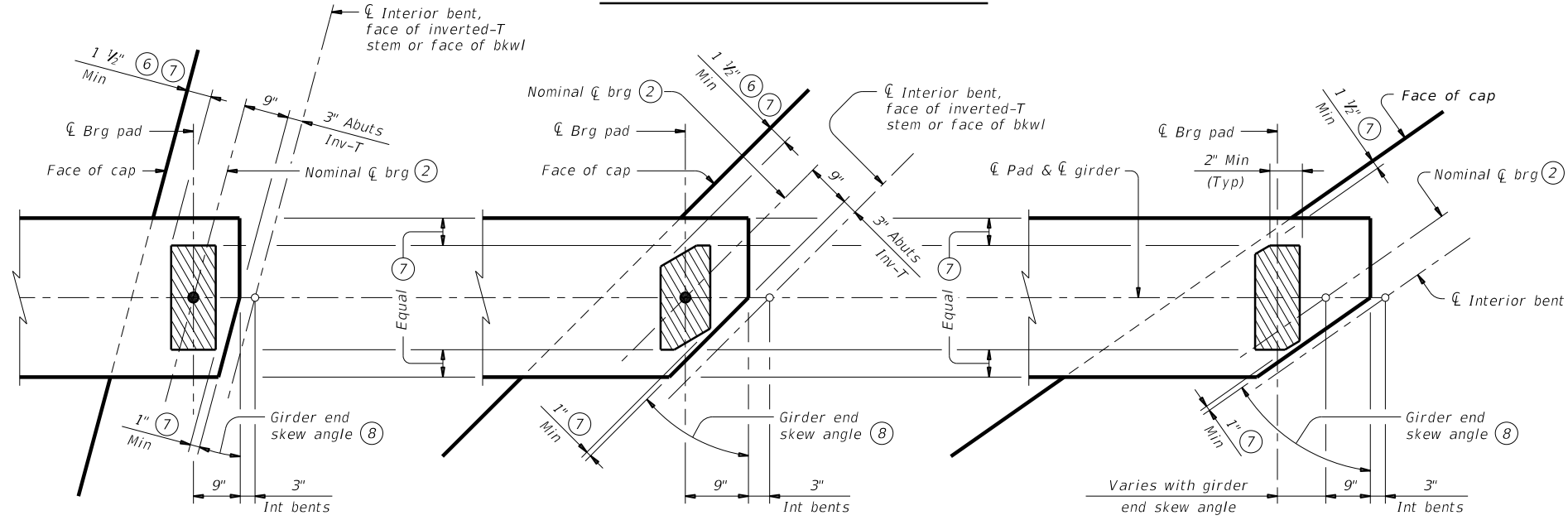
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 1/2"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 1/2"

**TABLE OF BEARING PAD DIMENSIONS**

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions	
					"A"	"B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 1/2"	2 1/2"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 1/2"	4 1/2"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 1/2"	2 1/2"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 1/2"	4 1/2"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 1/4"	4 1/4"
CONVENTIONAL INTERIOR BENTS	Tx28, Tx34, Tx40, Tx46 & Tx54	---	---	---	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 1/2"	2 1/2"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 1/2"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 1/2"	1 1/2"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 3/4"



**ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL**



**SKWED GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL**

**SKWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16) (NO GIRDER DOWELS)**

**BEARING PAD PLACEMENT DIAGRAMS**

- (2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- (6) 3" for inverted-T.
- (7) Place centerline pad as near nominal centerline bearing as possible between limits shown.
- (8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.
- (9) Provide 2" dia hole only at locations required. See Substructure details for location.
- (10) See Table of Bearing Pad Dimensions for dimensions.
- (11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- (12) Locate Permanent Mark here.
- (13) 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 1/8" increments) in this mark.  
Examples: N=0, (for 0" taper)  
N=1, (for 1/8" taper)  
N=2, (for 1/4" taper)  
(etc.)  
Fabricated pad top surface slope must not vary from plan girder slope by more than (0.0625" / IN) IN/IN.
- (14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.
- (15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.
- (16) If girder end is skewed for a girder conflict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
**PRESTR CONCRETE I-GIRDERS**

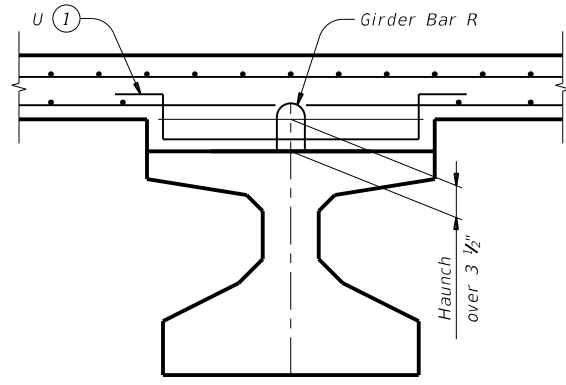
**IGEB**  
 Bridge Division Standard

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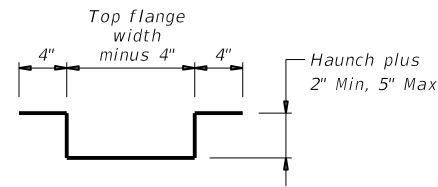


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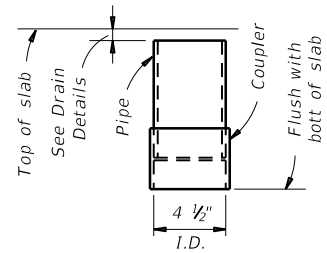
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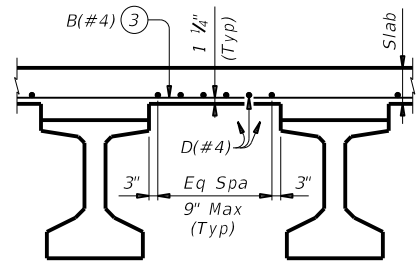
**HAUNCH REINFORCING DETAIL**



**BARS U (#4)**

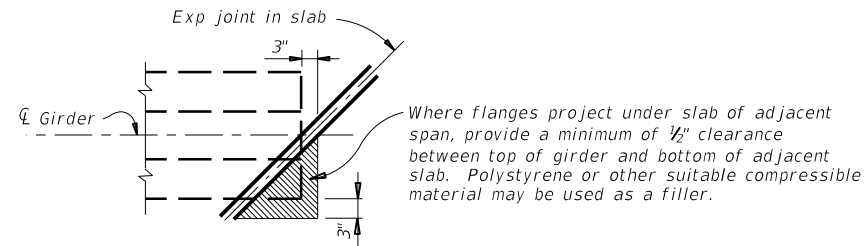


**C-I-P DRAIN DETAIL**

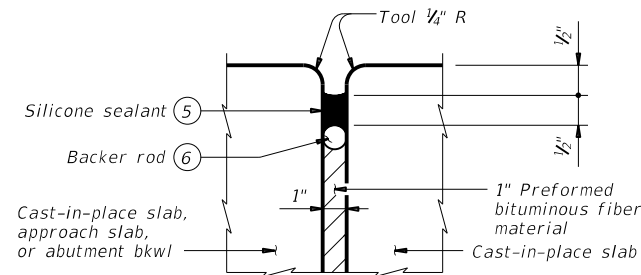


**TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP**

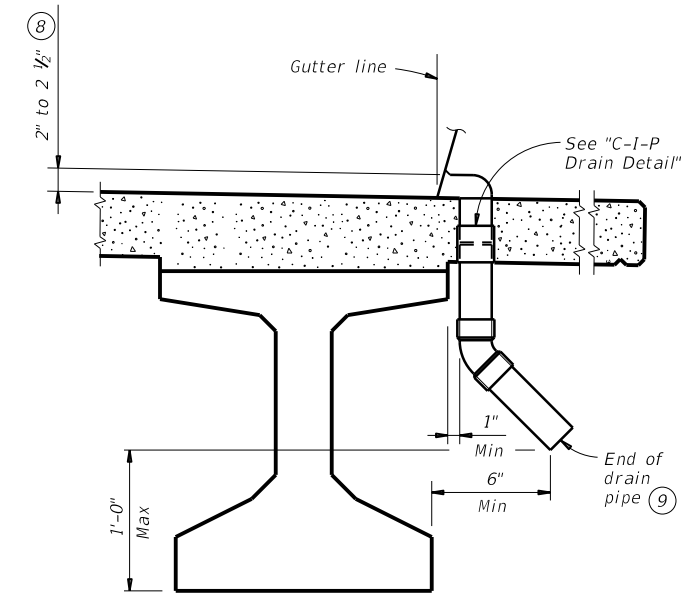
Top reinforcing steel not shown for clarity.



**TREATMENT AT GIRDER END FOR SKEWED SPANS**



**TYPE A JOINT DETAIL**



**DRAIN DETAIL**

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."  
 All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

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

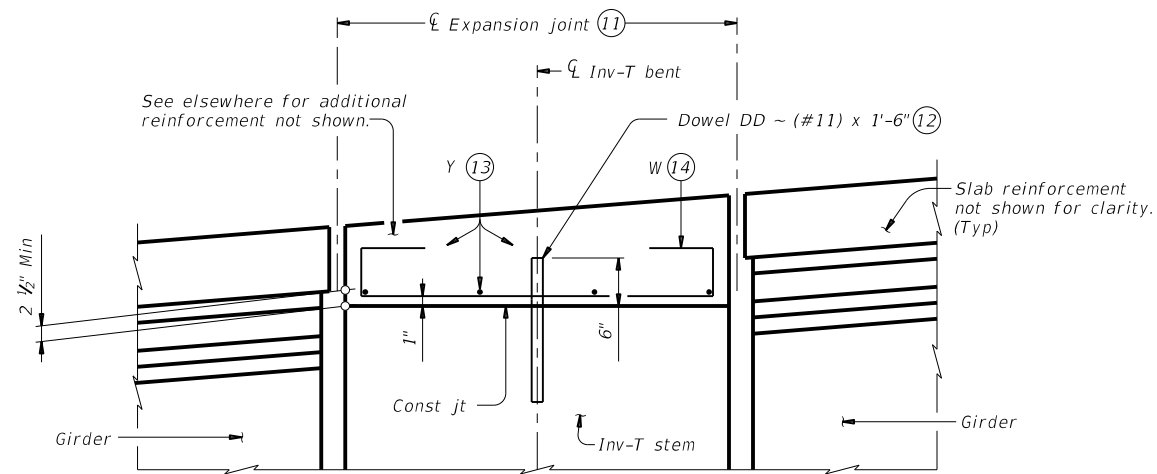
**DECK FORMWORK NOTES:**  
 Overhang bracket hangers are limited to a safe working load of 3,600 lbs, applied to and along the axis of a coil rod at 45 degrees from vertical, regardless of higher loads permitted by hanger manufacturers. Do not place a hanger less than 12" from girder end. Space hangers accordingly.

- ① Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 1/2".
- ② Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
- ③ Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.
- ④ Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy coated ~ #4 = 2'-5"
- ⑤ 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.
- ⑥ 1 1/4" 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.
- ⑦ The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.
- ⑧ Drain entrance formed in rail or sidewalk.
- ⑨ Water may not be discharged onto girders.
- ⑩ All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

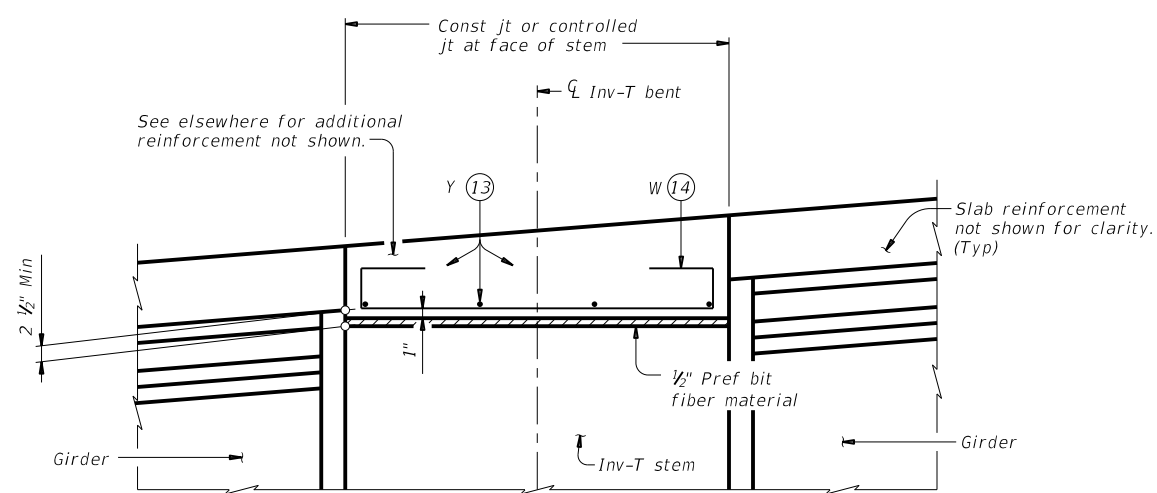
SHEET 1 OF 2

		<b>Bridge Division Standard</b>	
<b>MISCELLANEOUS SLAB DETAILS</b> <b>PRESTR CONCRETE I-GIRDERS</b>			
<b>IGMS</b>			
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©TxDOT August 2017	CONT	SECT	HIGHWAY
REVISIONS	0911	04	089 CR
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY	SHEET NO.
	LFK	POLK	50

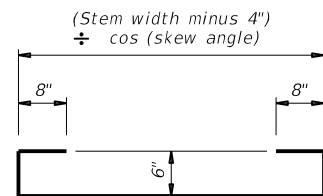
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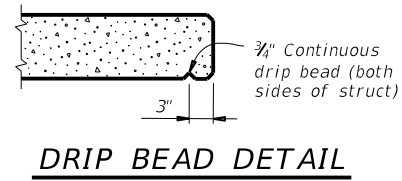
**SHOWING EXPANSION JOINTS**



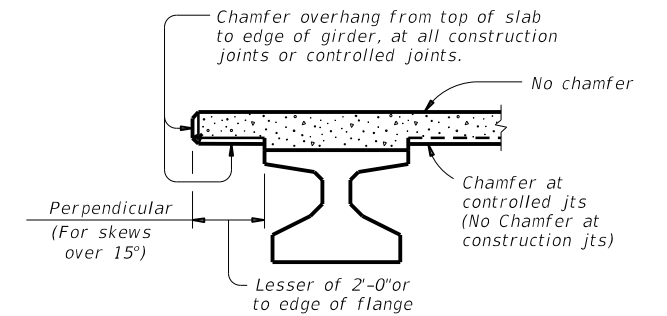
**SHOWING CONST JTS OR CONTROLLED JTS  
REINFORCEMENT OVER INV-T BENTS**



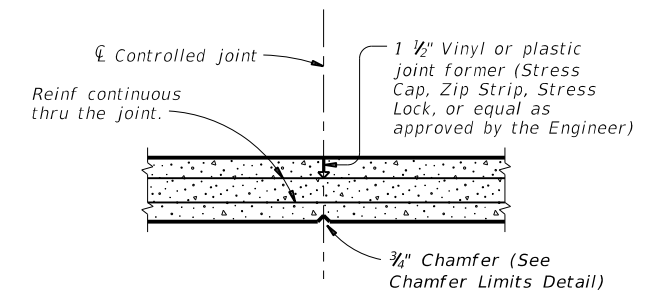
**BARS W (#4)**



**DRIP BEAD DETAIL**



**CHAMFER LIMITS DETAIL (15)**



**CONTROLLED JOINT DETAIL**

(Saw-cutting is not allowed)

- (11) See Layout for joint type.
- (12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.
- (13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.
- (14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.
- (15) See Span details for type of joint and joint locations.

SHEET 2 OF 2

		<b>Bridge Division Standard</b>	
<b>MISCELLANEOUS SLAB DETAILS PRESTR CONCRETE I-GIRDERS</b>			
<b>IGMS</b>			
FILE: igmsst1-19.dgn	DN: TXDOT	CK: TXDOT	DW: JTR
©TXDOT August 2017	CONT	SECT	JOB
REVISIONS	0911	04	089
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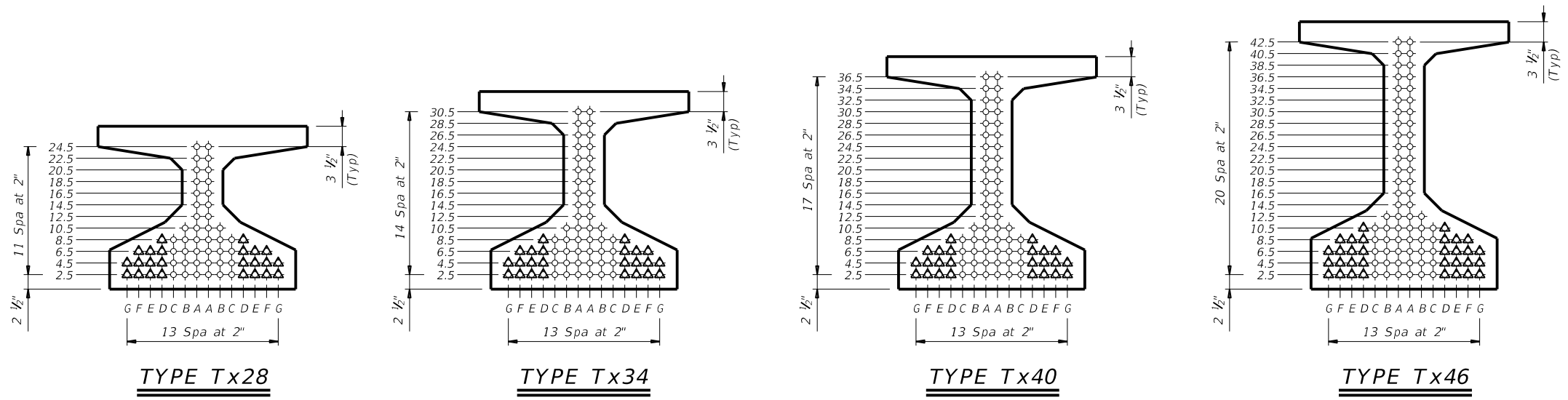
STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.					TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP $\epsilon$ ) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOT $\epsilon$ ) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" $\bar{c}$ (in)		"e" END (in)	Moment	Shear	Inv							Opr	Inv	
Type Tx28 Girders 24' Roadway 8.5" Slab	40	ALL	Tx28		10	0.6	270	10.48	10.48			4.000	5.000	1.055	-1.423	1382	0.670	0.850	1.56	2.02	1.98	
	45	ALL	Tx28		12	0.6	270	10.48	10.48			4.500	5.000	1.332	-1.744	1525	0.650	0.850	1.58	2.05	1.79	
	50	ALL	Tx28		12	0.6	270	10.48	10.48			4.200	5.000	1.645	-2.113	1657	0.630	0.860	1.25	1.62	1.25	
	55	ALL	Tx28		14	0.6	270	10.48	9.62		2	8.5	4.000	5.000	1.969	-2.490	1919	0.610	0.860	1.27	1.64	1.11
	60	ALL	Tx28		18	0.6	270	10.04	7.81		4	14.5	4.000	5.600	2.320	-2.901	2206	0.600	0.870	1.43	1.86	1.14
	65	ALL	Tx28		22	0.6	270	9.75	6.12		4	24.5	4.300	5.900	2.716	-3.337	2486	0.580	0.870	1.55	2.00	1.14
	70	ALL	Tx28		26	0.6	270	9.56	6.48		4	24.5	5.200	6.300	3.131	-3.802	2793	0.570	0.870	1.26	1.89	1.01
	75	ALL	Tx28		28	0.6	270	9.48	6.62		4	24.5	5.600	7.800	3.572	-4.291	3110	0.560	0.880	1.38	1.81	1.08
Type Tx34 Girders 24' Roadway 8.5" Slab	40	ALL	Tx34		10	0.6	270	13.01	13.01			4.000	5.000	0.835	-1.089	1605	0.690	0.830	1.85	2.40	2.60	
	45	ALL	Tx34		10	0.6	270	13.01	13.01			4.500	5.500	1.050	-1.332	1750	0.670	0.840	1.90	2.46	2.42	
	50	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.294	-1.612	1868	0.650	0.840	1.53	1.98	1.81	
	55	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.553	-1.904	1981	0.630	0.840	1.24	1.61	1.33	
	60	ALL	Tx34		14	0.6	270	13.01	12.44		2	6.5	4.000	5.000	1.845	-2.231	2287	0.620	0.850	1.27	1.64	1.22
	65	ALL	Tx34		16	0.6	270	12.76	11.76		4	8.5	4.000	5.000	2.161	-2.579	2605	0.610	0.850	1.25	1.62	1.06
	70	ALL	Tx34		20	0.6	270	12.41	9.61		4	18.5	4.000	5.100	2.461	-2.902	2888	0.590	0.850	1.46	1.89	1.13
	75	ALL	Tx34		24	0.6	270	12.18	7.84		4	30.5	4.300	5.400	2.818	-3.283	3223	0.580	0.860	1.57	2.04	1.15
	80	ALL	Tx34		26	0.6	270	12.09	8.09		4	30.5	4.700	5.700	3.168	-3.660	3554	0.570	0.860	1.39	1.96	1.04
	85	ALL	Tx34		30	0.6	270	11.81	7.81		6	26.5	5.400	6.100	3.567	-4.078	3909	0.560	0.860	1.46	2.00	1.04
Type Tx40 Girders 24' Roadway 8.5" Slab	40	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.697	-0.889	1671	0.720	0.820	2.10	2.73	3.15	
	45	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.873	-1.080	1972	0.690	0.820	1.74	2.26	2.50	
	50	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	1.065	-1.299	2276	0.670	0.830	1.78	2.31	2.33	
	55	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	1.283	-1.538	2237	0.650	0.830	1.46	1.90	1.80	
	60	ALL	Tx40		14	0.6	270	15.60	15.60			4.200	5.000	1.522	-1.801	2434	0.640	0.830	1.49	1.93	1.66	
	65	ALL	Tx40		14	0.6	270	15.60	15.60			4.000	5.000	1.780	-2.081	2688	0.630	0.840	1.24	1.60	1.25	
	70	ALL	Tx40		16	0.6	270	15.35	14.85		4	6.5	4.000	5.000	2.035	-2.349	2989	0.610	0.840	1.28	1.65	1.17
	75	ALL	Tx40		18	0.6	270	15.16	14.27		4	8.5	4.000	5.000	2.328	-2.657	3337	0.600	0.840	1.28	1.66	1.05
	80	ALL	Tx40		22	0.6	270	14.87	11.24		4	24.5	4.000	5.000	2.616	-2.961	3681	0.590	0.850	1.47	1.90	1.11
	85	ALL	Tx40		26	0.6	270	14.68	9.76		4	36.5	4.400	5.100	2.930	-3.287	4041	0.580	0.850	1.60	2.08	1.22
	90	ALL	Tx40		28	0.6	270	14.60	10.03		4	36.5	4.800	5.500	3.259	-3.626	4410	0.570	0.850	1.55	2.01	1.07
	95	ALL	Tx40		32	0.6	270	14.23	8.60		6	36.5	5.100	5.800	3.620	-3.991	4799	0.560	0.850	1.62	2.10	1.06
	100	ALL	Tx40		36	0.6	270	13.93	8.93		6	36.5	5.800	6.600	4.006	-4.393	5245	0.560	0.850	1.47	1.94	1.06
Type Tx46 Girders 24' Roadway 8.5" Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.613	-0.708	1732	0.740	0.810	2.35	3.05	3.78	
	45	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.768	-0.865	2066	0.720	0.810	1.93	2.50	3.01	
	50	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.937	-1.042	2452	0.700	0.820	1.97	2.55	2.81	
	55	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	1.127	-1.235	2726	0.680	0.820	1.63	2.11	2.22	
	60	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.332	-1.438	2951	0.660	0.820	1.68	2.18	2.10	
	65	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.557	-1.662	2905	0.650	0.820	1.41	1.82	1.64	
	70	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.798	-1.898	3157	0.640	0.830	1.18	1.52	1.25	
	75	ALL	Tx46		16	0.6	270	17.35	16.85		4	6.5	4.000	5.000	2.050	-2.137	3495	0.620	0.830	1.23	1.59	1.17
	80	ALL	Tx46		18	0.6	270	17.16	16.27		4	8.5	4.000	5.000	2.304	-2.384	3859	0.610	0.830	1.25	1.63	1.09
	85	ALL	Tx46		22	0.6	270	16.88	15.06		4	14.5	4.000	5.000	2.591	-2.656	4249	0.600	0.830	1.46	1.89	1.30
	90	ALL	Tx46		24	0.6	270	16.77	14.10		4	20.5	4.000	5.000	2.870	-2.923	4631	0.590	0.840	1.45	1.88	1.06
	95	ALL	Tx46		28	0.6	270	16.60	11.46		4	40.5	4.200	5.000	3.192	-3.234	5087	0.590	0.840	1.57	2.03	1.08
	100	ALL	Tx46		32	0.6	270	16.23	9.48		6	42.5	4.400	5.000	3.524	-3.542	5513	0.580	0.840	1.65	2.14	1.07
	105	ALL	Tx46		36	0.6	270	15.94	9.94		6	42.5	5.000	5.800	3.856	-3.851	5937	0.570	0.840	1.72	2.23	1.17
110	ALL	Tx46		38	0.6	270	15.81	10.45		6	40.5	5.400	6.300	4.200	-4.169	6370	0.560	0.840	1.67	2.16	1.04	
115	ALL	Tx46		42	0.6	270	15.60	10.75		6	40.5	6.000	7.000	4.584	-4.532	6886	0.560	0.840	1.46	1.96	1.05	

- 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.  
 Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.  
 Prestress losses for the designed girders 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 bars.  
 Use low relaxation strands, each pretensioned to 75 percent of fpu.  
 Strand debonding must comply with Item 424.4.2.2.4. Full-length debonded strands are only permitted in positions marked  $\Delta$ . Double wrap full-length debonded strands in outer most position of each row.  
 When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.  
 Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

**DEPRESSED STRAND DESIGNS:**  
 Locate strands for the designed girder 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", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



SHEET 1 OF 2

Texas Department of Transportation  
 Bridge Division Standard

**PRESTRESSED CONCRETE  
 I-GIRDER STANDARD  
 DESIGNS**  
 24' ROADWAY

**IGSD-24**

FILE: ig01stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TXDOT	CONV	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
10-19: Redesigned girders. 1-21: Added load rating.	DIST	COUNTY	SHEET NO.	
	LFK	POLK	52	

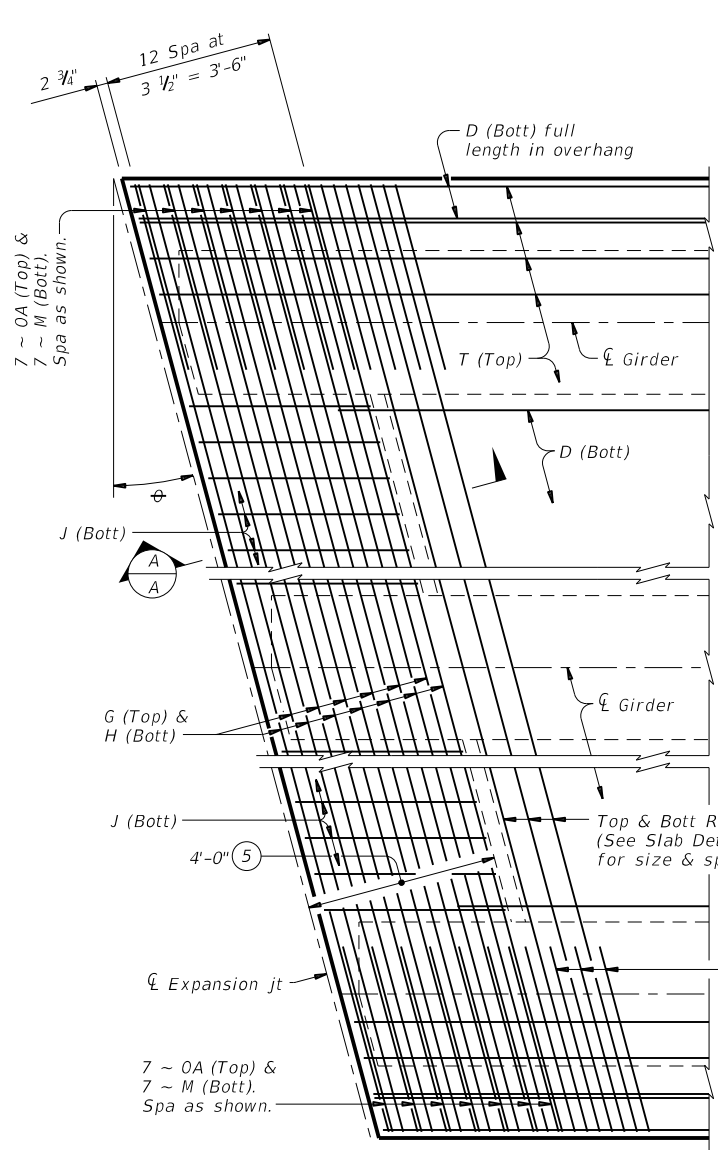




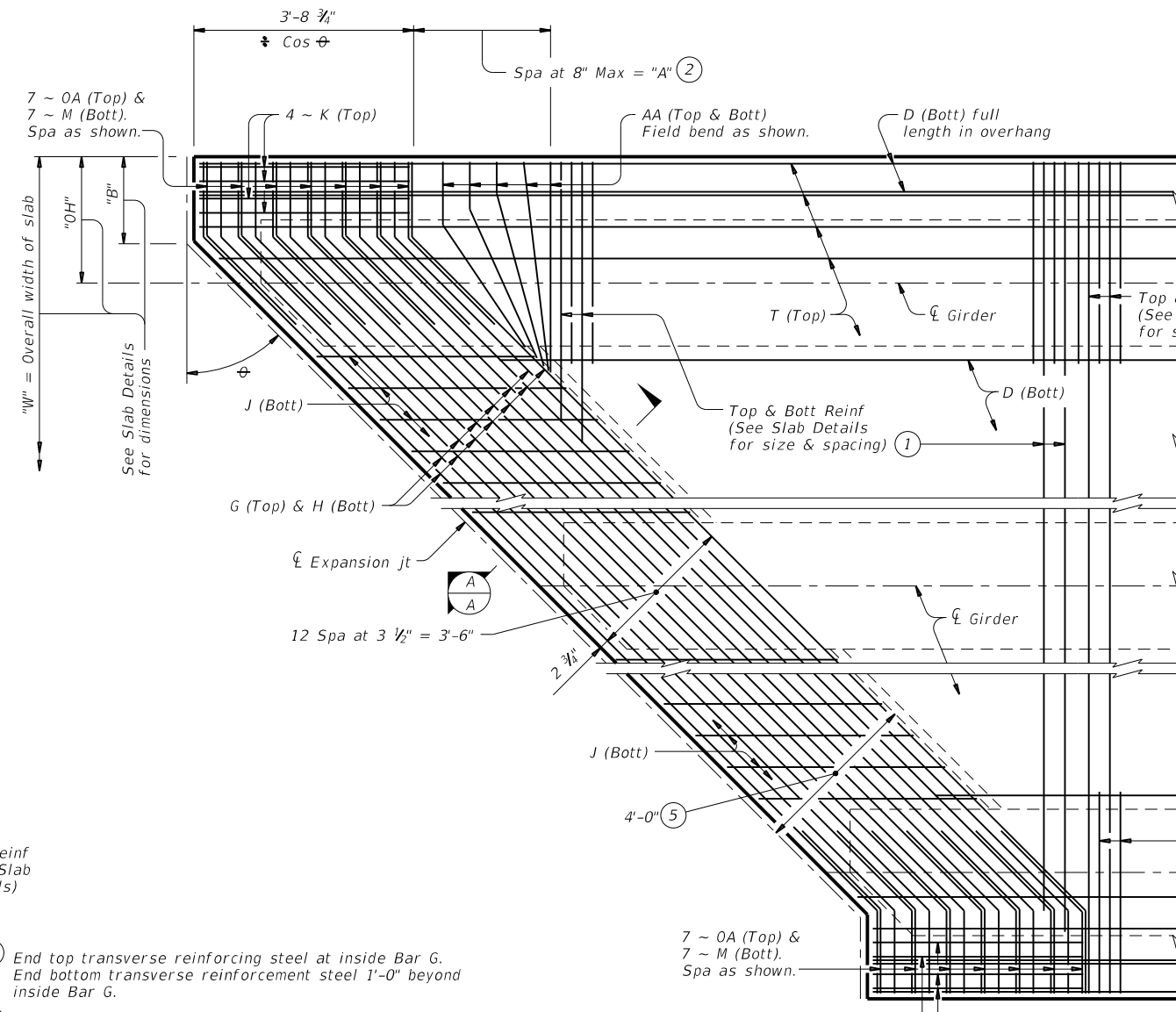


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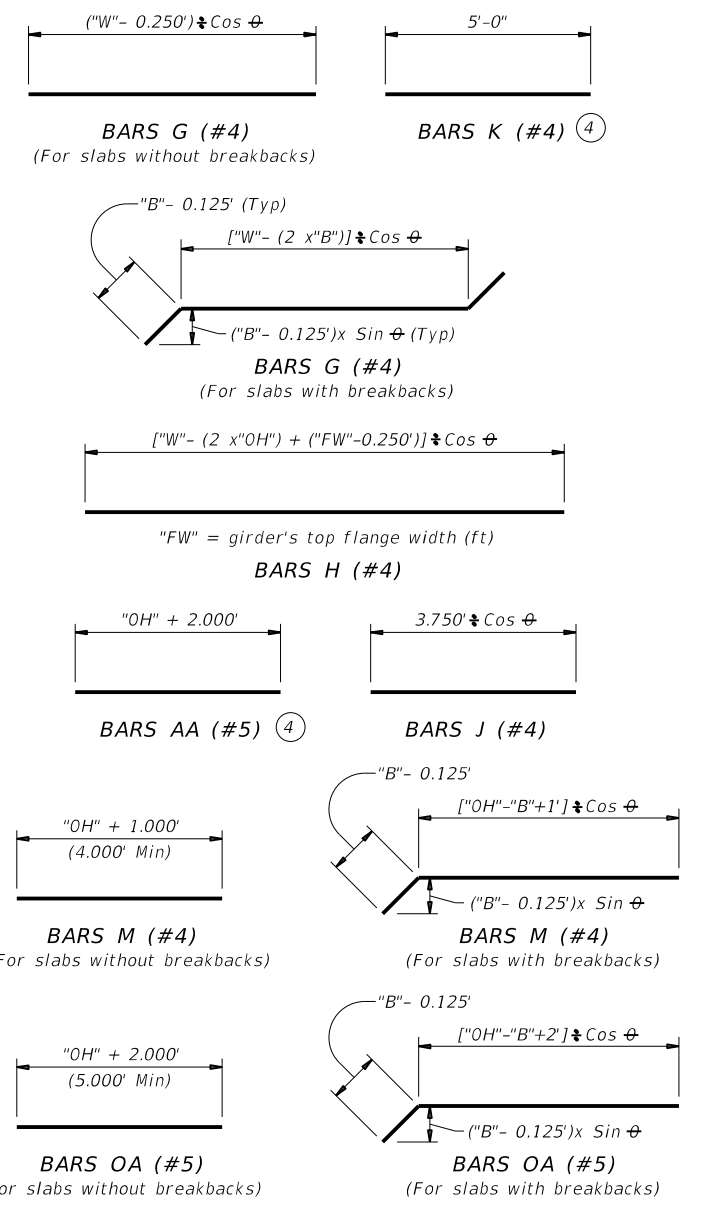


**PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK**



**PARTIAL PLAN FOR SLABS WITH BREAKBACK**

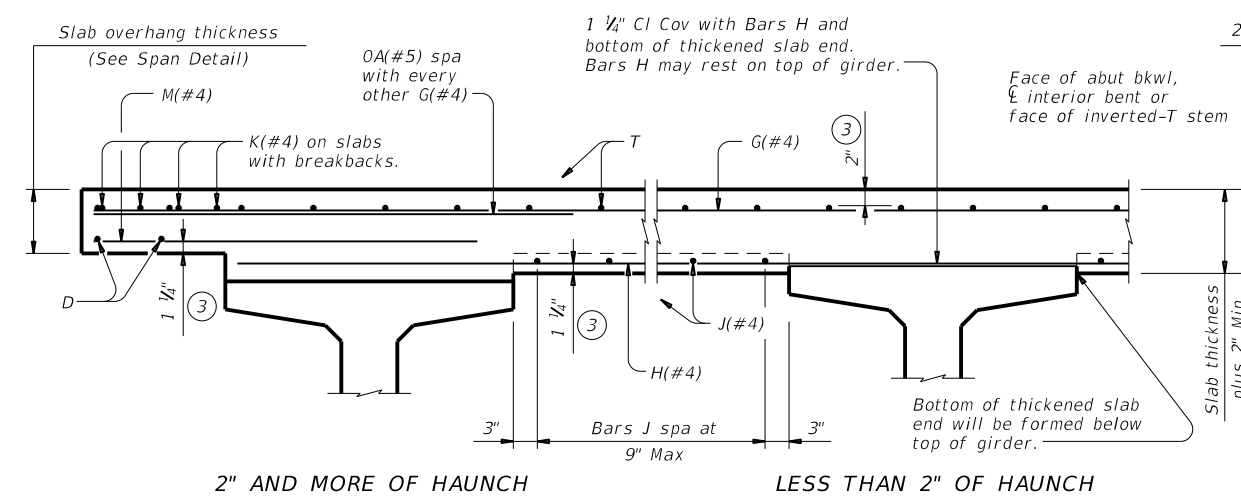
- ① End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
- ② "A" = ("OH" + 2.333' - "B") x Tan  $\phi$
- ③ Provide clear cover as indicated unless otherwise shown on Span Details.
- ④ Only required on slabs with breakbacks.
- ⑤ Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



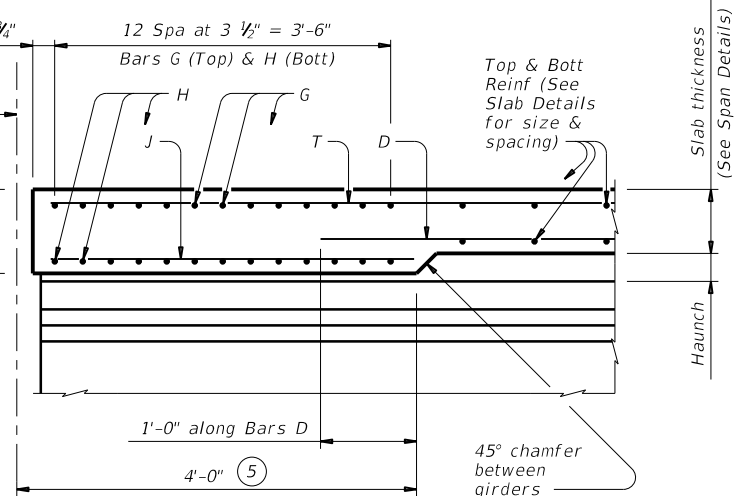
**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. These details are restricted to Prestressed Concrete I-Girder Spans. These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used). When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel. If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated. Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"

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



**TYPICAL TRANSVERSE SECTION**  
 (Showing Prestressed Conc I-Girders at  $\phi$  Brg)

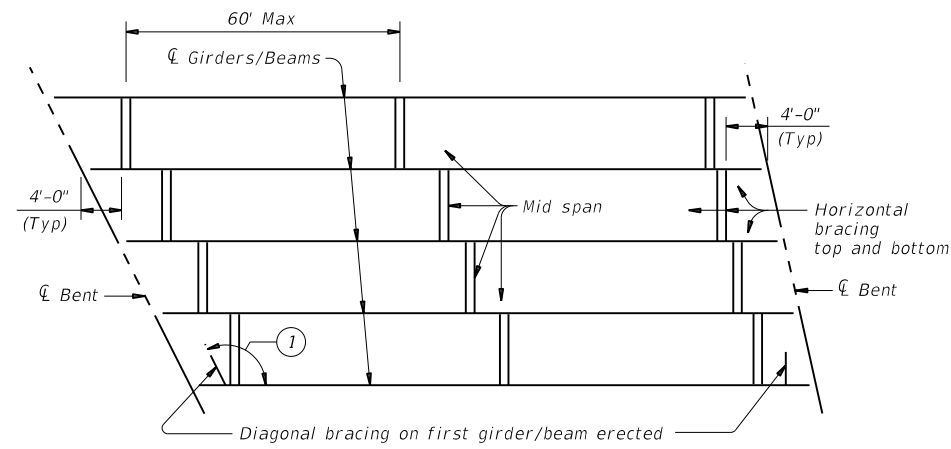


**SECTION A-A**  
 (Showing with 2" and more of haunch)

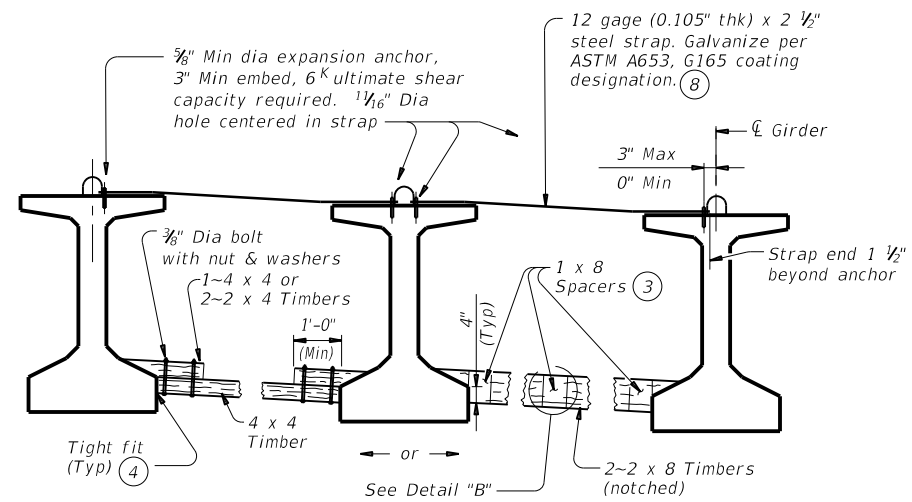
HL93 LOADING		Bridge Division Standard	
<b>THICKENED SLAB END DETAILS</b>			
<b>PRESTRESSED CONCRETE I-GIRDER SPANS</b>			
<b>IGTS</b>			
FILE: igtssst1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT	SECT	JOB
REVISIONS	0911	04	089
	DIST	COUNTY	SHEET NO.
	LFK	POLK	55

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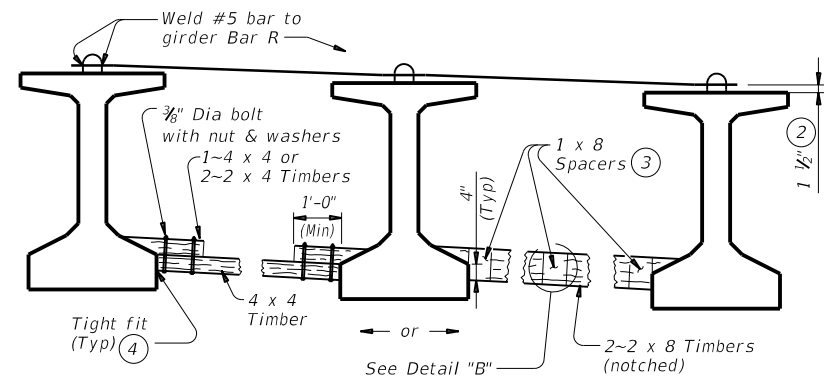


**ERECTION BRACING**



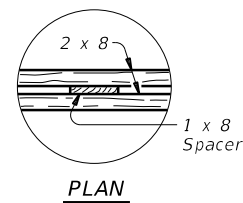
**FOR ERECTION BRACING, OPTION 1**

(This option is not allowed when slab is formed with PMDF or plywood.)

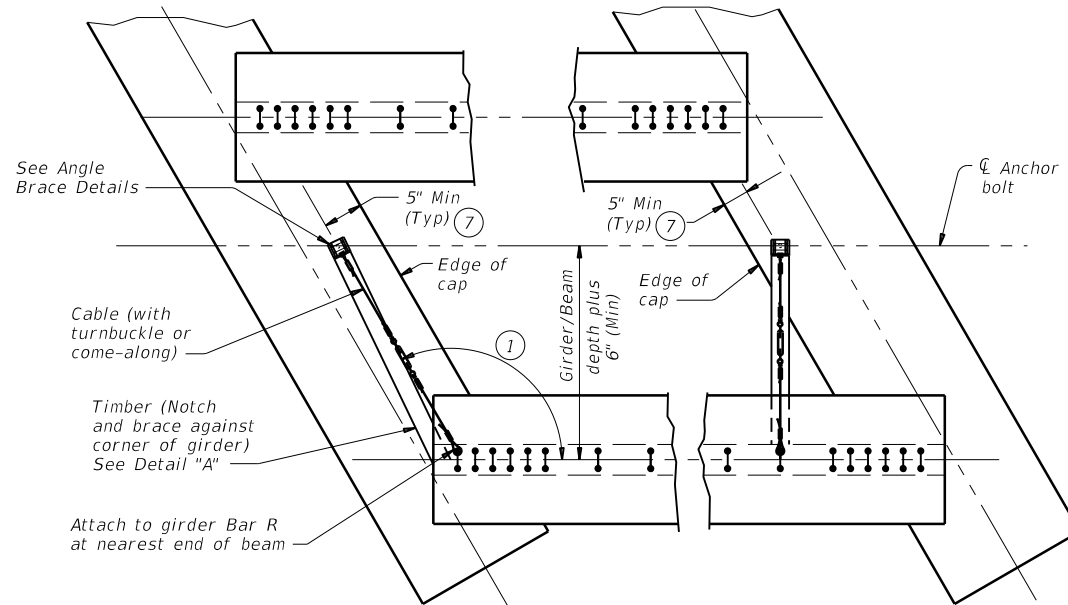


**FOR ERECTION BRACING, OPTION 2**

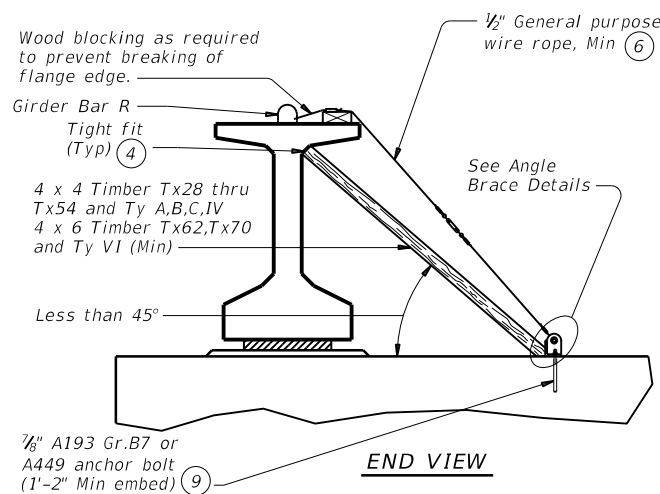
**HORIZONTAL BRACING DETAILS**



**DETAIL "B"**



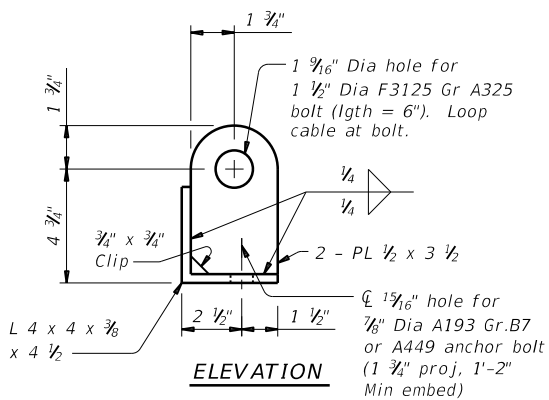
**PLAN**



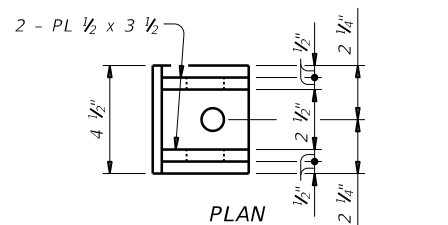
**END VIEW**

**DIAGONAL BRACING DETAILS**

(To be used on both ends of the first girder/beam erected in the span in each phase.)



**ELEVATION**



**PLAN**

**ANGLE BRACE DETAILS**

**HAULING & ERECTION:**

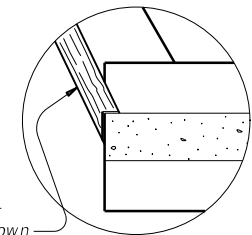
The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

**ERECTION BRACING:**

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425. Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

**PHASED CONSTRUCTION:**

Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



**DETAIL "A"**

- 1 If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.
- 2 Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).
- 3 Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- 4 Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- 5 Pressure treated landscape timbers can not be used.
- 6 All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing against the dead end.
- 7 It is acceptable to tie anchor bolts to cap reinforcement.
- 8 Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.
- 9 Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

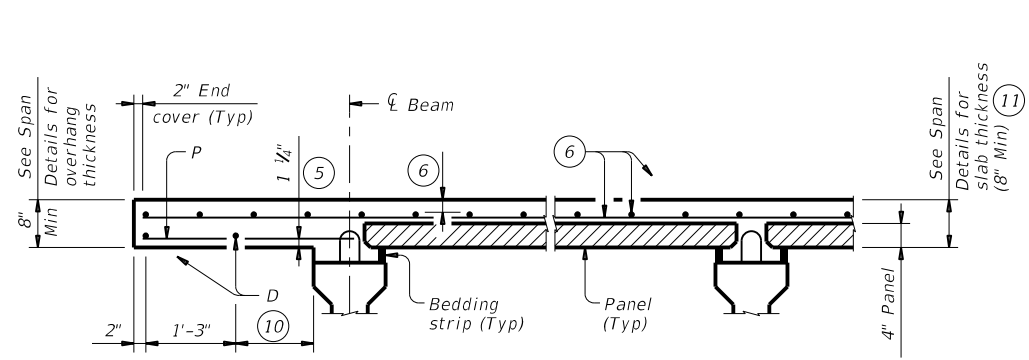
SHEET 1 OF 2

		<b>Bridge Division Standard</b>	
<b>MINIMUM ERECTION AND BRACING REQUIREMENTS PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS</b>			
<b>MEBR(C)</b>			
FILE: mebcst1-17.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT August 2017	CONTRACT NO: 0911	SECTION: 04	JOB NO: 089
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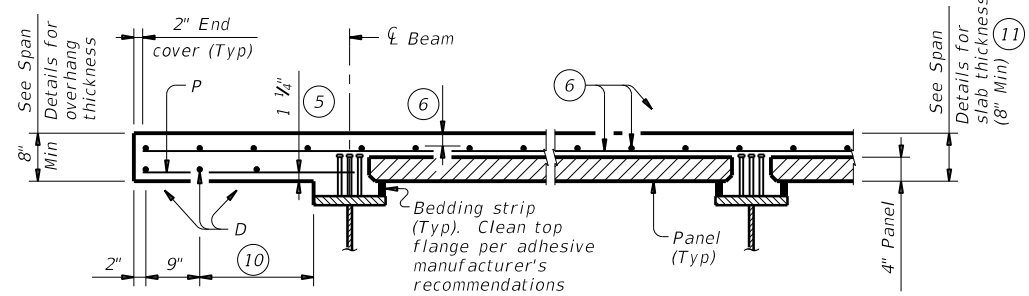




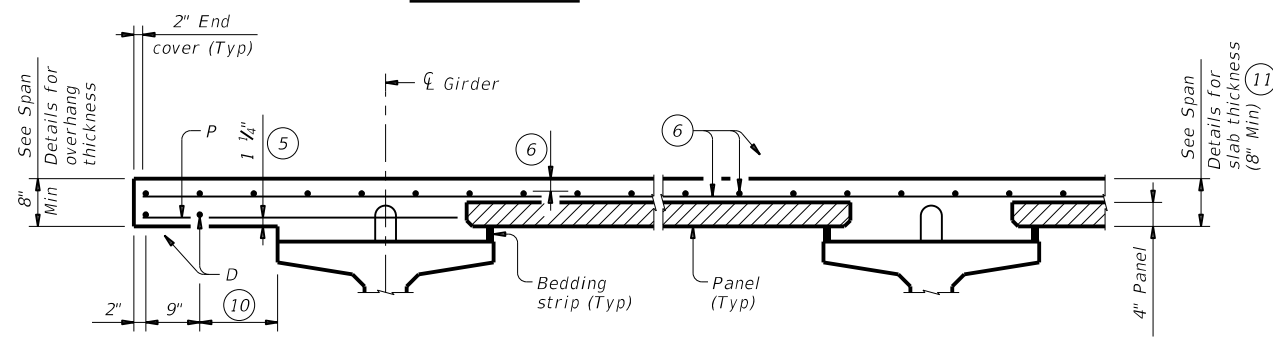
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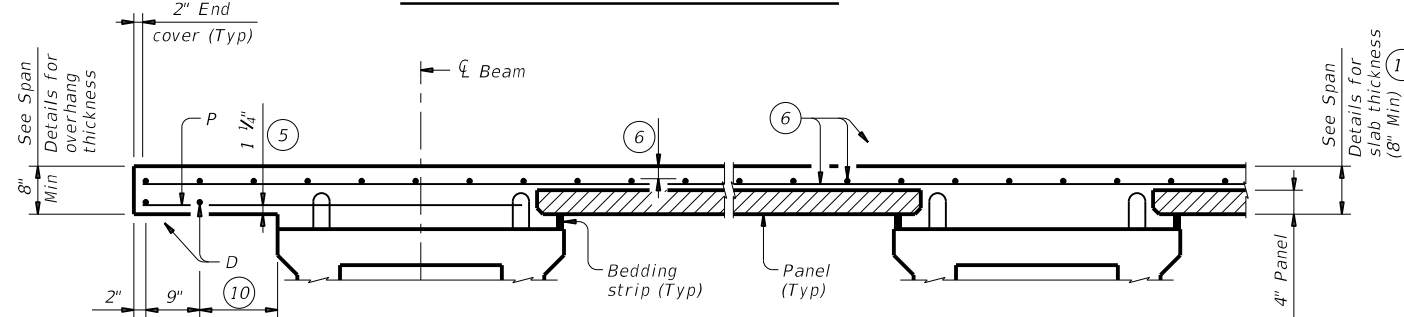
**PRESTRESSED CONCRETE I-BEAMS**



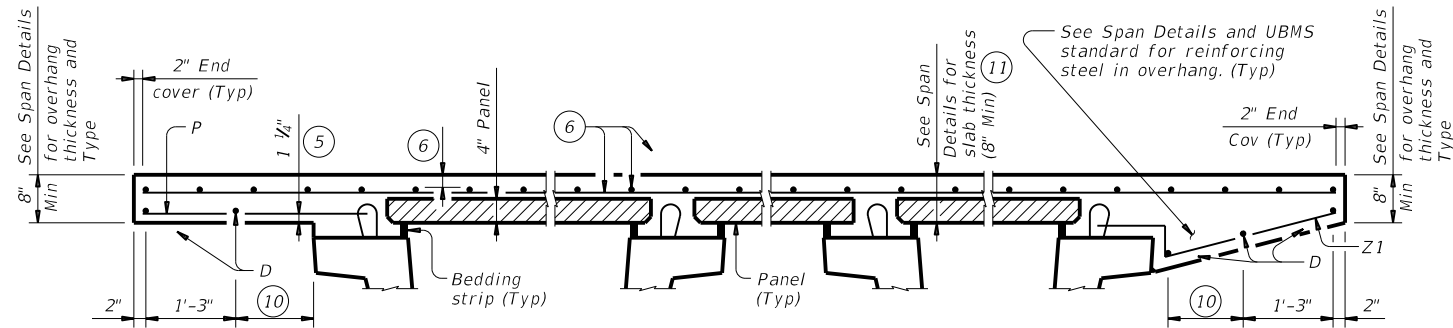
**STEEL BEAMS**



**PRESTRESSED CONCRETE I-GIRDERS**



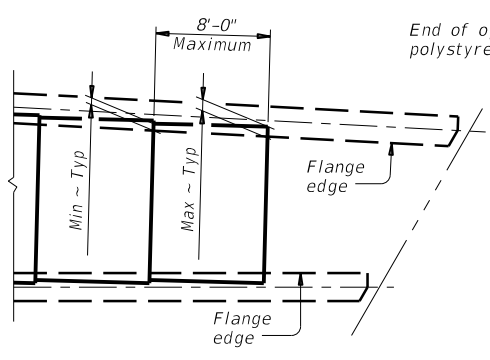
**PRESTRESSED CONCRETE X-BEAMS**



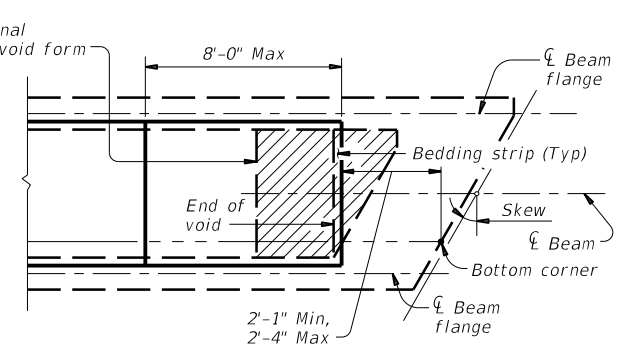
**NORMAL OVERHANG WITH PRESTR CONC U-BEAMS**

**TYPICAL PART TRANSVERSE SECTIONS**

**SLOPED OVERHANG WITH PRESTR CONC U-BEAMS**



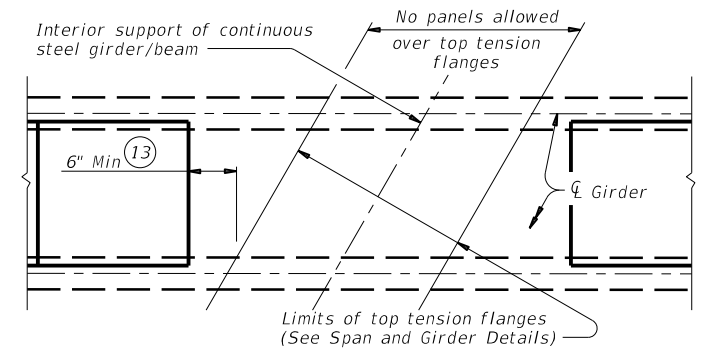
**AT FLARED BEAMS OR GIRDERS**  
 See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



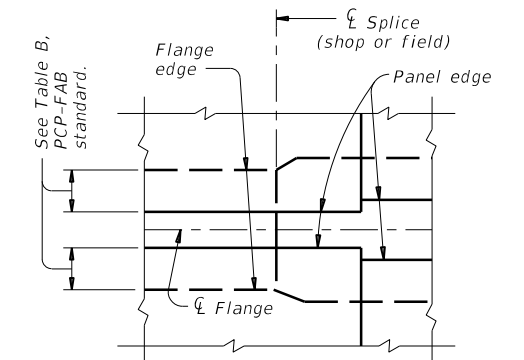
**OVER CONC U-BEAMS**

**PART PLANS OF PANEL PLACEMENT**

- 5 Provide clear cover as indicated unless otherwise shown on Span Details.
- 6 See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 9 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c..
- 10 Equally space additional bar if more than 1'-3" Max.
- 11 The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.
- 12 Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.
- 13 Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



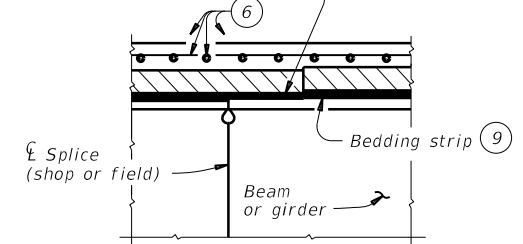
**AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS**



**PLAN AT SPLICE**

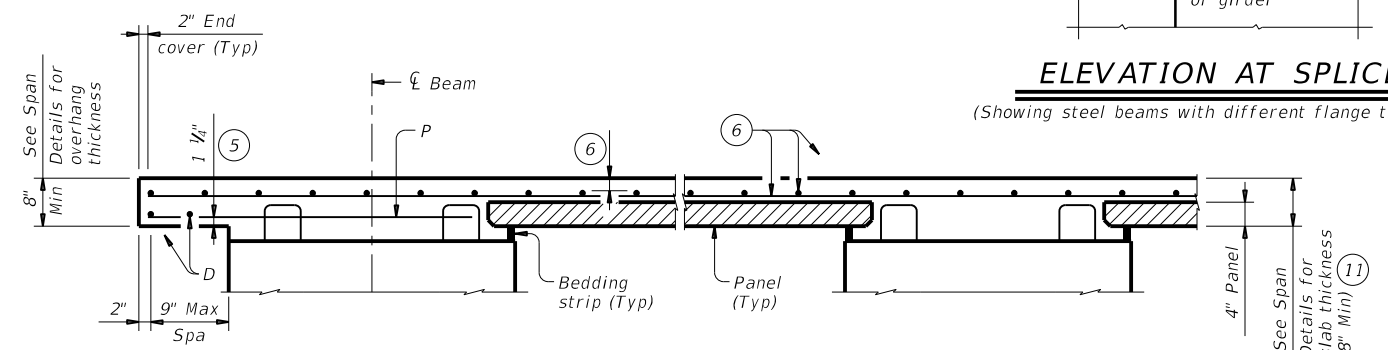
(Showing steel beams with flange width transition)

Cut bedding strip to adjust for difference in flange thickness.



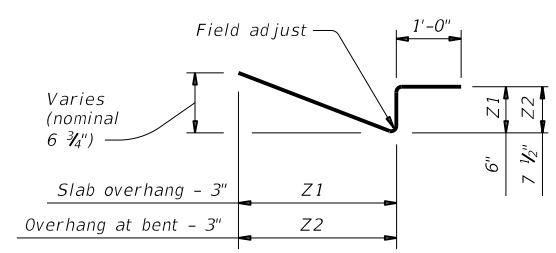
**ELEVATION AT SPLICE**

(Showing steel beams with different flange thickness)



**PRESTRESSED CONCRETE SPREAD SLAB BEAMS**

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



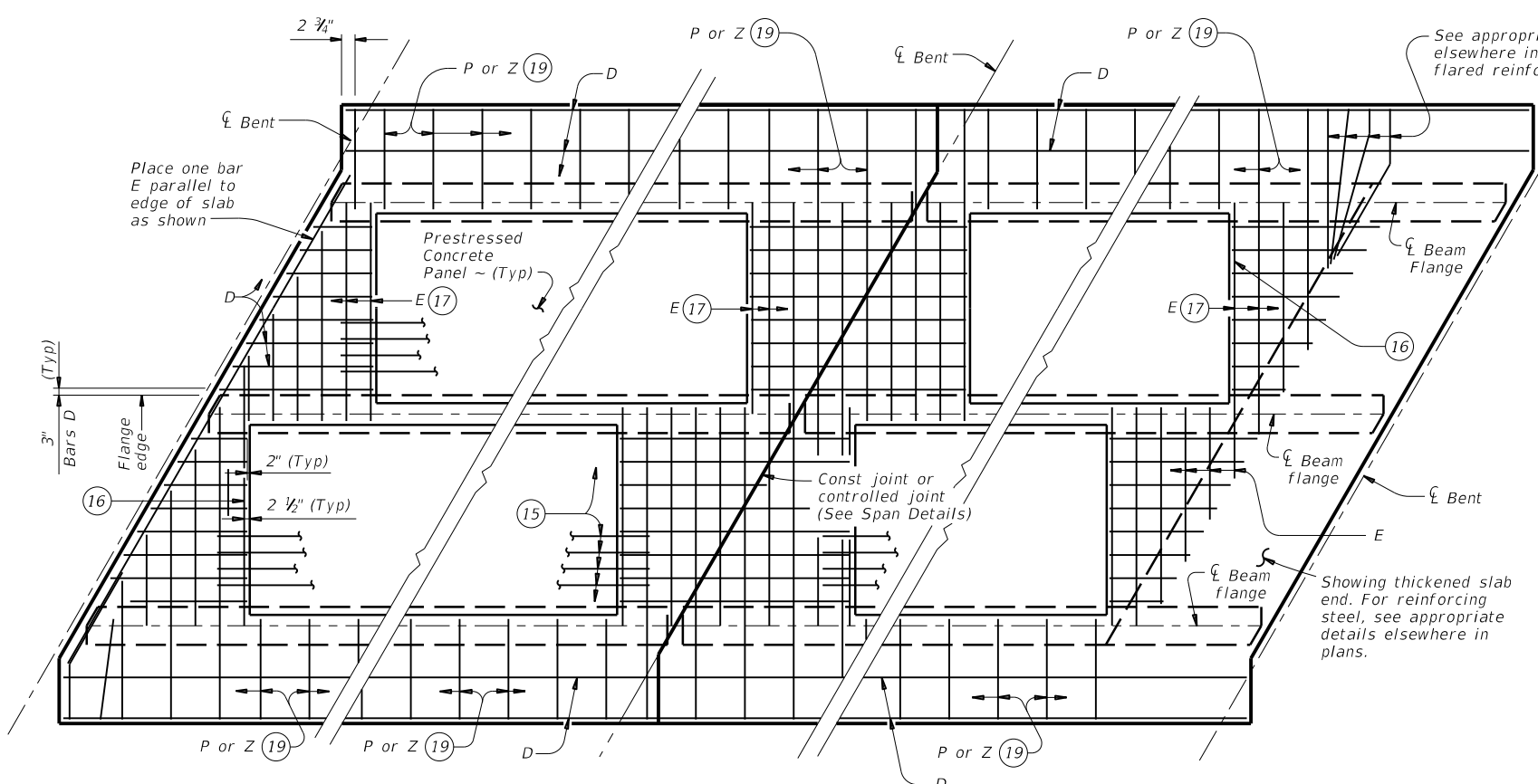
**BARS Z (#4) (12)**

**PRESTRESSED CONCRETE PANELS DECK DETAILS**

PCP

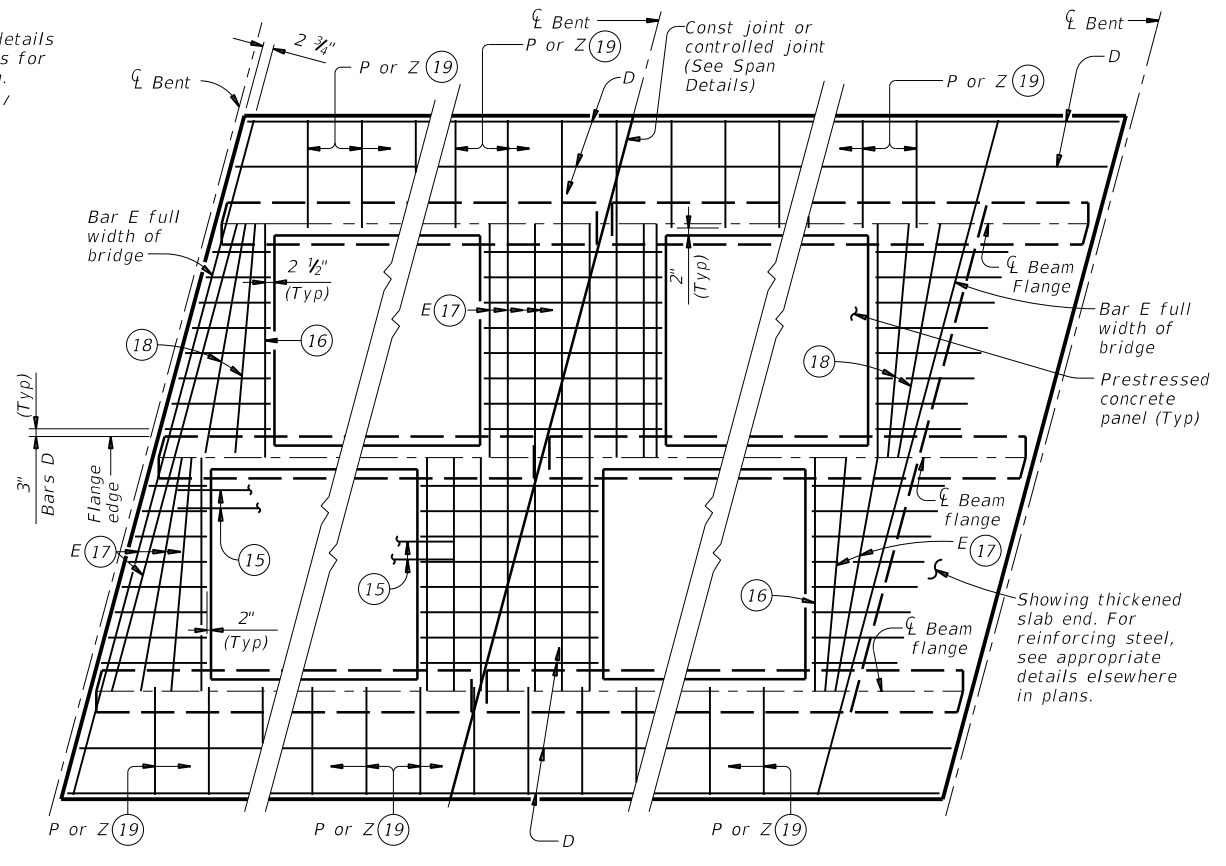
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	LFK	POLK	59	

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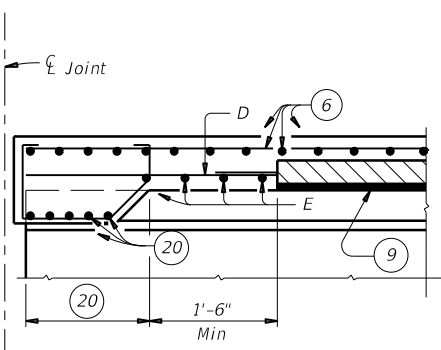
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE  
 AT INTERIOR BENTS  
 AT THICKENED END SLABS

**OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT**

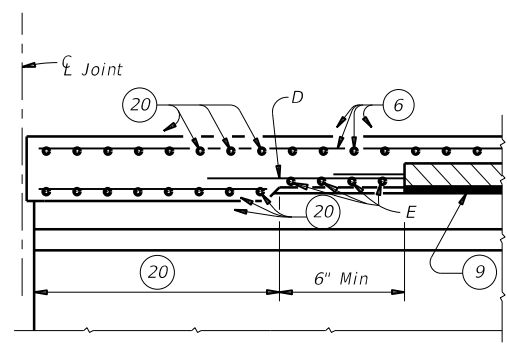


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE  
 AT INTERIOR BENTS  
 AT THICKENED END SLABS

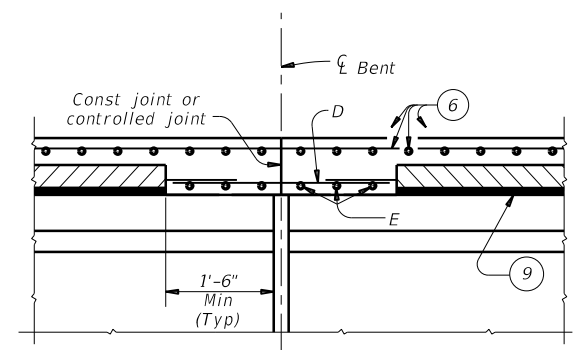
**OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT**



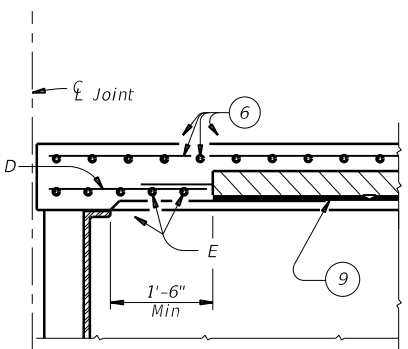
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



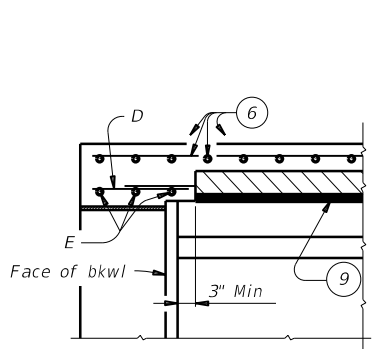
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



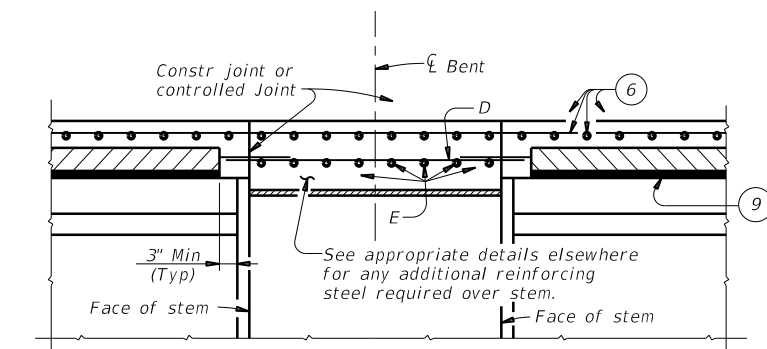
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

**OPTION 1 ~ ELEVATIONS AT BEAM ENDS**

- 6 See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- 9 Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/4" deep, in the top of the bedding strips at 8' o.c.
- 14 Max Spacing as listed unless otherwise shown.
- 15 At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.
- 16 Maintain one Bar E(#4) parallel to panel ends (Typ).
- 17 Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.
- 18 Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.
- 19 Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.
- 20 See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



**PRESTRESSED CONCRETE PANELS DECK DETAILS**

**PCP**

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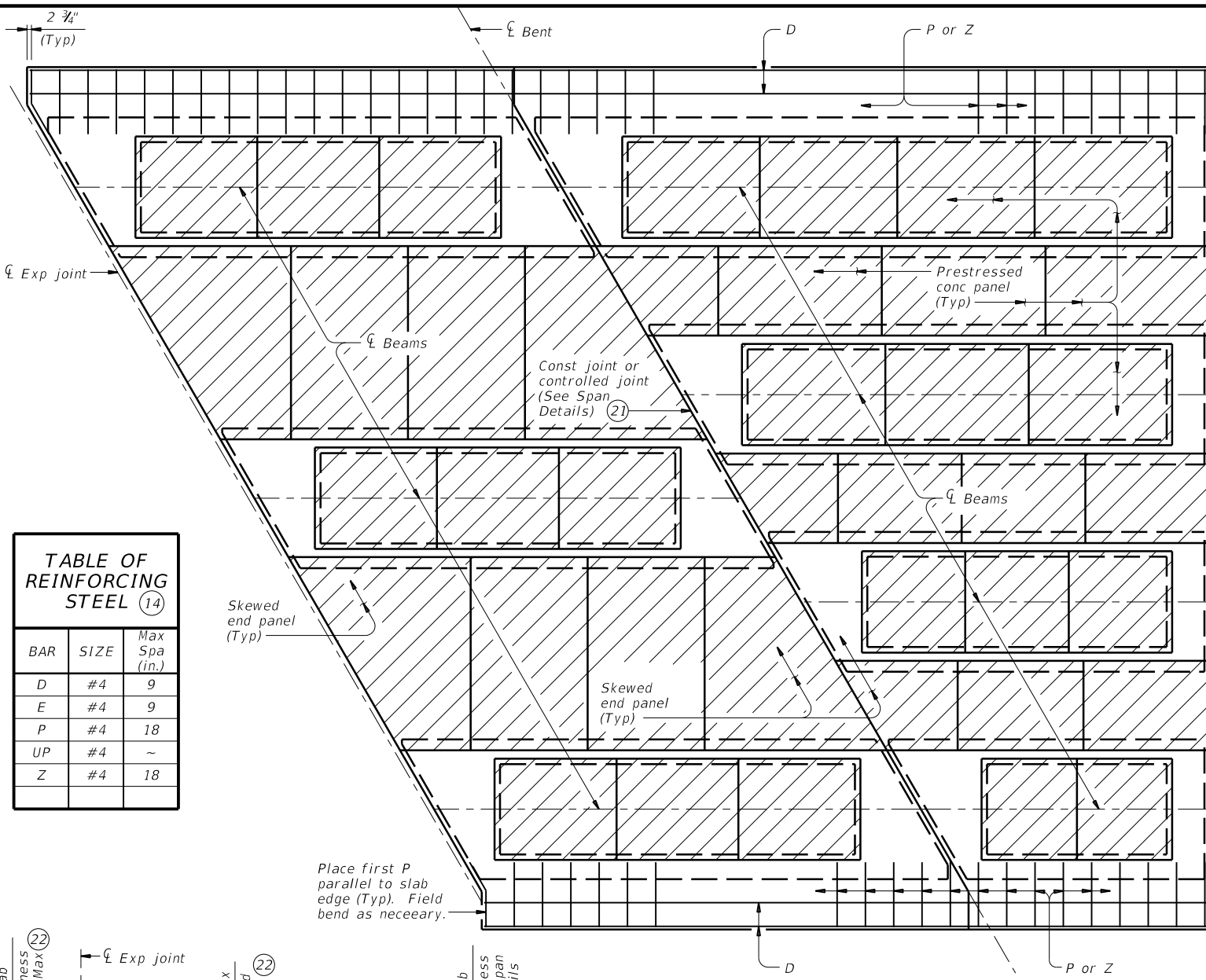
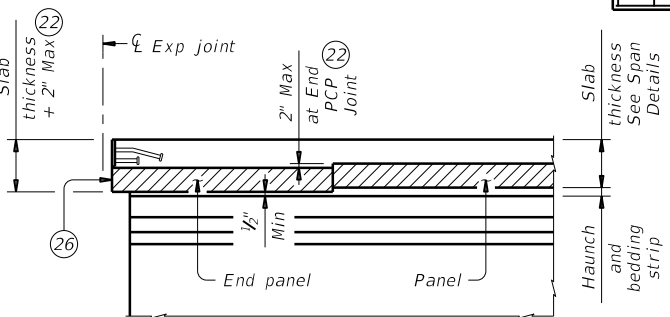
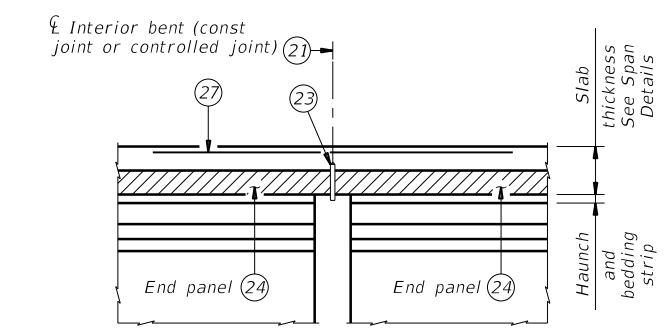


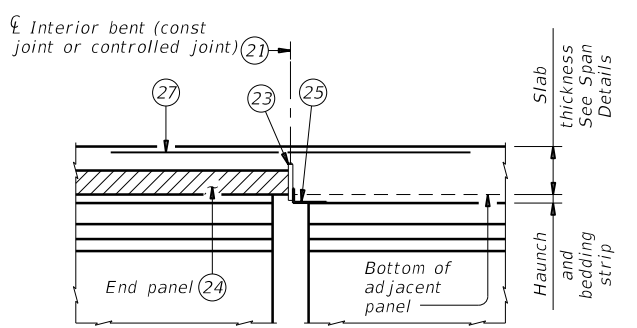
TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



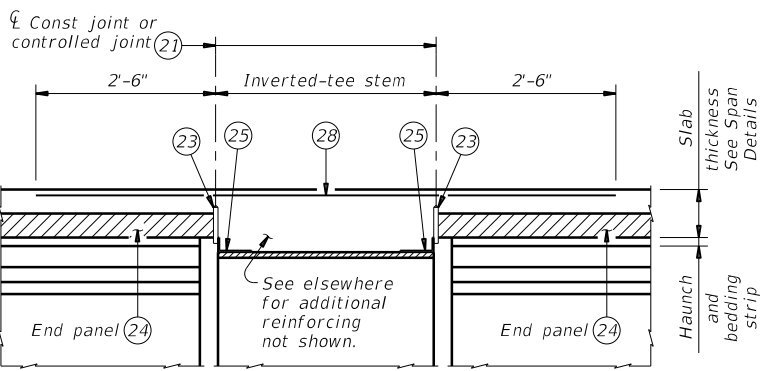
**JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)**  
 For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



**CONVENTIONAL INTERIOR BENT**  
 Panel against panel between beams/girders.



**CONVENTIONAL INTERIOR BENT**  
 Panel against beam/girder end in adjacent span.

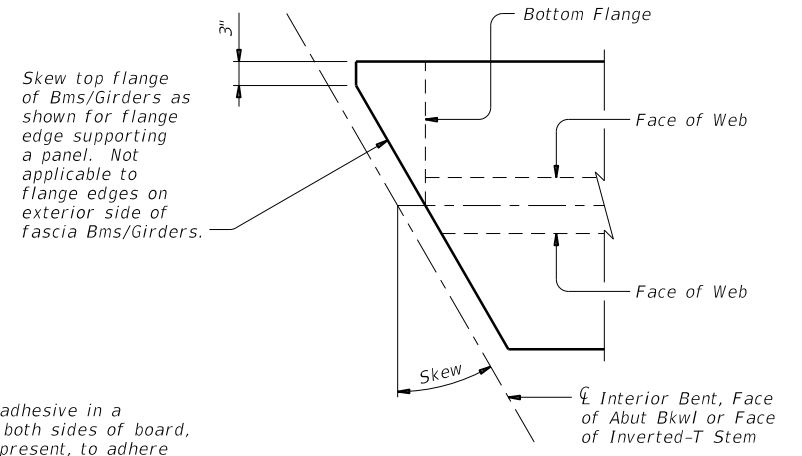
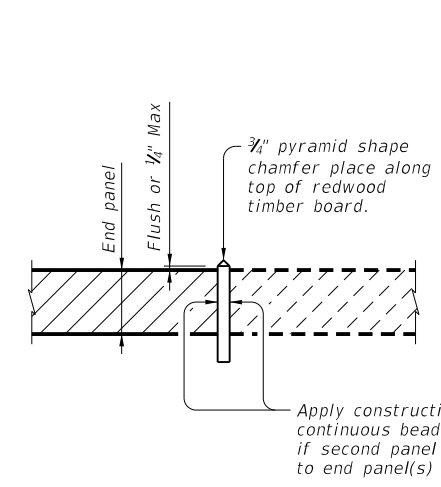


**INVERTED-T BENT**  
 Panels against inverted-tee stem

**OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)**

**ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)**

See "Option 2 ~ Elevation At Beam Ends".



**OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°**

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

- (6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- (14) Max Spacing as listed unless otherwise shown.
- (21) 1 1/2" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)
- (22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than 1/2" thick.
- (23) 3/4" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within 1/4" Max above panel. Place 3/4" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within 1/4" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.
- (24) Place panel within 1/2" of 3/4" thick board.
- (25) Permanent galvanized steel sheet form. Removable formwork is acceptable.
- (26) Place end panel within 1/2" of expansion joint opening. End panel cannot encroach on required expansion joint opening.
- (27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.
- (28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

**SPECIAL OPTION 2 CONSTRUCTION NOTES:**

When Option 2 is chosen bottom mat of thickened slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.  
 Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 1/2".  
 Do not extend the longitudinal panel reinforcement into the cast-in-place slab.  
 Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.  
 Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.  
 Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.  
 Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.  
 Provide Bars AA, G, K and OA from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation Bridge Division Standard

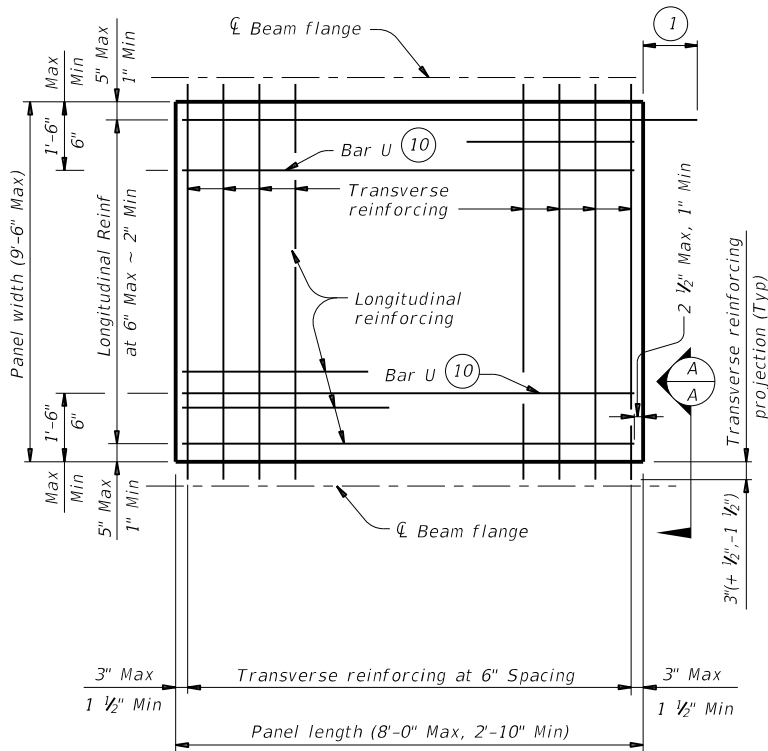
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

PCP

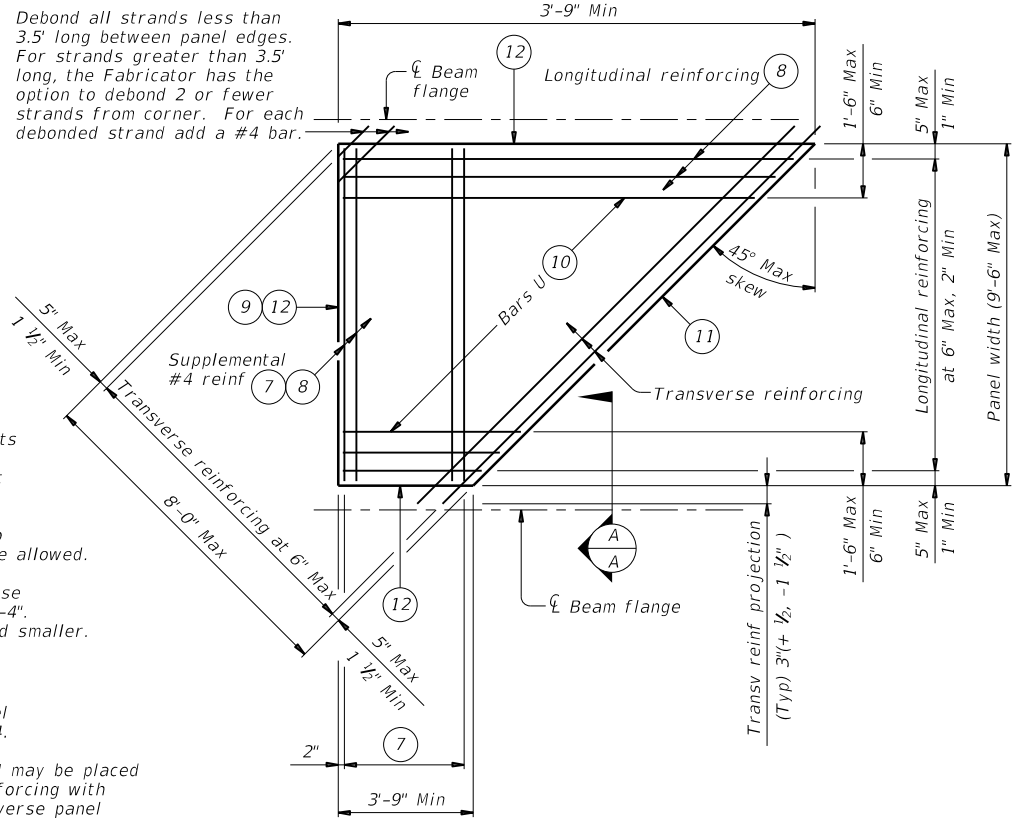
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**TYPICAL NON-SKEWED PANEL PLAN**



**TYPICAL SKEWED END PANEL PLAN**

- 1 At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2", -0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
- 2 Four loops required per panel.
- 3 Four loops required per panel. 3/8" or 1/2" strands may be used.
- 4 Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
- 5 See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
- 6 One Splice allowed per panel. No more than two sheets of WWR are allowed.
- 7 Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
- 8 End Cover 2 1/2" Max, 1" Min.
- 9 Recess strands on indicated panel edge in accordance with Item 424.
- 10 At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
- 11 Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
- 12 Timber form work permissible this edge.

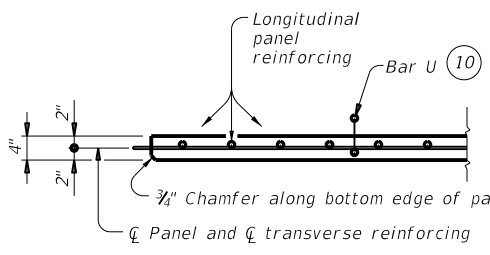
TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 1/2	3 1/2
B	3	2 1/2	3 1/2
C	4	3	4 1/2
IV	6	4	7 1/2
VI	6 1/2	4 1/2	8 1/2
U40 - 54	5 1/2	5 1/2	7
Tx28-70	6	5	7 1/2
XB20 - 40	4	3	4 1/2
XSB12 - 15	4	3	4 1/2

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 3/4	2 1/2	2 3/4
Over 12" to 15"	3 1/4	3	3 1/4
Over 15" to 18"	4	3	4 1/4
Over 18"	5	3 1/2	6 1/4

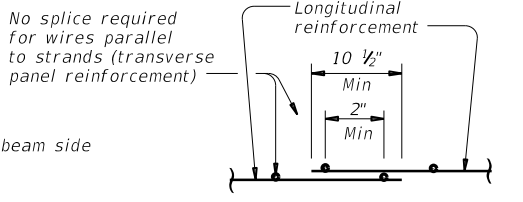
**GENERAL NOTES:**  
 Provide Class H concrete for panels. Release strength  $f'_{ci}=3,500$  psi. Minimum 28 day strength  $f'_c=5,000$  psi.  
 Provide 3/4" chamfer along bottom edge of panel on beam side. Do not use epoxy-coated reinforcing steel bar or strand in panels. Remove laitance from top panel surface. Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).  
 Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.  
 A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

**TRANSVERSE PANEL REINFORCEMENT:**  
 For panel widths over 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.  
 For panel widths over 3'-6" up to and including 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.  
 For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).  
 Place transverse panel reinforcement at panel centroid and space at 6" Max.

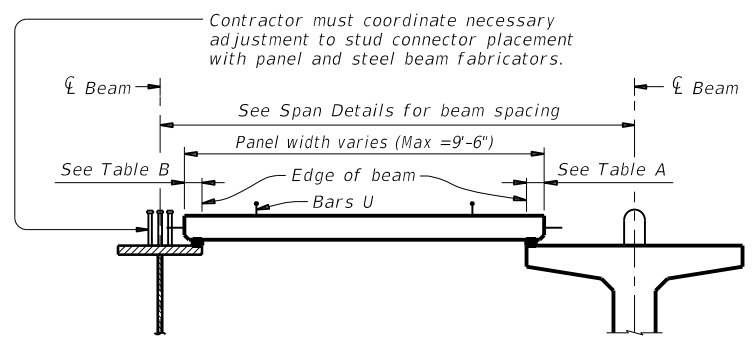
**LONGITUDINAL PANEL REINFORCEMENT:**  
 Any of the following options may be used for longitudinal panel reinforcement:  
 1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.  
 2. 3/8" Dia prestressing strands at 4 1/2" Max Spacing (unstressed). No splices allowed.  
 3. 1/2" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.  
 4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.  
 No combination of longitudinal reinforcement options in a panel is allowed. Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.



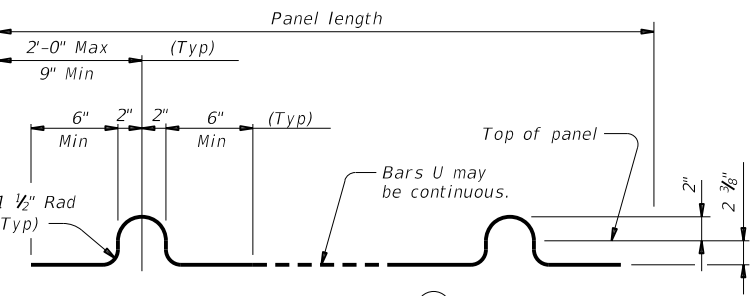
**SECTION A-A**  
 (Not showing supplemental #4 bars for skewed end panels.)



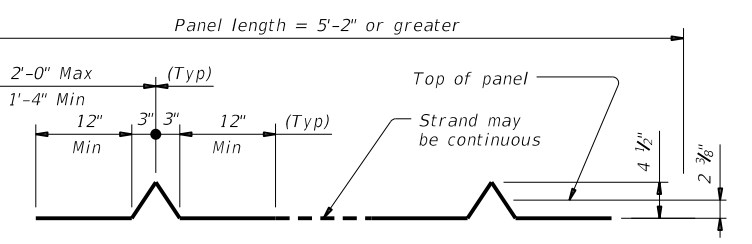
**WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL**



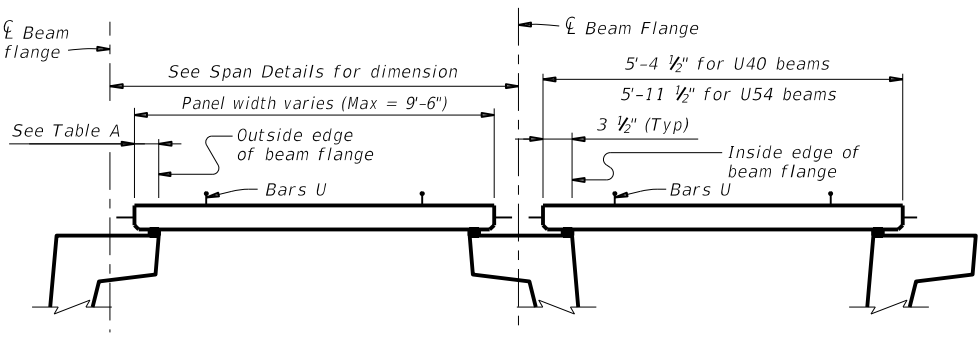
**TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH**



**BARS U (#3)**



**OPTIONAL STRAND FOR BARS U**

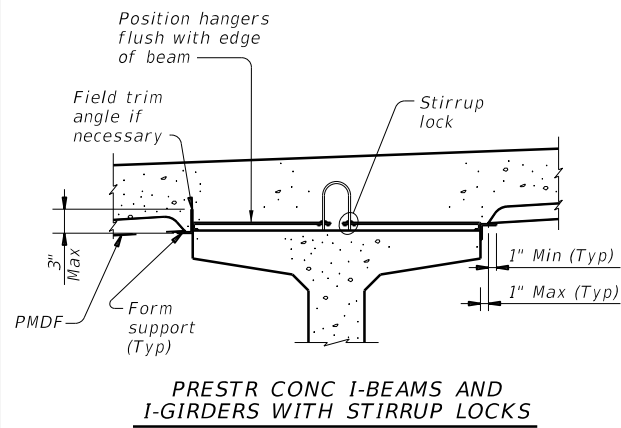


**PRESTRESSED CONCRETE U-BEAMS**

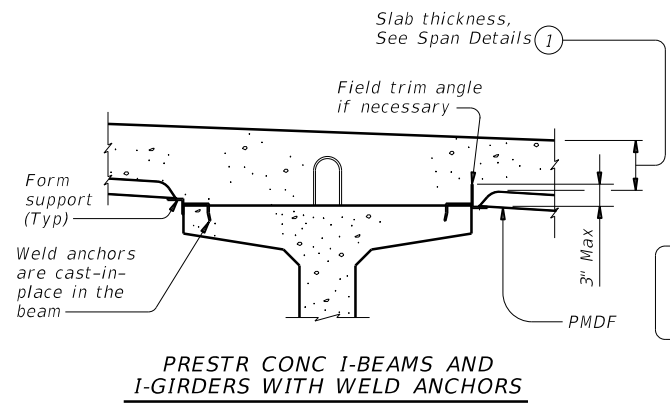
HL93 LOADING

Texas Department of Transportation		Bridge Division Standard	
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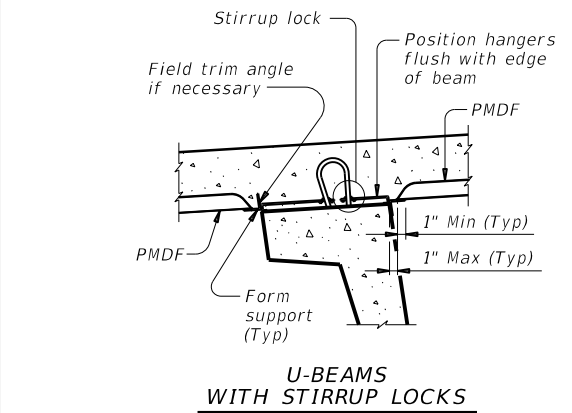
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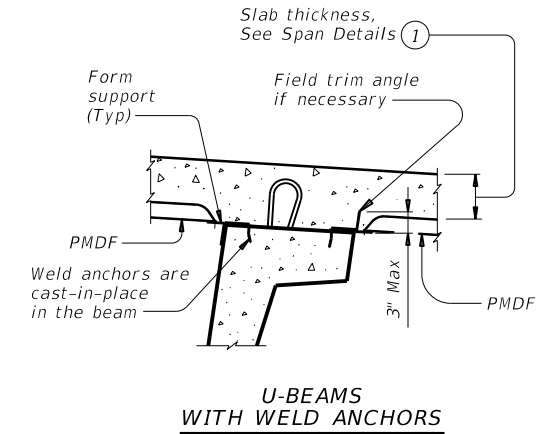
**PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS**



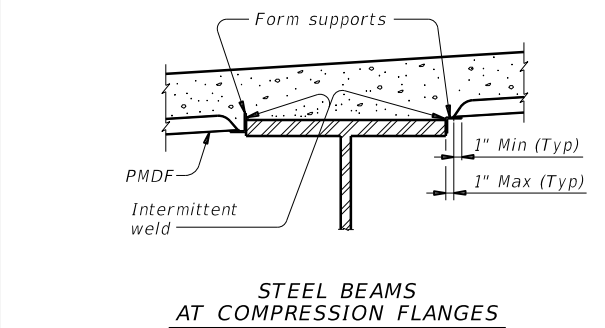
**PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS**



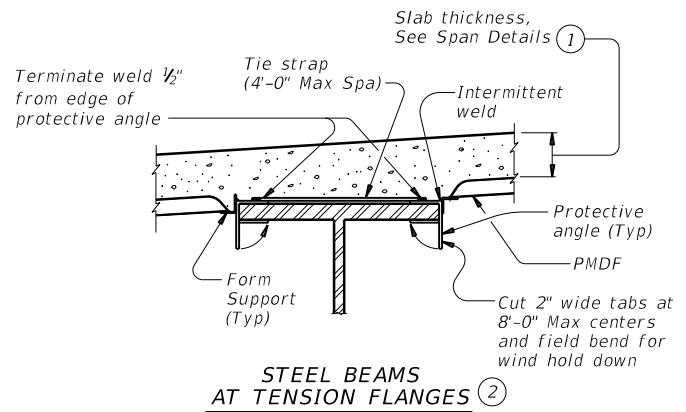
**U-BEAMS WITH STIRRUP LOCKS**



**U-BEAMS WITH WELD ANCHORS**

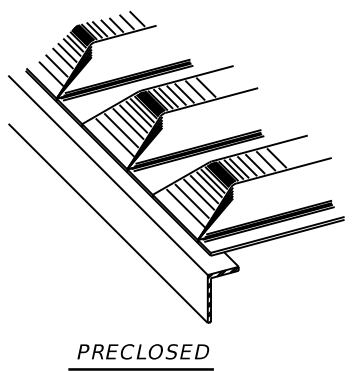


**STEEL BEAMS AT COMPRESSION FLANGES**

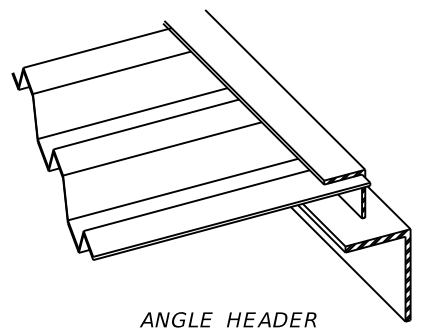


**STEEL BEAMS AT TENSION FLANGES**

**TYPICAL TRANSVERSE SECTIONS**



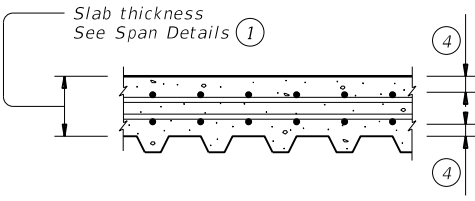
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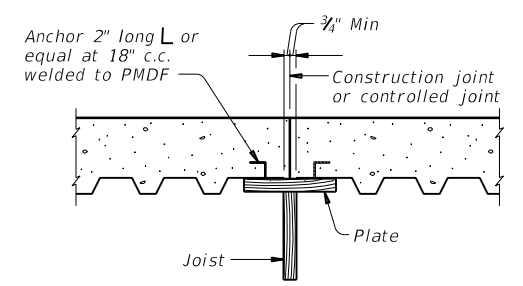
**ANGLE HEADER**

NOTE: This type is to be used for skewed ends only.

**TYPES OF END CLOSURES**



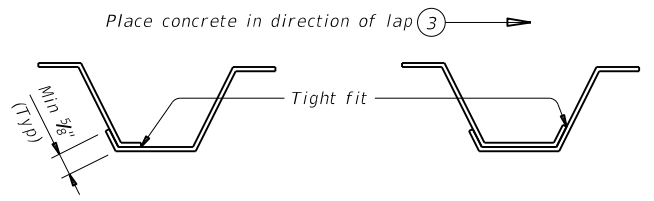
**TYP LONGITUDINAL SLAB SECTION**



Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

**SECTION THRU CONSTRUCTION JOINT**

**FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:**  
 Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."  
**FOR PRESTR CONC TX-GIRDER BRIDGES:**  
 See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.



**SIDE LAP DETAILS**

- ① Slab thickness minus 5/8" if corrugations match reinforcing bars.
- ② Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.
- ③ The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.
- ④ See Span details for cover requirements.

**GENERAL NOTES:**

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage. Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans. The details and notes shown on this standard are to be used as a guide in preparation of the forming plans. All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

**DESIGN NOTES:**  
 As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi. Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

- 1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.
- 1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.
- 1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

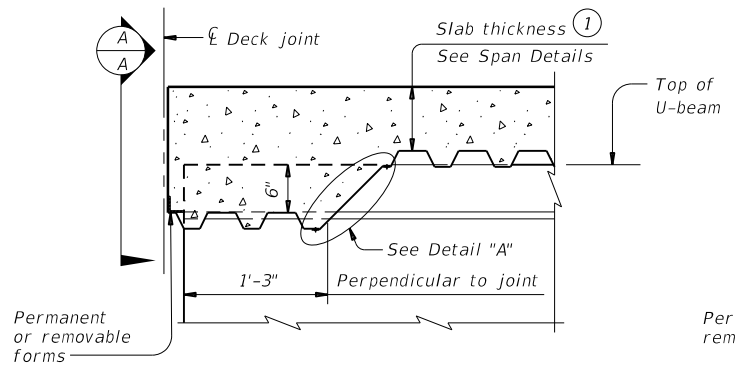
**CONSTRUCTION NOTES:**

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges. All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads. Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448. All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up. Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute. Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab. A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

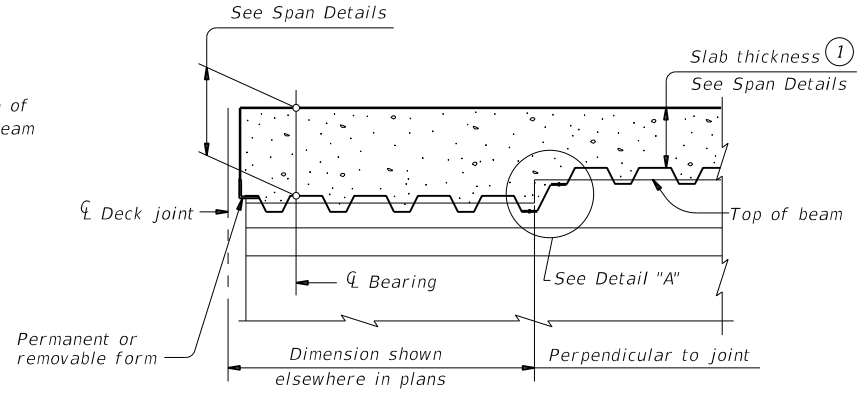
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<h3>PMDF</h3>			
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©TXDOT April 2019	CONT	SECT	JOB
REVISIONS	0911	04	089
02-20: Modified box note by adding steel beams/girders and subsidiary	DIST	COUNTY	SHEET NO.
12-21: Updated max deflection for RR.	LFK	POLK	63

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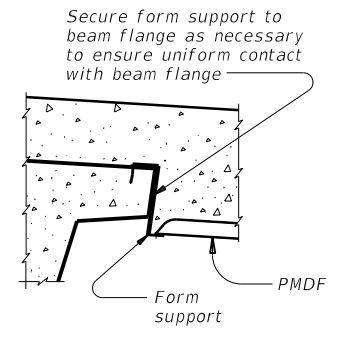
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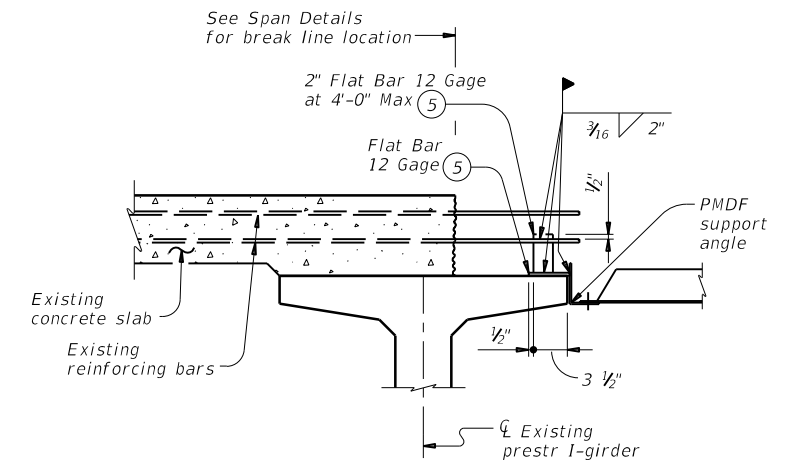
**AT THICKENED SLAB END FOR U-BEAMS**



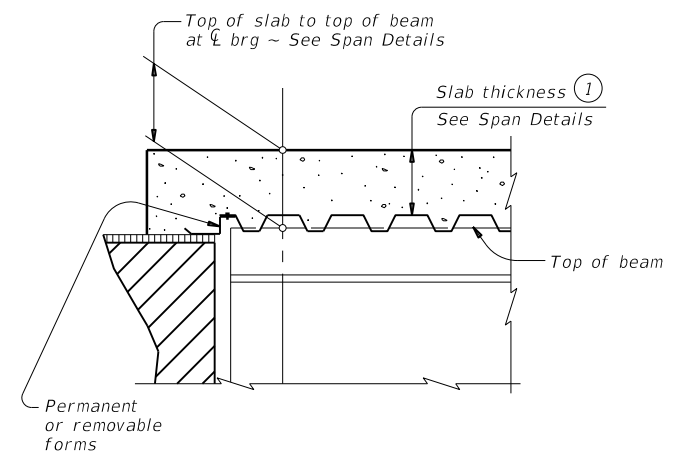
**AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS**  
 Showing I-beam block-out. No block-out for I-girders or steel beams.



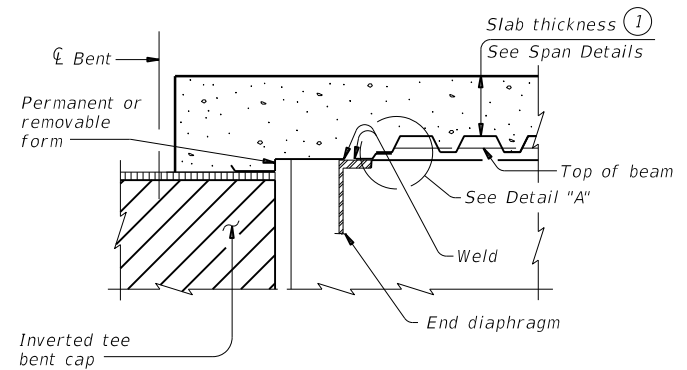
**SECTION A-A**



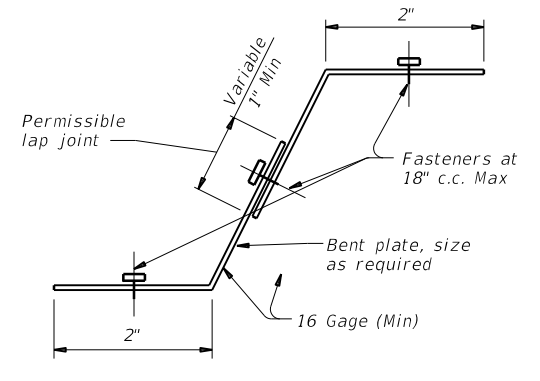
**SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS**



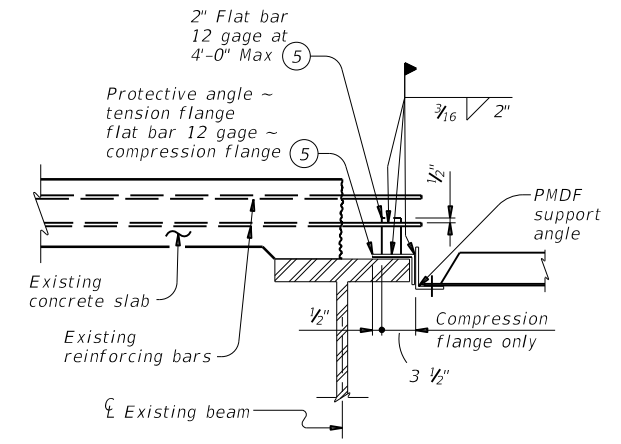
**AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END**



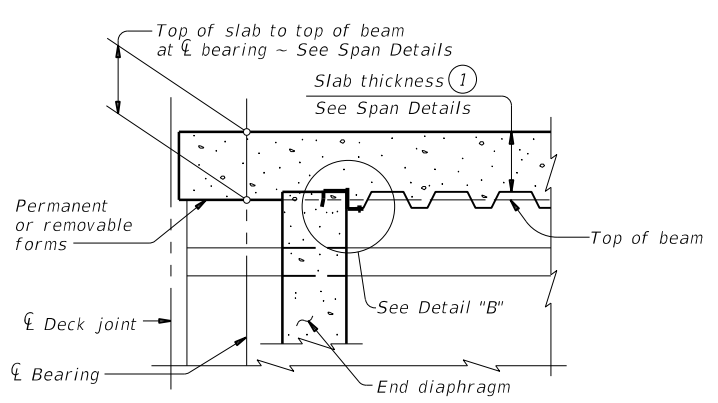
**AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END**



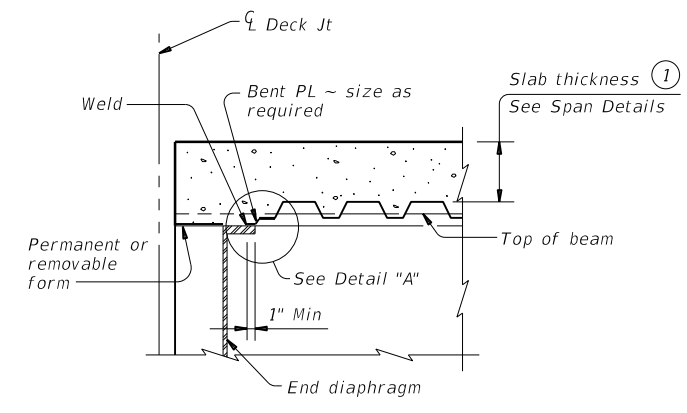
**DETAIL "A"**



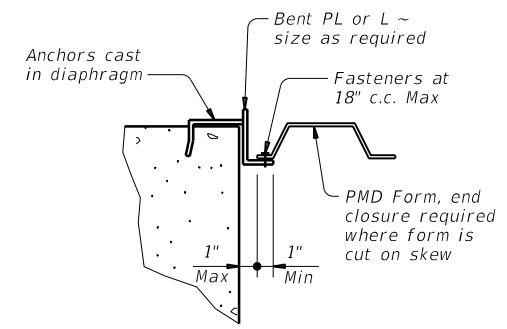
**SHOWING STEEL BEAMS**



**AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS**



**AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END**



**DETAIL "B"**

**WIDENING DETAILS**

- ① Slab thickness minus 5/16" if corrugations match reinforcing bars
- ⑤ Minimum yield stress of 12 gage bars shall be 40 ksi

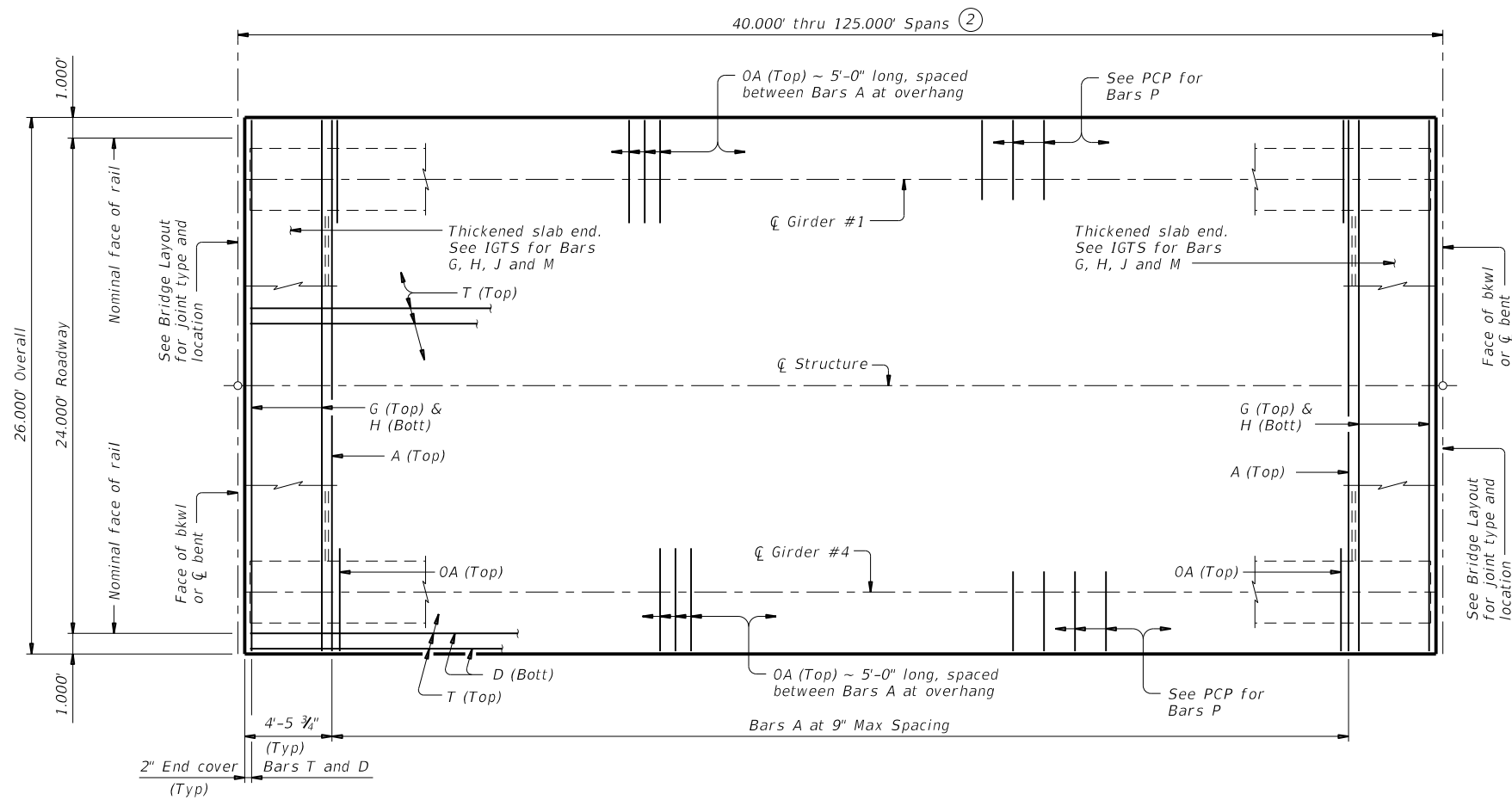
**DETAILS AT ENDS OF BEAMS**

SHEET 2 OF 2

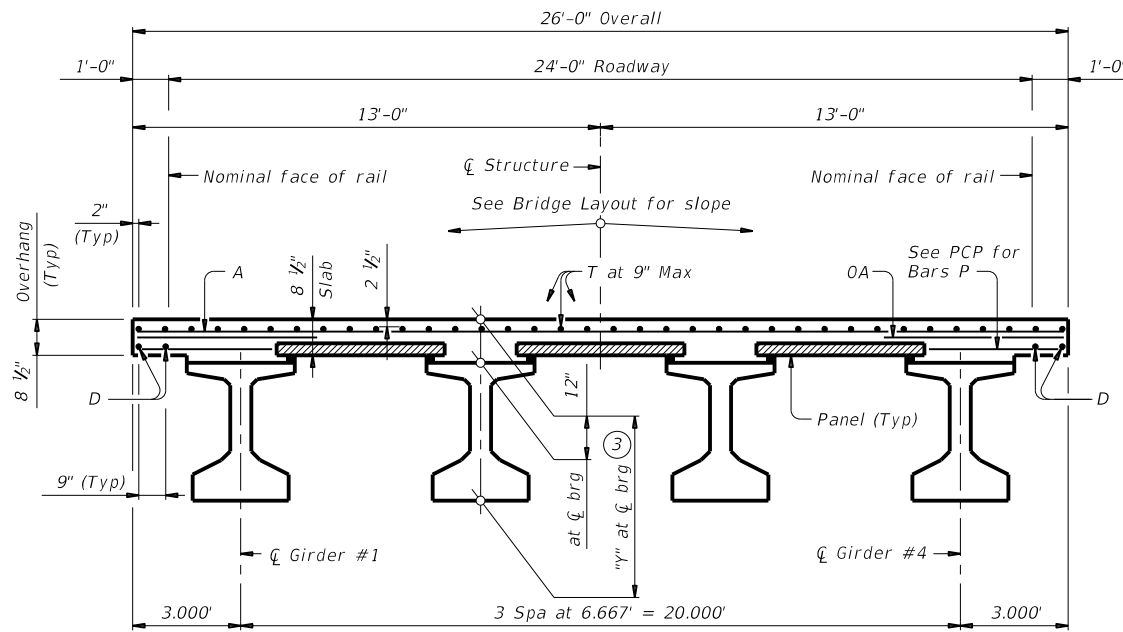
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<b>PERMANENT METAL DECK FORMS</b>			
<b>PMDF</b>			
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©TxDOT April 2019	CONT	SECT	HIGHWAY
REVISIONS	0911	04	089 CR
02-20: Modified box note by adding steel beams/girders and subsidiary	DIST	COUNTY	SHEET NO.
12-21: Updated max deflection for RR.	LFK	POLK	64

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**PLAN** ①



**TYPICAL TRANSVERSE SECTION**  
 (Showing girder type Tx46)

TABLE OF SECTION DEPTHS	
GIRDER TYPE	"y" AT G. BRG ③
	Ft./In
Tx28	3'-4"
Tx34	3'-10"
Tx40	4'-4"
Tx46	4'-10"
Tx54	5'-6"

**BAR TABLE**

BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#5
P	#4
T	#4

- ① If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see standard IGCS for adjustment to slab reinforcement and quantities.
- ② Span lengths for Prestressed Concrete I-Girder type:  
 Type Tx28 for spans lengths 40.000' thru 75.000'.  
 Type Tx34 for spans lengths 40.000' thru 85.000'.  
 Type Tx40 for spans lengths 40.000' thru 100.000'.  
 Type Tx46 for spans lengths 40.000' thru 115.000'.  
 Type Tx54 for spans lengths 40.000' thru 125.000'.
- ③ "y" value shown is based on theoretical girder camber, dead load deflection from an 8 1/2" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve and/or if precast overhang panel (PCP(0)) option is use.

HL93 LOADING SHEET 1 OF 2



**PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54) 24' ROADWAY**

**SIG-24**

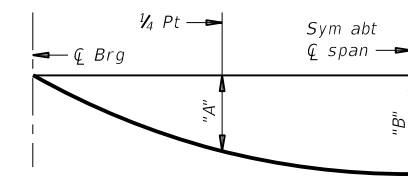
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REVISIONS	0911	04	089	CR
10-19: Increased "x" and "y" Values	DIST	COUNTY	SHEET NO.	
	LFK	POLK	65	

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**TABLE OF DEAD LOAD DEFLECTIONS**

TYPE Tx28 GIRDERS			TYPE Tx34 GIRDERS			TYPE Tx40 GIRDERS			TYPE Tx46 GIRDERS			TYPE Tx54 GIRDERS		
Span Length	"A"	"B"	Span Length	"A"	"B"	Span Length	"A"	"B"	Span Length	"A"	"B"	Span Length	"A"	"B"
Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
40	0.007	0.010	40	0.004	0.006	40	0.003	0.004	40	0.002	0.003	40	0.001	0.002
45	0.012	0.017	45	0.007	0.010	45	0.005	0.007	45	0.004	0.005	45	0.002	0.003
50	0.019	0.027	50	0.011	0.016	50	0.007	0.010	50	0.005	0.007	50	0.004	0.005
55	0.028	0.040	55	0.017	0.024	55	0.011	0.016	55	0.008	0.011	55	0.005	0.007
60	0.041	0.057	60	0.024	0.034	60	0.016	0.022	60	0.011	0.015	60	0.007	0.010
65	0.056	0.079	65	0.033	0.047	65	0.022	0.031	65	0.015	0.021	65	0.010	0.014
70	0.077	0.108	70	0.046	0.064	70	0.030	0.042	70	0.021	0.029	70	0.014	0.019
75	0.102	0.143	75	0.061	0.085	75	0.040	0.056	75	0.027	0.038	75	0.018	0.025
			80	0.079	0.111	80	0.052	0.073	80	0.036	0.050	80	0.024	0.033
			85	0.102	0.143	85	0.066	0.093	85	0.046	0.064	85	0.030	0.042
						90	0.084	0.118	90	0.057	0.080	90	0.038	0.053
						95	0.105	0.147	95	0.071	0.100	95	0.047	0.066
						100	0.130	0.182	100	0.088	0.124	100	0.058	0.082
									105	0.108	0.151	105	0.071	0.100
									110	0.130	0.182	110	0.086	0.121
									115	0.156	0.219	115	0.103	0.144
									120			120	0.123	0.172
									125			125	0.145	0.203



**DEAD LOAD DEFLECTION DIAGRAM**

Calculated deflections shown are due to the concrete slab on interior girders only ( $E_c = 5000$  ksi). Adjust values as required for exterior girders and if optional slab forming is used. These values may require field verification.

**TABLE OF ESTIMATED QUANTITIES**

SPAN LENGTH	REINF CONCRETE SLAB	Prestressed Concrete Girders			TOTAL REINF STEEL <sup>5</sup>
		ABUT TO INT BT <sup>4</sup>	INT BT TO INT BT <sup>4</sup>	ABUT TO ABUT <sup>4</sup>	
Ft	SF	LF	LF	LF	Lb
40	1,040	158.00	158.00	158.00	2,392
45	1,170	178.00	178.00	178.00	2,691
50	1,300	198.00	198.00	198.00	2,990
55	1,430	218.00	218.00	218.00	3,289
60	1,560	238.00	238.00	238.00	3,588
65	1,690	258.00	258.00	258.00	3,887
70	1,820	278.00	278.00	278.00	4,186
75	1,950	298.00	298.00	298.00	4,485
80	2,080	318.00	318.00	318.00	4,784
85	2,210	338.00	338.00	338.00	5,083
90	2,340	358.00	358.00	358.00	5,382
95	2,470	378.00	378.00	378.00	5,681
100	2,600	398.00	398.00	398.00	5,980
105	2,730	418.00	418.00	418.00	6,279
110	2,860	438.00	438.00	438.00	6,578
115	2,990	458.00	458.00	458.00	6,877
120	3,120	478.00	478.00	478.00	7,176
125	3,250	498.00	498.00	498.00	7,475

- <sup>4</sup> Fabricator will adjust lengths for girder slopes as required.
- <sup>5</sup> Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and standard IGCS.  
 See IGTS standard for Thickened Slab End details and quantity adjustments.  
 See PCP and PCP-FAB for panel details not shown.  
 See PCP(0) and PCP(0)-FAB for precast overhang panel details if this option is used.  
 See IGMS standard for miscellaneous details.  
 See applicable rail details for rail anchorage in slab.  
 See PMDF standard for details and quantity adjustments if this option is used.  
 This standard does not support the use of transition bents.

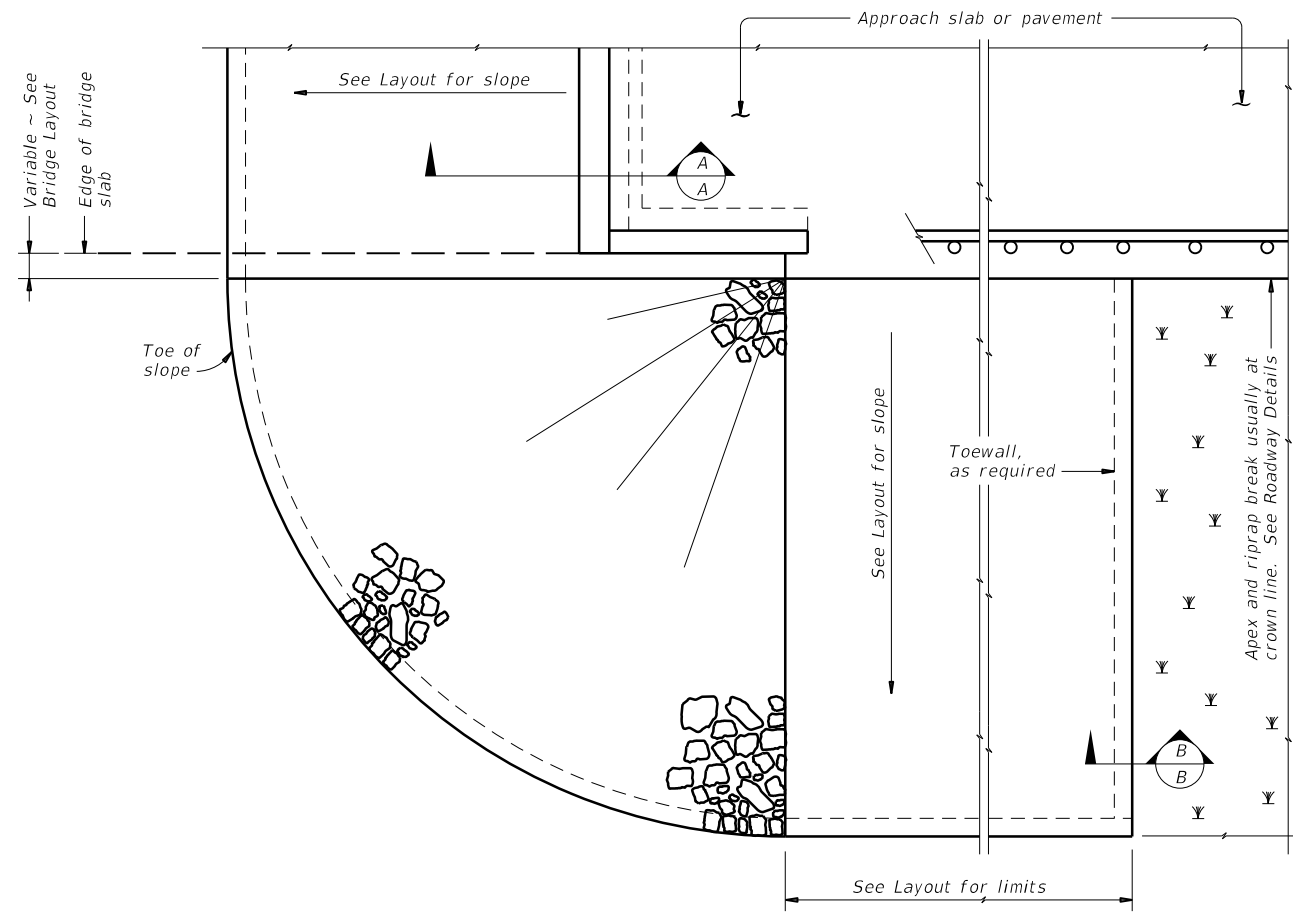
Cover dimensions are clear dimensions, unless noted otherwise.

**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"  
 Epoxy coated ~ #4 = 2'-5"  
 Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, OA, P or T unless noted otherwise.

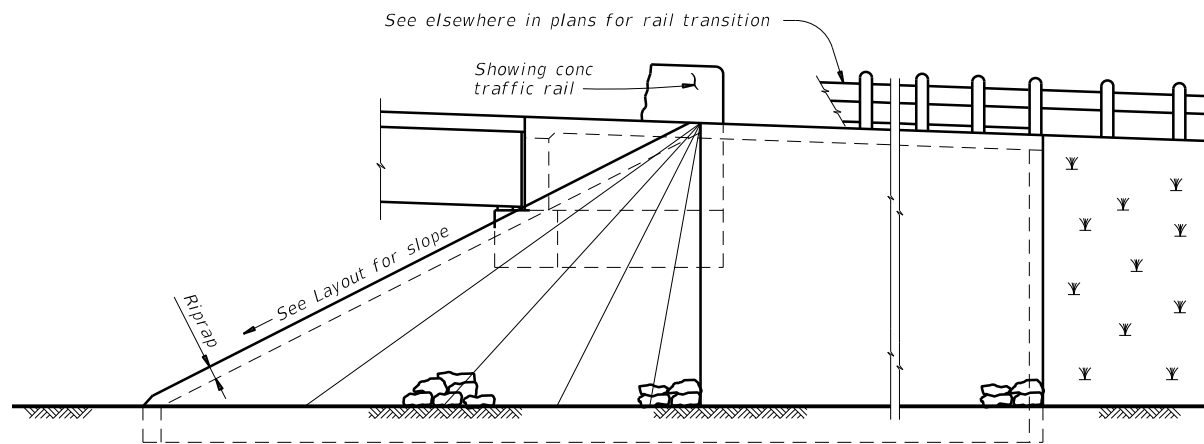
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<b>PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54) 24' ROADWAY</b>					
<b>SIG-24</b>					
FILE: sig01sts-19.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR	
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0911	04	089	CR	
10-19: Increased "X" and "Y" Values	DIST	COUNTY	SHEET NO.		
	LFK	POLK	66		

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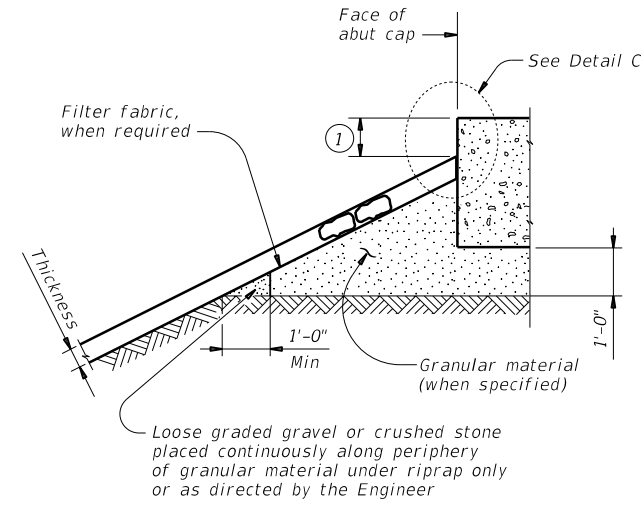
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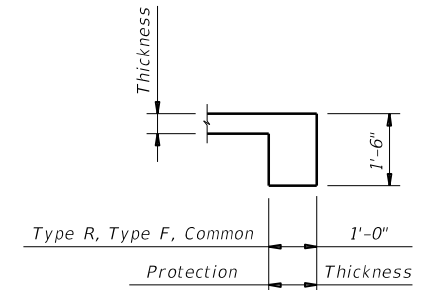
PLAN



ELEVATION

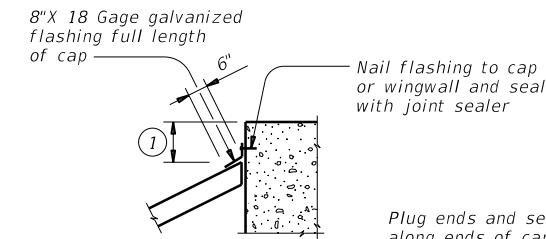


SECTION A-A AT CAP

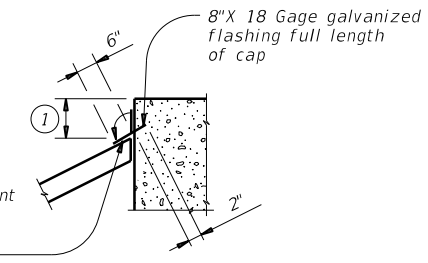


SECTION B-B

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:**

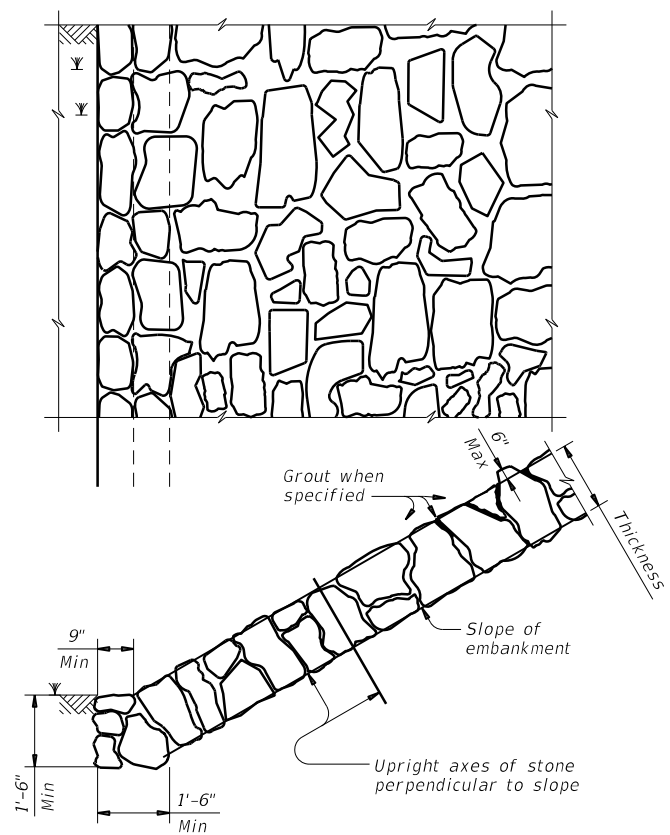
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.  
 See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

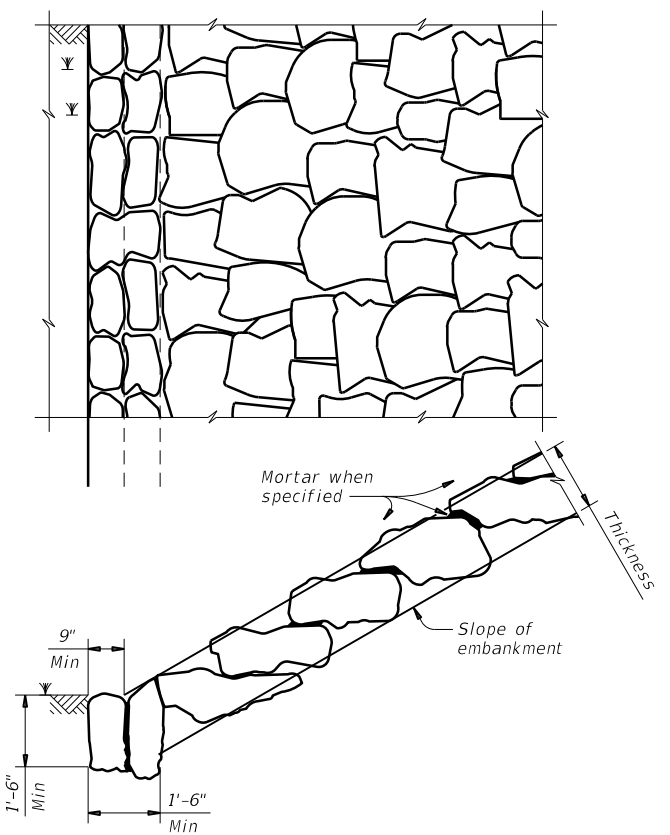
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©TxDOT April 2019 REVISIONS		CONT SECT <b>0911 04</b>	JOB <b>089</b>	HIGHWAY <b>CR</b>		
		DIST <b>LFK</b>	COUNTY <b>POLK</b>	SHEET NO. <b>67</b>		

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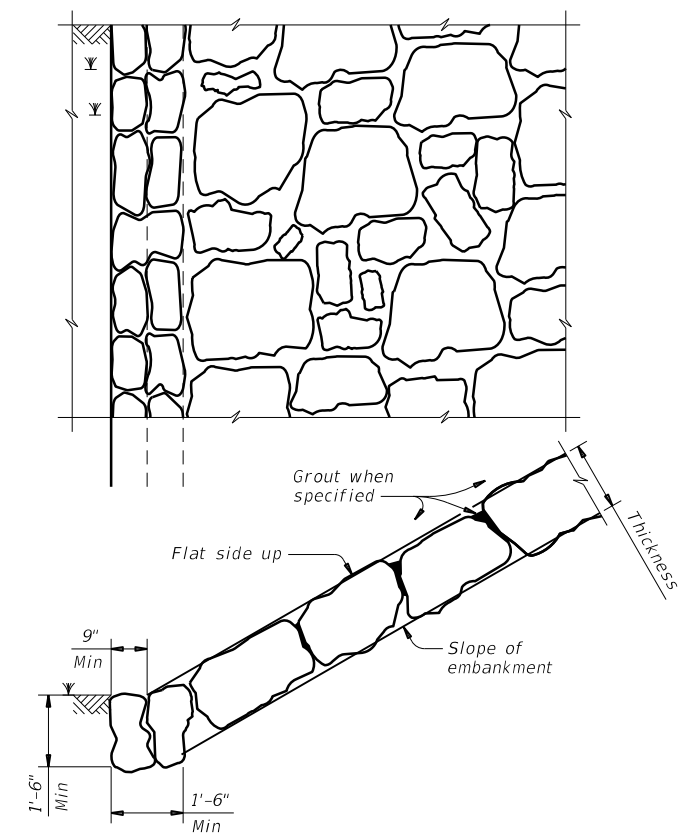
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**FIGURE 1 ~ TYPE R STONE RIPRAP**  
dry or grouted

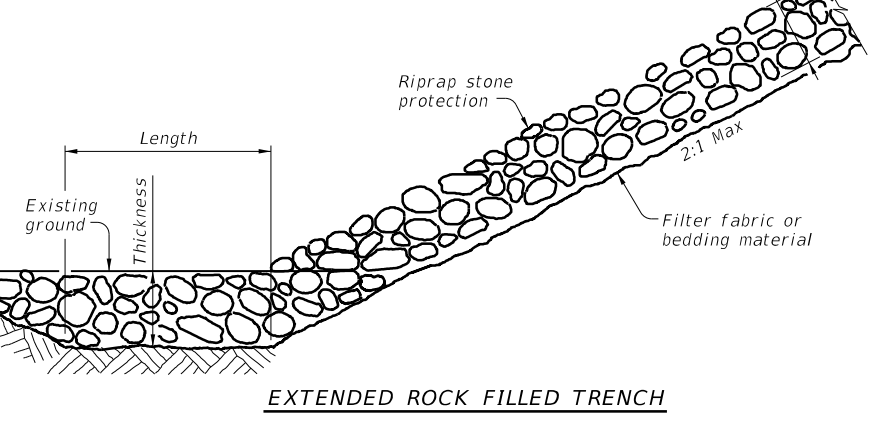
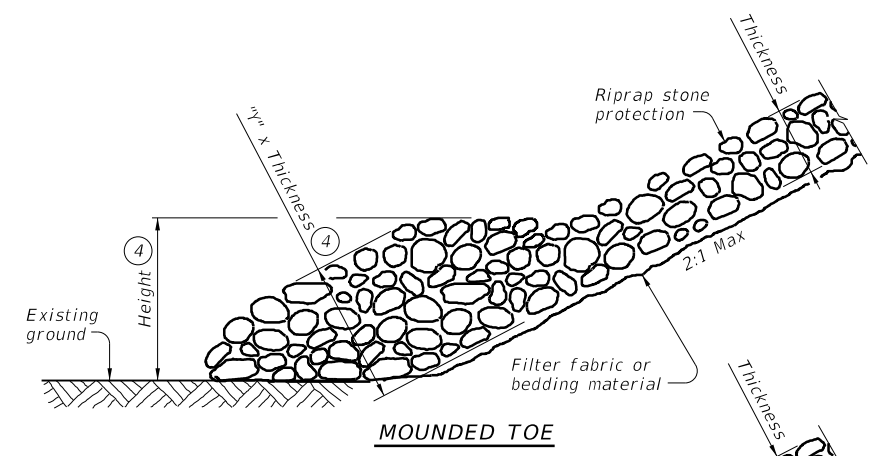


**FIGURE 2 ~ TYPE F STONE RIPRAP**  
dry or mortared

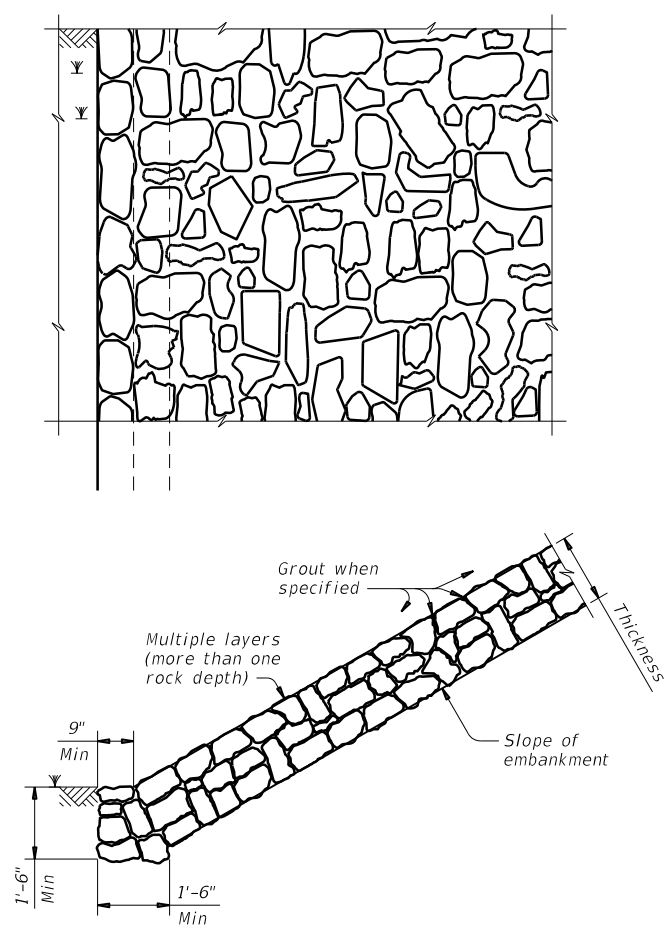


**FIGURE 3 ~ TYPE F STONE RIPRAP**  
grouted

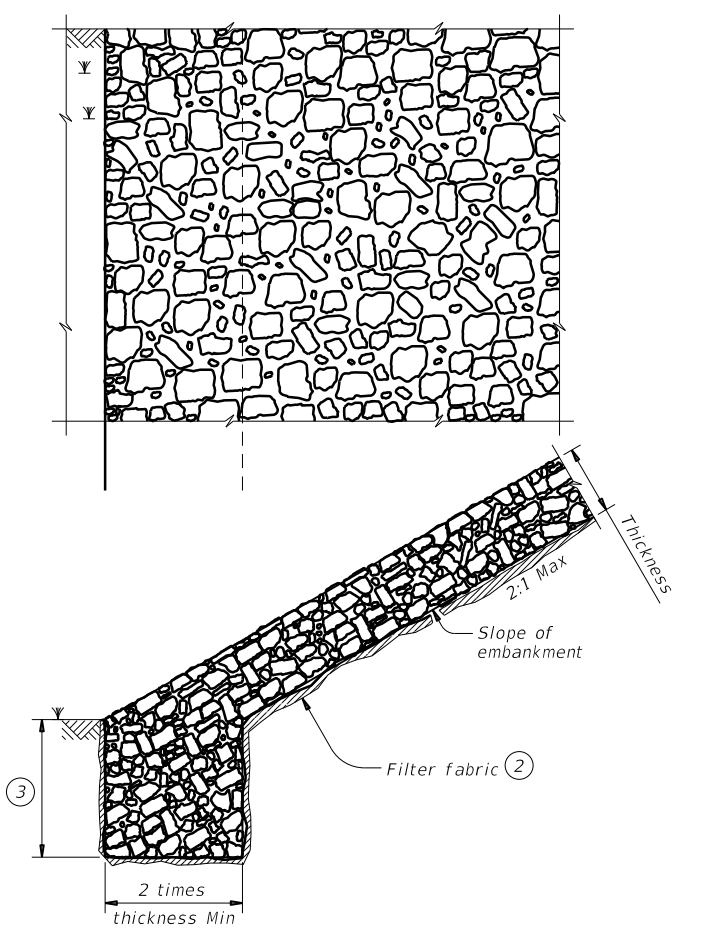
- ② Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.
- ③ Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.
- ④ "Y" and Height need to be defined. See layout or detail sheet for values 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.



**PROTECTION STONE RIPRAP TOE OPTIONS ⑤**



**FIGURE 4 ~ COMMON STONE RIPRAP**  
dry or grouted



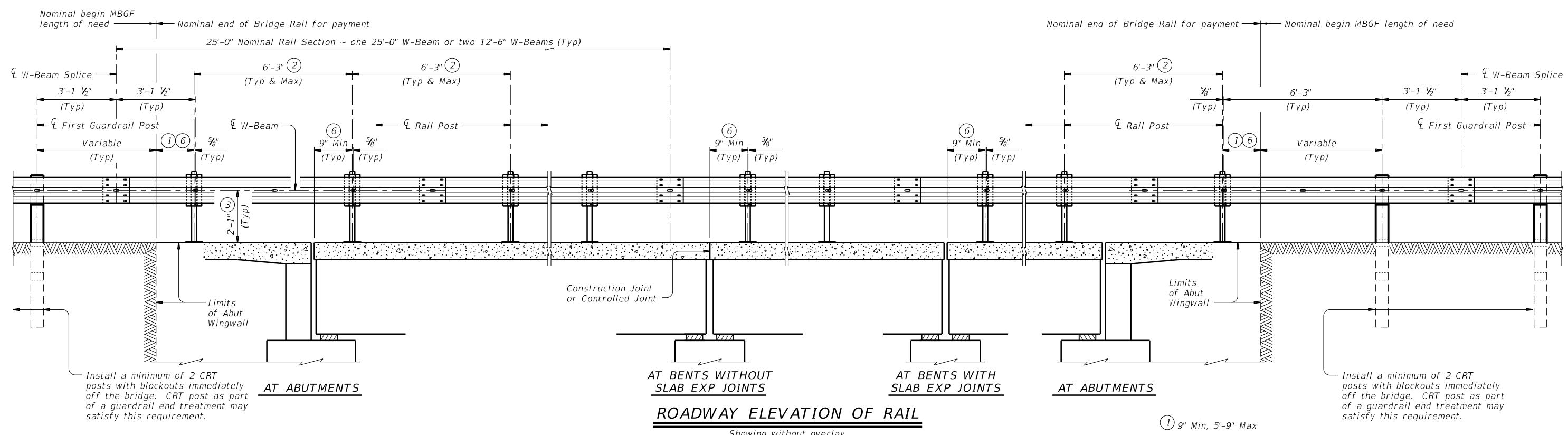
**FIGURE 5 ~ PROTECTION STONE RIPRAP ⑤**

**STONE RIPRAP**

**SRR**

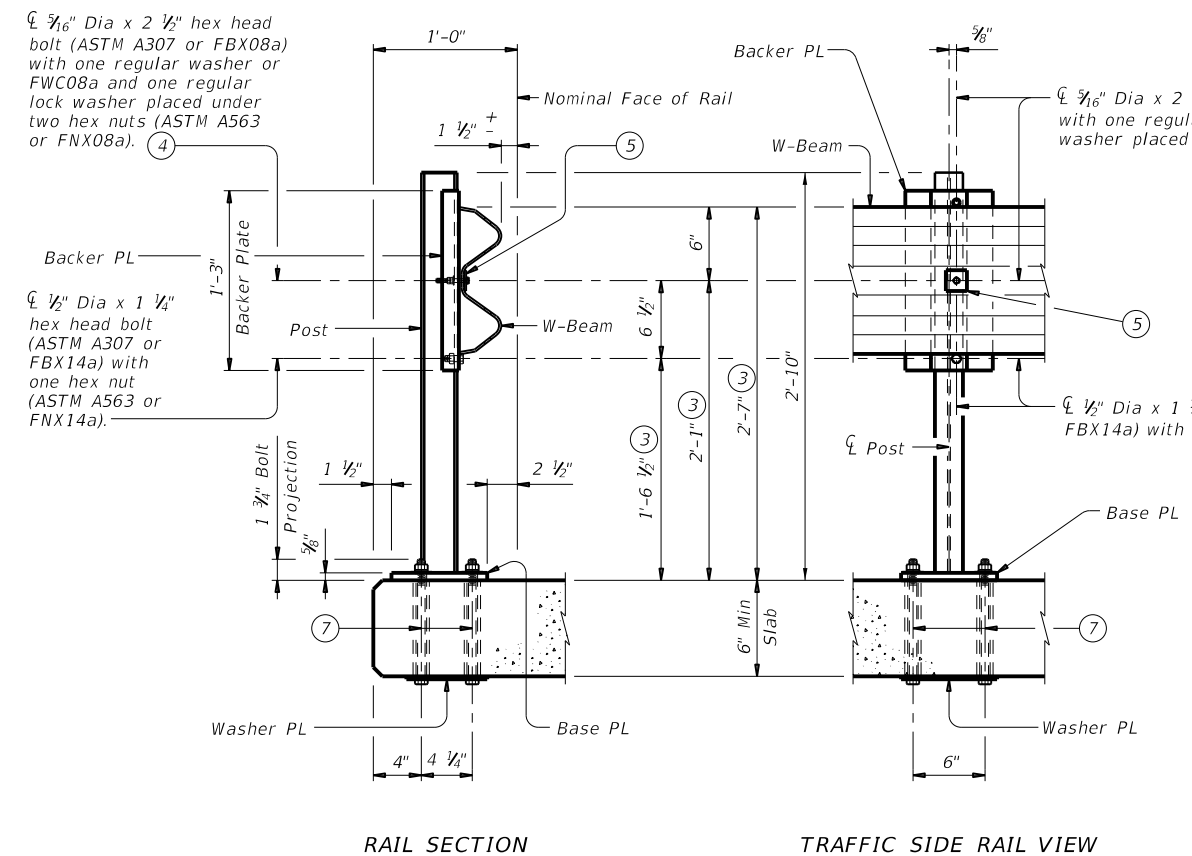
FILE: srrside1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
	DIST	COUNTY	SHEET NO.	
	LFK	POLK	68	

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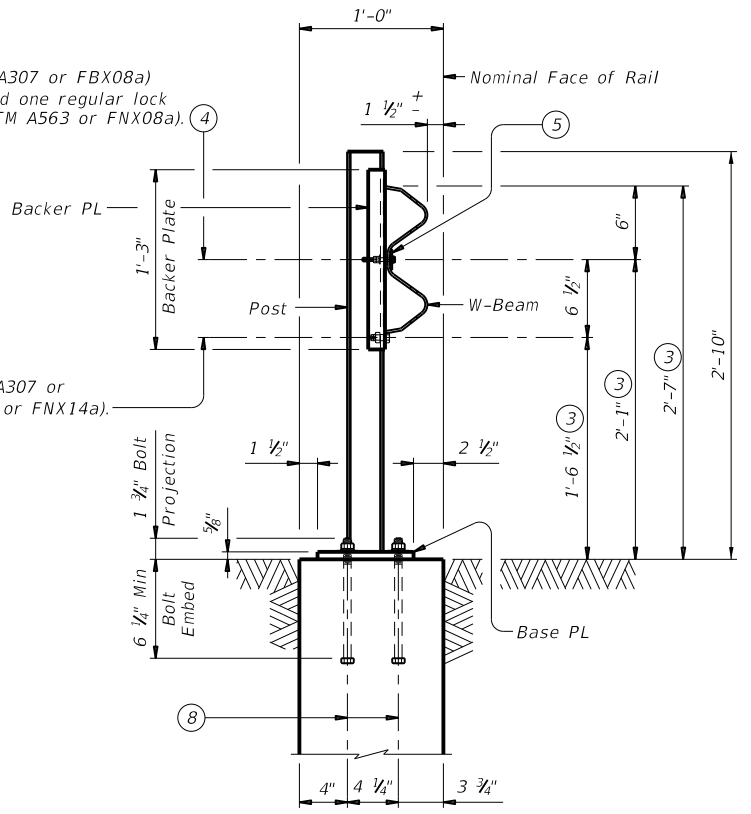


**ROADWAY ELEVATION OF RAIL**  
Showing without overlay.

- 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 1/8" x 1 3/4" x 1 3/4" with 5/8" 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 3/4" Dia hole in 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.
- ⑦ 5/8" Dia formed holes for 5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".
- ⑧ 5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".



**RAIL SECTION**  
**TRAFFIC SIDE RAIL VIEW**  
**RAIL DETAILS ON BRIDGE SLAB**  
Showing without overlay.



**RAIL SECTION ON ABUTMENT WINGWALL**  
Showing without overlay.

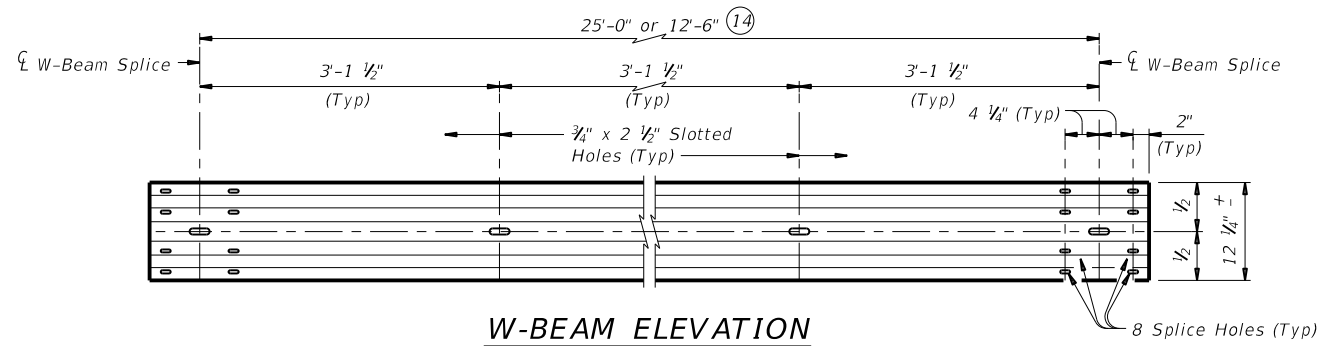
The use of this railing is restricted to speeds of 45 mph or less.

SHEET 1 OF 2

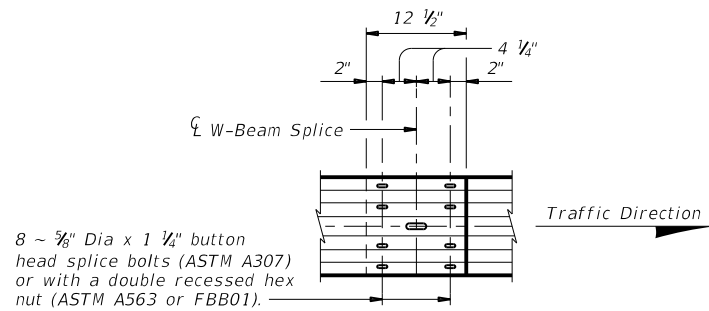
		<b>Bridge Division Standard</b>	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T631LS</h2>			
FILE: r1std037-20.dgn	DN: TXDOT	CK: AES	DW: JTR
©TXDOT	REVISIONS	CONTRACT	HIGHWAY
07-20: Allowing 9'-4" or 6'-3" W-Beam sections.	0911 04	089	CR
DIST: LFK	COUNTY: POLK	SHEET NO: 69	



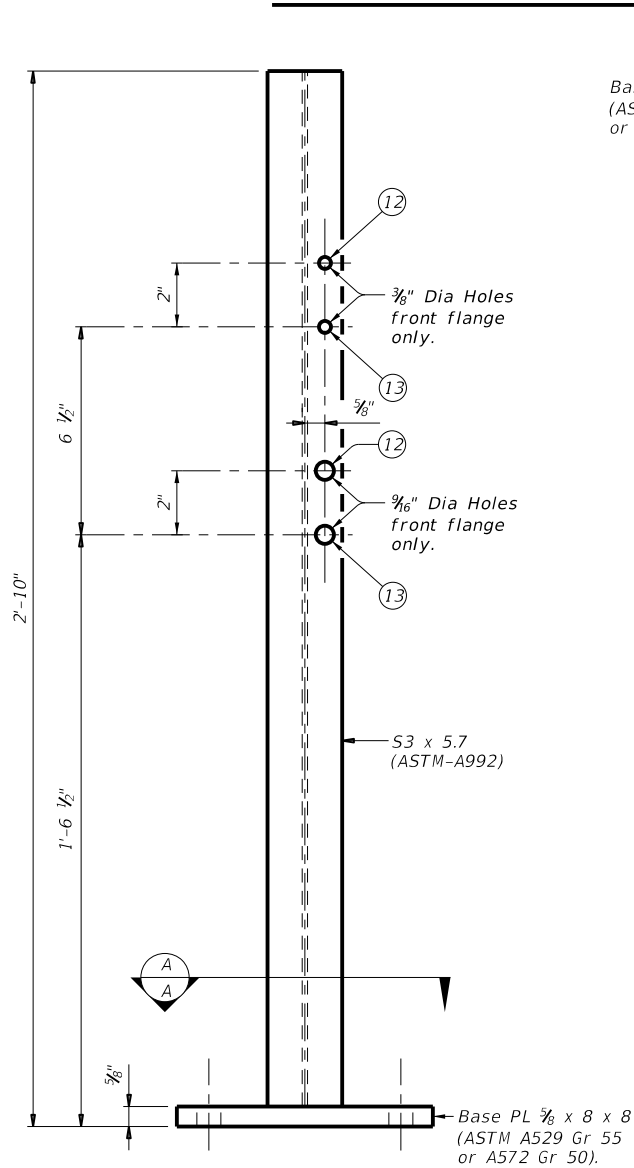
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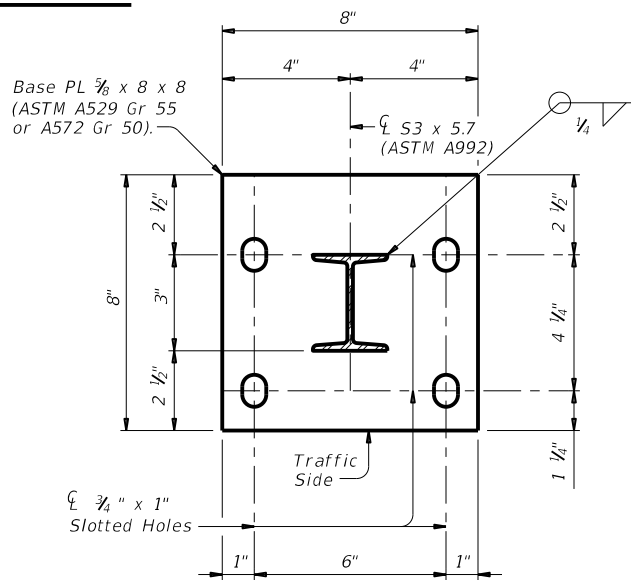
**W-BEAM ELEVATION**



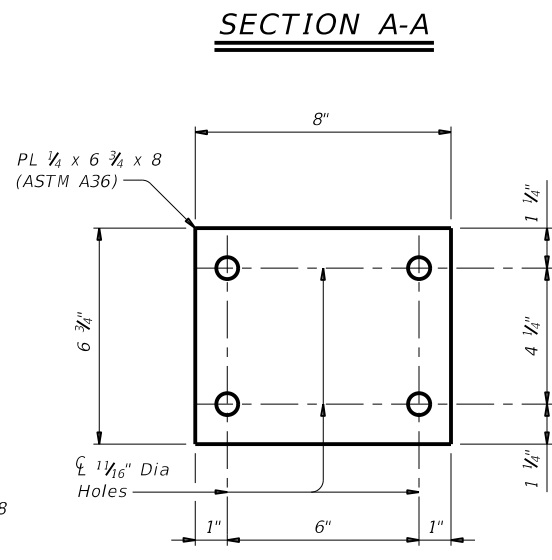
**W-BEAM SPLICE ELEVATION**



**POST ELEVATION**

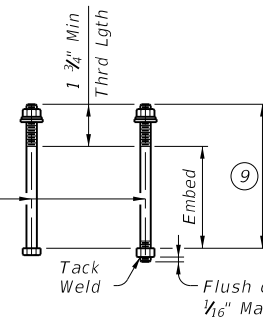


**SECTION A-A**



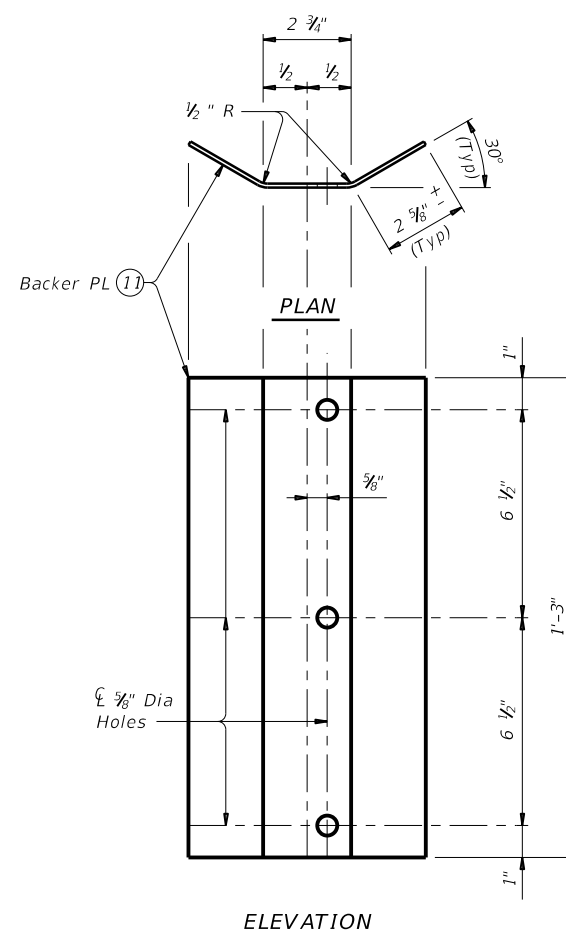
**WASHER PLATE DETAIL**

$\frac{3}{8}$ " Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



**CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (10)**

- 9 See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".
- 10 See "Material Notes" for anchor bolt information.
- 11 Backer PL 1/4 x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).
- 12 Used for structures with overlay.
- 13 Used for structures without overlay.
- 14 At the nominal end of the bridge rail for payment, one 9'-4 1/2" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



**BACKER PLATE**

**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 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.  
 At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".  
 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.  
 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 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 3/8" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) 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.  
 Optional adhesive anchorage system must be 3/8" 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 3/4". 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."  
 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 and a single rail element of 9'-4 1/2" or 6'-3" (Nominal) length. W-Beam must have slotted holes at 3'-1 1/2".  
 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

		<b>Bridge Division Standard</b>	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T631LS</h2>			
FILE: r1std037-20.dgn	DN: TXDOT	CK: AES	DW: JTR
REVISIONS	CONTRACT	SECTION	JOB
0911	04		089
07-20: Allowing 9'-4 1/2" or 6'-3" W-Beam sections.	DISTRICT	COUNTY	SHEET NO.
	LFK	POLK	70

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DATE: 2/2/2022 \$TIME\$  
 FILE: ...Standards\dom1-20.dgn

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

OBJECT MARKERS								D & OM DESCRIPTIVE CODES	
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	INSTL OM ASSM (OM-XX) (XXXX)XXX (XX) 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
SHEETING	Yellow-Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting			Red -Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting	
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT	
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP	

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

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.
GF1 GF2 CTB 	W1-8 				W1-6 				
1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.	SIZE (W x L)	18" x 24" (Conventional)	24" x 30" (Conventional Oversize)	30" x 36" (Expressway)	36" x 48" (Freeway)	SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)	
	MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only		MOUNTING HEIGHT	7'-0"		
	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).							
SHEETING	Yellow, White, Red								
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.								

Texas Department of Transportation

### 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	0911	04	089	CR
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	LFK	POLK	71	

20A

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DATE: 2/2/2022 \$TIME\$  
 FILE: ...Standards\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS				TYPE OF BARRIER MOUNTS					
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT				
GND	GND	SRF	WAS	WAP	GF1				
		<b>CONCRETE TRAFFIC BARRIER (CTB)</b>							
<b>NOTES</b> 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only. 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.	<b>EMBEDDED</b>		<b>SURFACE MOUNT</b>	<b>STEEL</b>	<b>PLASTIC</b>				
	<b>NOTES</b> 1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices. 2. Install per manufacturer's recommendations. 3. Post length may vary to meet field conditions. 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.		<b>NOTE</b> 1. Install per manufacturer's recommendations.						
<b>TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS</b>	<b>CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN</b>		<b>DELINEATORS AND TYPE 2 OBJECT MARKERS</b>						
<b>NOTE</b> Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)	<b>NOTE</b> Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.		See general notes 1, 2 and 3.						
					<b>GENERAL NOTES</b> 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement. 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction. 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible. 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation. 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface. 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.				
					<b>Traffic Safety Division Standard</b>				
					<b>DELINEATOR &amp; OBJECT MARKER INSTALLATION</b>				
					<b>D &amp; OM(2)-20</b>				
FILE: dom2-20.dgn		DN: TxDOT		CK: TxDOT		DW: TxDOT		CK: TxDOT	
© TxDOT August 2004		CONT SECT		JOB		HIGHWAY			
REVISIONS		0911 04		089		CR			
10-09 3-15		DIST		COUNTY		SHEET NO.			
4-10 7-20		LFK		POLK		72			

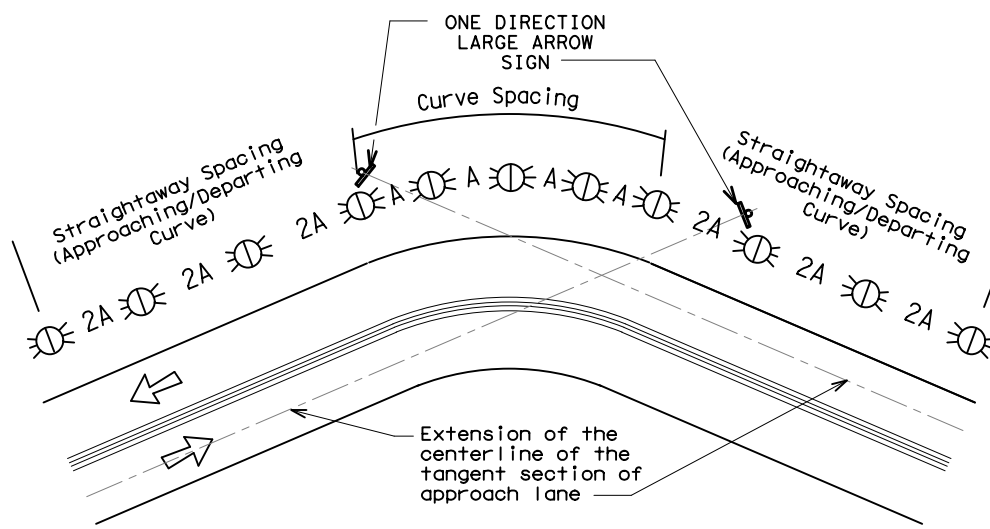
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DATE: 2/2/2022 \$TIME\$  
 FILE: ...Standards\dom3-20.dgn

### 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

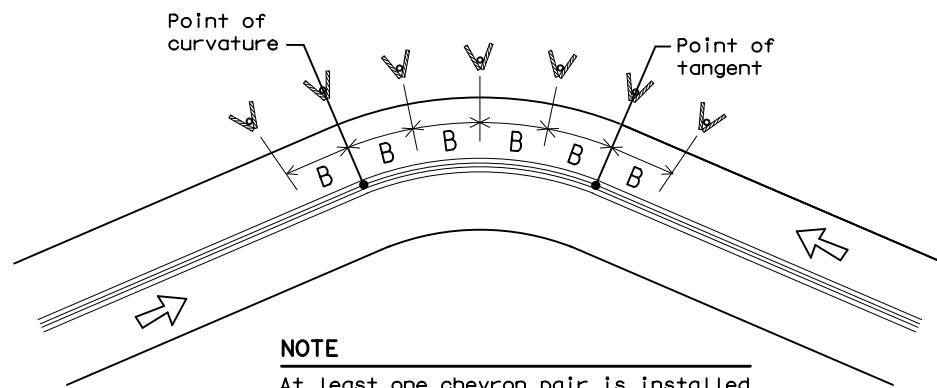
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**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**

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

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

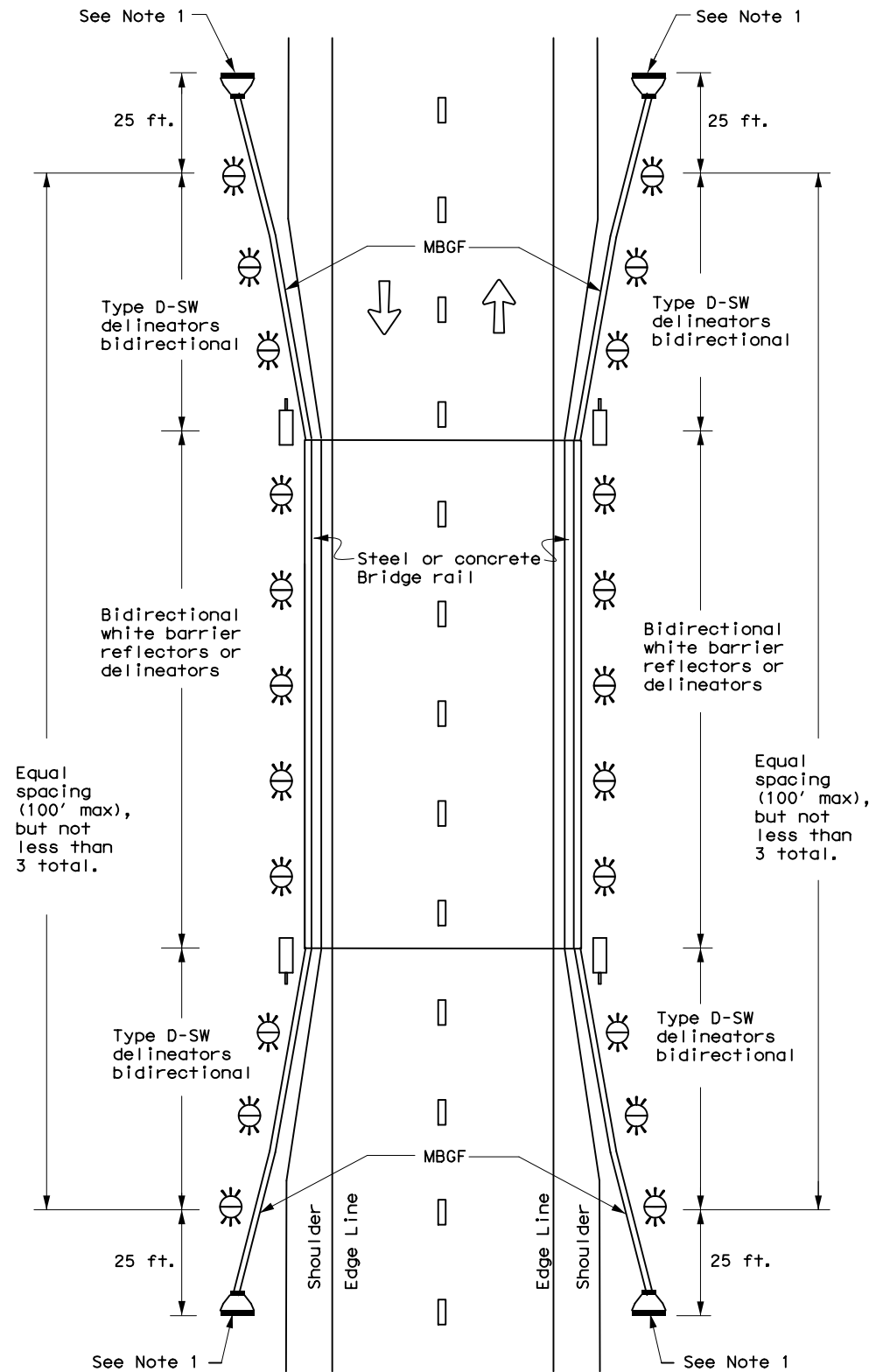
Texas Department of Transportation  
Traffic Safety Division Standard

## 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	0911	04	089	CR
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	LFK	POLK	73	

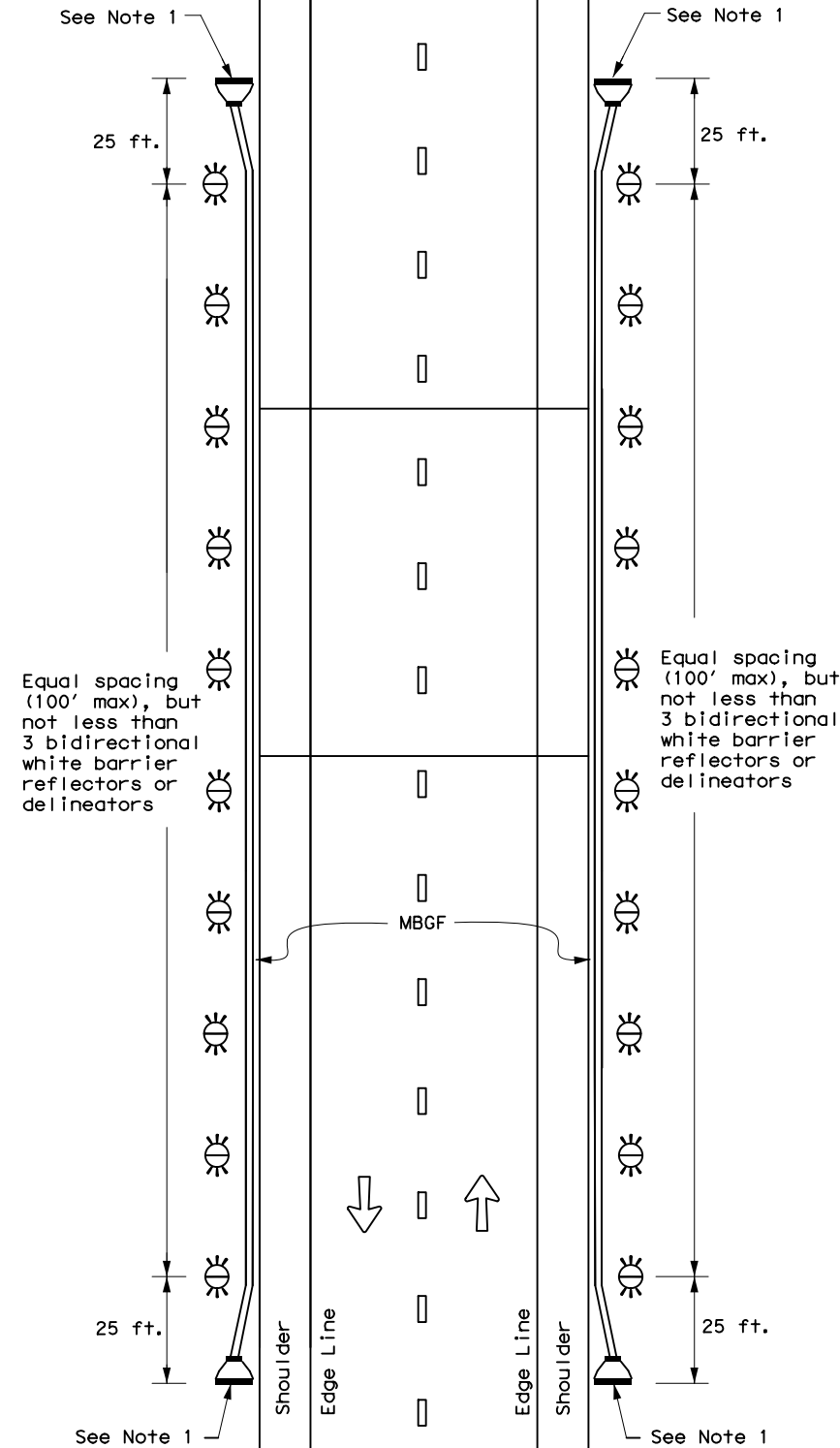
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**NOTE:**

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

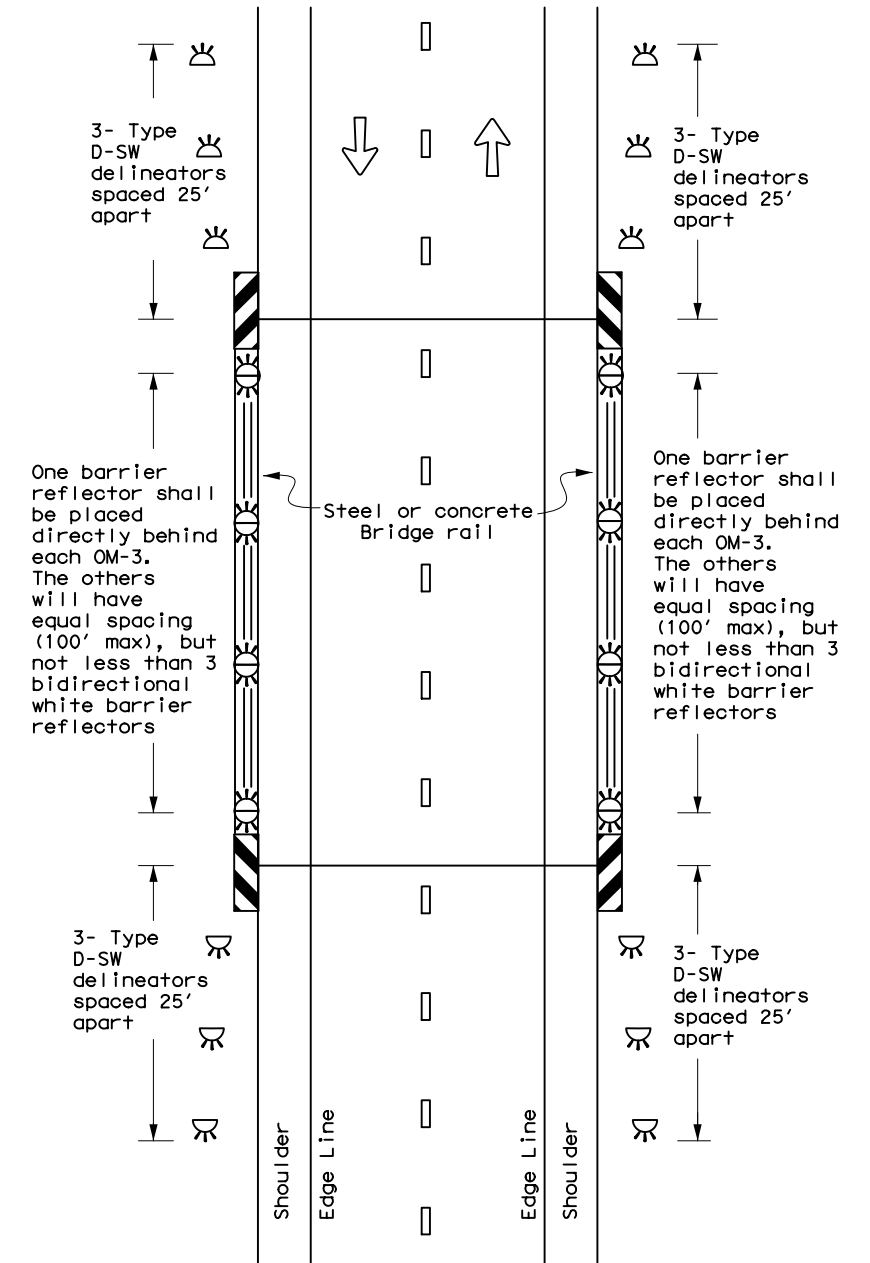
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**NOTE:**

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

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



**LEGEND**

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



**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

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

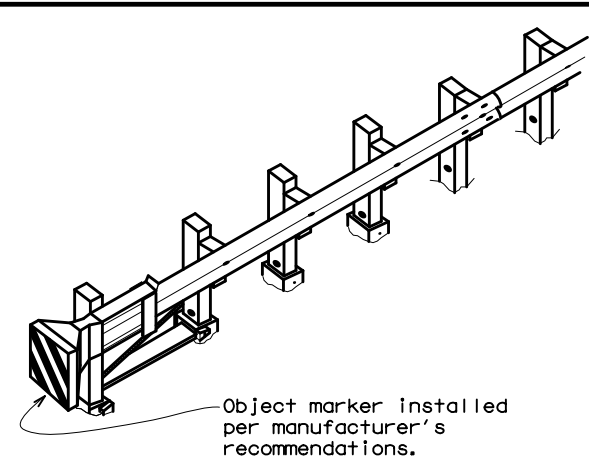
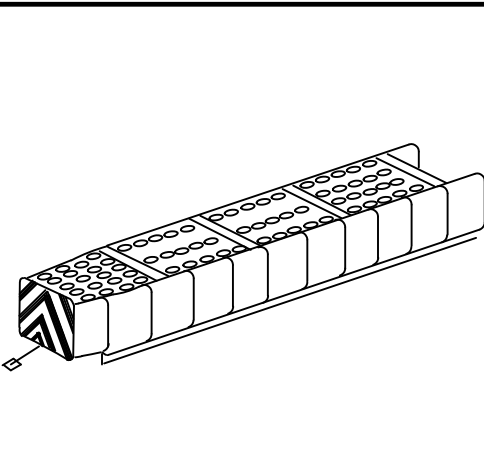
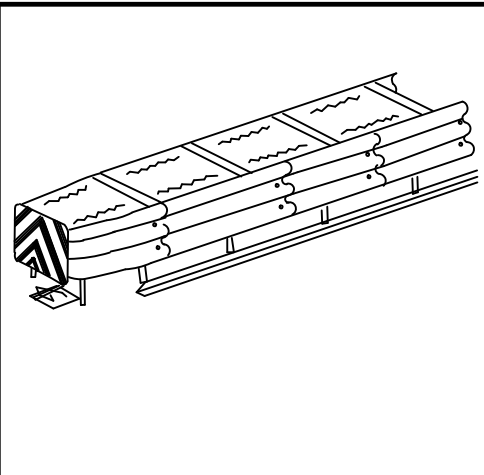
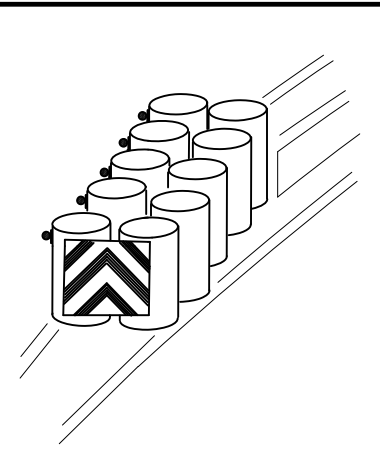
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	04	089	CR
7-20	DIST	COUNTY	SHEET NO.	
	LFK	POLK	74	

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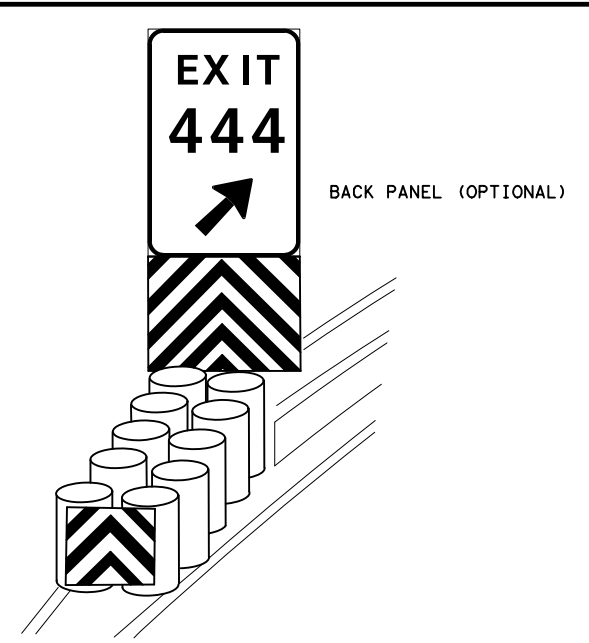
DATE: 2/2/2022 \$TIME\$  
FILE: ...Standards\dom5-20.dgn

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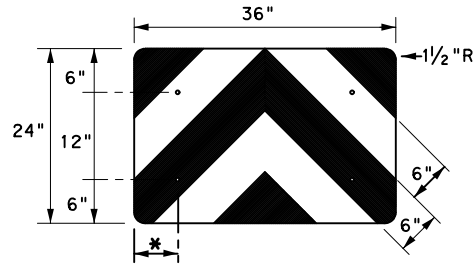
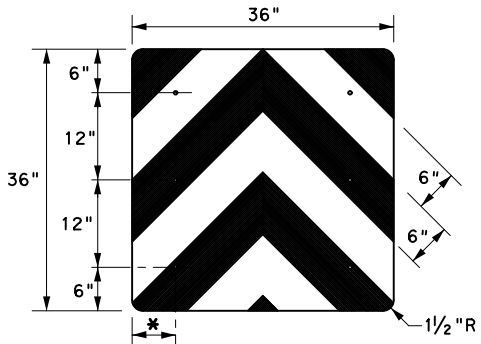
DATE: 2/2/2022 \$TIME\$  
 FILE: ...Standards\domvia-20.dgn



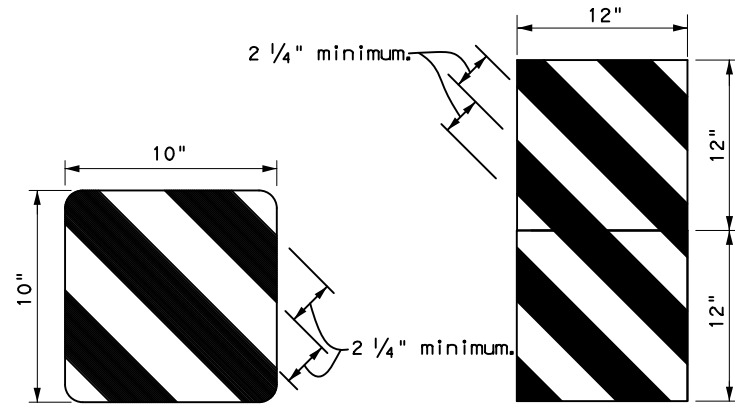
Object marker installed per manufacturer's recommendations.



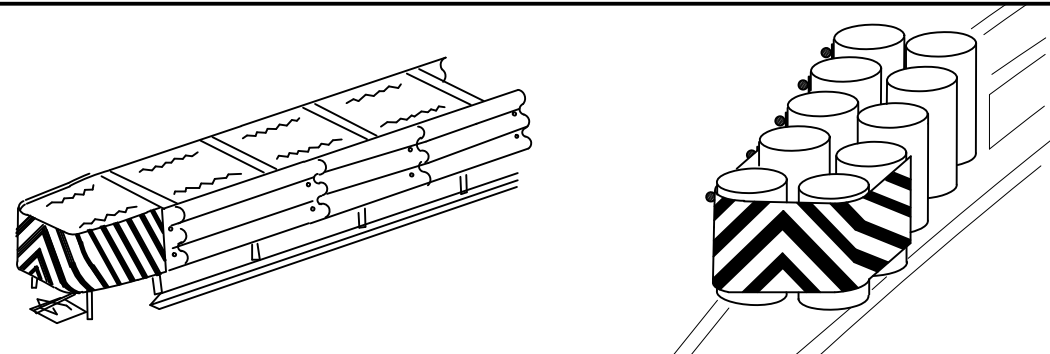
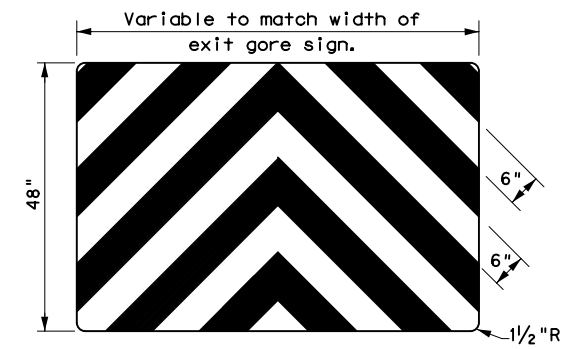
BACK PANEL (OPTIONAL)



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

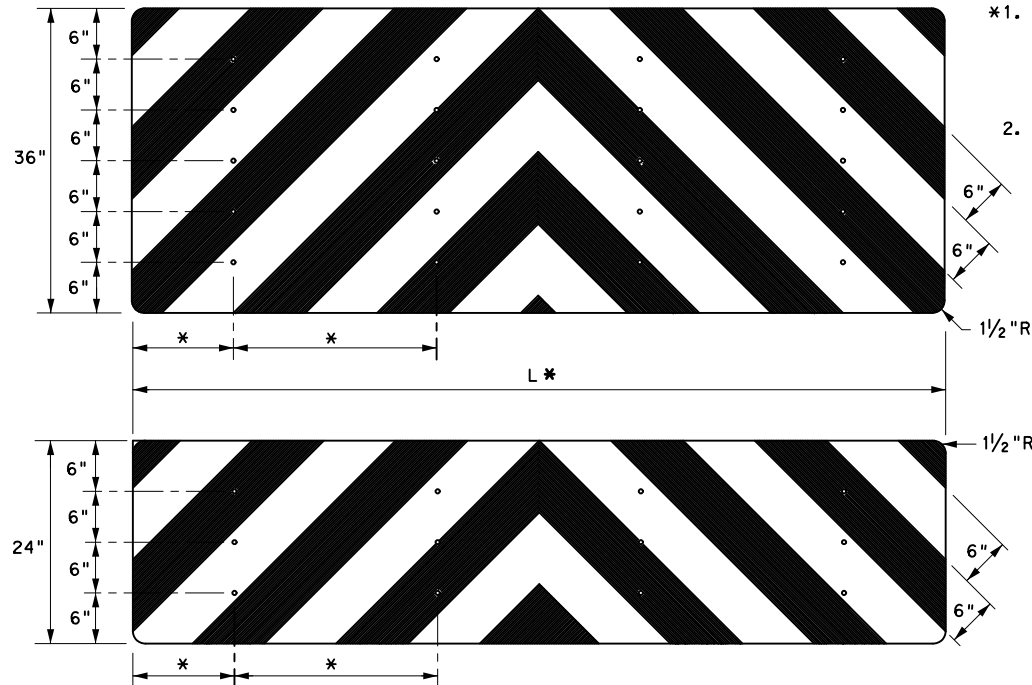


OBJECT MARKERS SMALLER THAN 3 FT<sup>2</sup>



**NOTES**

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



**NOTES**

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

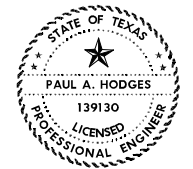
		<b>Traffic Safety Division Standard</b>	
<b>DELINEATOR &amp; OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS</b> <b>D &amp; OM(VIA)-20</b>			
FILE: domvia20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT December 1989	CONT	SECT	HIGHWAY
REVISIONS		0911 04	089 CR
4-92 8-04	DIST	COUNTY	SHEET NO.
8-95 3-15	LFK	POLK	75
4-98 7-20			
20G			

KELLY RD AT BLUFF CREEK (CSJ: 0911-04-089)

THE PROPOSED WORK OF THIS PROJECT IS TO REPLACE THE BRIDGE AND APPROACHES AT KELLY ROAD OVER BLUFF CREEK. THE TOTAL DISTURBED AREA IS 0.503 ACRES. THE DISTURBED AREA IN THIS PROJECT AND THE CONTRACTOR PROJECT SPECIFIC LOCATIONS (PSLS) WITHIN 1 MILE OF THE PROJECT LIMITS FOR THE CONTRACT WILL FURTHER ESTABLISH THE AUTHORIZATION REQUIREMENTS FOR STORM WATER DISCHARGES. AS THE DISTURBED AREA INCLUDING PSLS IS LESS THAN 1 ACRE, THE TPDES CGP DOES NOT APPLY; HOWEVER, THE CONTRACTOR SHALL PLACE BMPs AS DIRECTED TO ADHERE TO WATER QUALITY REQUIREMENTS ASSOCIATED WITH SECTION 404/401 PERMITS. IF THE TOTAL AREA DISTURBED SHOWN IN THE PLANS AND PSLS WITHIN 1 MILE OF THE PROJECT LIMITS EXCEED 1 ACRE, THE ENGINEER WILL DEVELOP A SWP3 SITE PLAN AND POST A SMALL CONSTRUCTION SITE NOTICE FOR THE CONSTRUCTION ACTIVITIES.

FILENAME: ...\\10 SWP3\SWP3\*INDEX01.dgn

DRAWING DATE: 2/4/2022

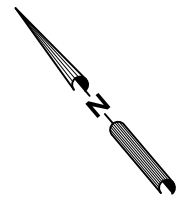


**CG** CIVIL CONSULTING GROUP  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356













**TXDOT SWP3 INDEX**  
 (KELLY RD AT BLUFF CREEK)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	POLK	76
CONTROL	SECTION	JOB	
0911	04	089	

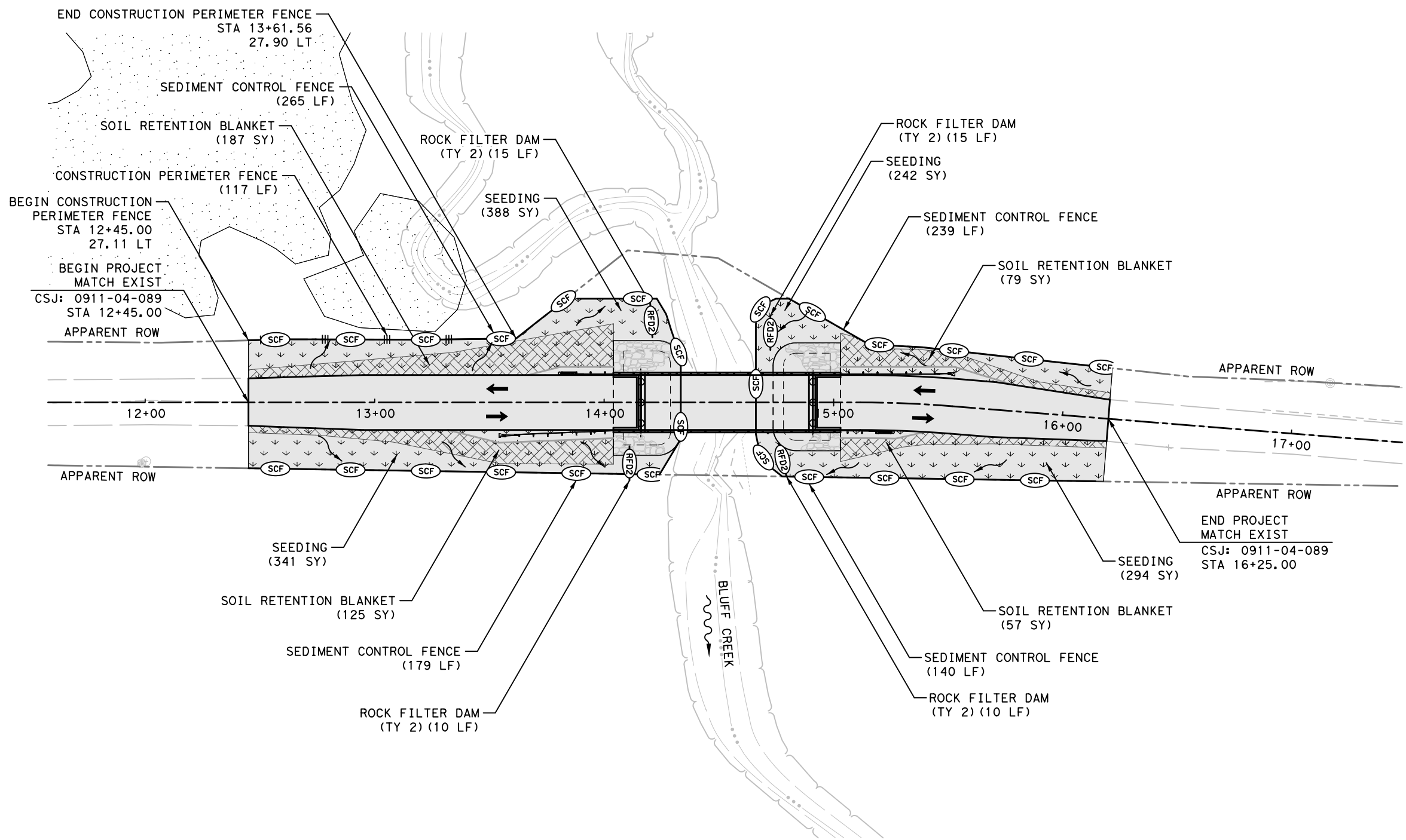


**LEGEND**

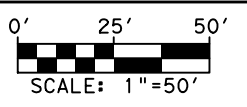
-  DISTURBED AREA/  
PREP ROW
-  SEEDING
-  STONE RIPRAP
-  SOIL RETENTION BLANKET
-  POTENTIAL WETLANDS
-  SEDIMENT CONTROL FENCE
-  ROCK FILTER DAM
-  CONSTRUCTION FENCE
-  DITCH FLOW
-  SURFACE FLOW

**NOTES:**

1. SEDIMENT CONTROLS SHALL BE IN PLACE PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES.
2. ALL CONTROLS TO BE PLACED AS SHOWN ON STANDARDS EC(1)-16 AND EC(2)-16.
3. ALL PERIMETER SEDIMENT CONTROLS TO REMAIN IN PLACE UNTIL END OF WORK.
4. SOIL RETENTION BLANKET TO BE PLACED ON TOP OF TOPSOIL LIMITS IMMEDIATELY FOLLOWING THE SEEDING OPERATION.
5. LOCATIONS OF EROSION CONTROL MEASURES MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY ENGINEER.



FILENAME: ...\\10 SWP3\KELLY\*SWP301.dgn  
 DRAWING DATE: 2/22/2022



02/23/2022

*Trevor L. Castilla*

**CIVIL CONSULTING GROUP**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**SWP3 LAYOUT**  
(KELLY RD AT BLUFF CREEK)

FED. RD. DIST. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		CR	
STATE	DISTRICT	COUNTY	
TEXAS	LFK	POLK	
CONTROL	SECTION	JOB	
0911	04	089	
			SHEET NO.
			77



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DATE: 4/2022 \$TIME\$  
I:\09\FHU03-089\*EPIC\_1of2.dgn

**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 proposed work of this project is to replace the bridge and approaches at Kelly Road over Bluff Creek. The total disturbed area is 0.503 acres. The disturbed area in this project and contractor project specific locations (PSLs) within 1 mile of the project limits for the contract will further establish the authorization requirements for storm water discharges. As the disturbed area including PSLs is less than 1 acre, the TPDES CGP does not apply; however, the contractor shall place BMPs as directed to adhere to water quality requirements associated with section 404/401 permits. If the total disturbed area shown in plans and PSLs within 1 mile of the project limits exceed 1 acre, the engineer will develop a SWP3 site plan and post a small construction site notice for the construction activities.

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

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

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

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

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

- The project area contains Bluff Creek
- Potential wetlands are present adjacent to the project area located Northwest of the bridge and West of Bluff Creek (See SWP3 layout). Avoid this area.
- Work MUST be conducted within the project area shown in plans.
- Refer to EPIC sheet 2 of 2 for Nationwide Permit #14 non-PCN requirements.

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

**III. CULTURAL RESOURCES**

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

No Action Required  Required Action

Action No.

1. N/A

**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. N/A

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

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

No Action Required  Required Action

Action No.

1. In order to maintain compliance with Chapter 64 of the Texas Parks and Wildlife Code and Migratory Bird Treaty Act (MBTA), construction activities that may affect nests (i.e. tree removal, tree limbing, bridge work) shall be conducted outside of the nesting season (March 15 to September 15). In the event birds or active nests (eggs and/or nestlings present) are encountered, contact the engineer prior to conducting work.

**TPWD Commitment Notes:**

- Eastern spotted skunk, Long-tailed weasel, and Swamp rabbit may occur in the project area. Avoid harming species if encountered. Avoid or minimize disturbing or removing downed logs, leaf litter, stumps, and dens where feasible
- Souther crawfish frog and Strecker's chorus frog may occur in the project area. Avoid harming species if encountered. PSLs within the ROW should be located in uplands away from aquatic features. Minimize impacts to shoreline basking sites (e.g. downed trees, sand bars, exposed bedrock) and refugia/overwinter sites (e.g. brush, debris piles, crayfish burrows, leaf pack, and log jams), where feasible.
- Eastern box turtle, Pigmy rattlesnake, Prairie skink, Slender glass lizard, Western box turtle, Western chicken turtle, and Timber rattlesnake may occur in the project area. Avoid harming species if encountered. If the species are found on project site, allow species to safely leave the project area. Visually inspect excavation areas for trapped wildlife prior to backfilling. Inspect heavy equipment stored on site before, particularly after rain event when reptile movement occur, to ensure no harm to species seeking temporary shelter. Avoid or minimize disturbing or removing down trees, rotting stumps, and leaf litter, where feasible.

**LIST OF ABBREVIATIONS**

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SWP3: 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.

- Lead was detected in paint less than 90ppm on the Bluff Creek bridge at Kelly Road. Requirements of Item 6 Special Provisions are not required. Contractor may request a copy of the Asbestos and Lead Paint Inspection Report from the Area Engineer. Any contracting personnel who may disturb the steel components should be made aware of the lead content in the materials so that they may use proper OSHA procedures.


**VII. OTHER ENVIRONMENTAL ISSUES**

(Includes region issues, such as Edwards Aquifer Districts, etc.)

No Action Required  Required Action

Action No.

1. N/A

 <b>Texas Department of Transportation</b>		<b>Design Division Standard</b>	
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</b>			
<b>EPIC</b>			
SHEET 1 OF 2			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
©TxDOT: February 2015	CONT	SECT	JOB
12-12-2011 (DS) REVISIONS	0911	04	089
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LFK	POLK	78

NWP GENERAL CONDITIONS

AS APPLICABLE TO  
THIS PROJECT

2. AQUATIC LIFE MOVEMENTS. NO ACTIVITY MAY SUBSTANTIALLY DISRUPT THE NECESSARY LIFE CYCLE MOVEMENTS OF THOSE SPECIES OF AQUATIC LIFE INDIGENOUS TO THE WATERBODY, INCLUDING THOSE SPECIES THAT NORMALLY MIGRATE THROUGH THE AREA, UNLESS THE ACTIVITY'S PRIMARY PURPOSE IS TO IMPOUND WATER.
3. SPAWNING AREAS. ACTIVITIES IN SPAWNING AREAS DURING SPAWNING SEASONS MUST BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. ACTIVITIES THAT RESULT IN THE PHYSICAL DESTRUCTION (E.G., THROUGH EXCAVATION, FILL, OR DOWNSTREAM SMOTHERING BY SUBSTANTIAL TURBIDITY) OF AN IMPORTANT SPAWNING AREA ARE NOT AUTHORIZED.
6. SUITABLE MATERIAL. NO ACTIVITY MAY USE UNSUITABLE MATERIAL (E.G., TRASH, DEBRIS, CAR BODIES, ASPHALT, ETC.). MATERIAL USED FOR CONSTRUCTION OR DISCHARGED MUST BE FREE FROM TOXIC POLLUTANTS IN TOXIC AMOUNTS (SEE SECTION 307 OF THE CLEAN WATER ACT).
8. ADVERSE EFFECTS FROM IMPOUNDMENTS. IF THE ACTIVITY CREATES AN IMPOUNDMENT OF WATER, ADVERSE EFFECTS TO THE AQUATIC SYSTEM DUE TO ACCELERATING THE PASSAGE OF WATER, AND/OR RESTRICTING ITS FLOW MUST BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE.
9. MANAGEMENT OF WATER FLOWS. TO THE MAXIMUM EXTENT PRACTICABLE, THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS MUST BE MAINTAINED FOR EACH ACTIVITY, INCLUDING STREAM CHANNELIZATION AND STORM WATER MANAGEMENT ACTIVITIES, EXCEPT AS PROVIDED BELOW. THE ACTIVITY MUST BE CONSTRUCTED TO WITHSTAND EXPECTED HIGH FLOWS. THE ACTIVITY MUST NOT RESTRICT OR IMPEDE THE PASSAGE OF NORMAL OR HIGH FLOWS, UNLESS THE PRIMARY PURPOSE OF THE ACTIVITY IS TO IMPOUND WATER OR MANAGE HIGH FLOWS. THE ACTIVITY MAY ALTER THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS IF IT BENEFITS THE AQUATIC ENVIRONMENT (E.G., STREAM RESTORATION OR RELOCATION ACTIVITIES).
11. EQUIPMENT. HEAVY EQUIPMENT WORKING IN WETLANDS OR MUD FLATS MUST BE PLACED ON MATS, OR OTHER MEASURES MUST BE TAKEN TO MINIMIZE SOIL DISTURBANCE.
12. SOIL EROSION AND SEDIMENT CONTROLS. APPROPRIATE SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND ALL EXPOSED SOIL AND OTHER FILLS, AS WELL AS ANY WORK BELOW THE ORDINARY HIGH WATER MARK OR HIGH TIDE LINE, MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE. PERMITTEES ARE ENCOURAGED TO PERFORM WORK WITHIN WATERS OF THE UNITED STATES DURING PERIODS OF LOW-FLOW OR NO-FLOW.
13. REMOVAL OF TEMPORARY FILLS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AFFECTED AREAS MUST BE REVEGETATED, AS APPROPRIATE.
14. PROPER MAINTENANCE. ANY AUTHORIZED STRUCTURE OR FILL SHALL BE PROPERLY MAINTAINED, INCLUDING MAINTENANCE TO ENSURE PUBLIC SAFETY AND COMPLIANCE WITH APPLICABLE NWP GENERAL CONDITIONS, AS WELL AS ANY ACTIVITY-SPECIFIC CONDITIONS ADDED BY THE DISTRICT ENGINEER TO AN NWP AUTHORIZATION.
23. MITIGATION. THE DISTRICT ENGINEER WILL CONSIDER SEVERAL FACTORS WHEN DETERMINING APPROPRIATE AND PRACTICABLE MITIGATION NECESSARY TO ENSURE THAT ADVERSE EFFECTS ON THE AQUATIC ENVIRONMENT ARE MINIMAL.
25. WATER QUALITY. WHERE STATES AND AUTHORIZED TRIBES, OR EPA WHERE APPLICABLE, HAVE NOT PREVIOUSLY CERTIFIED COMPLIANCE OF AN NWP WITH CWA SECTION 401, INDIVIDUAL 401 WATER QUALITY CERTIFICATION MUST BE OBTAINED OR WAIVED (SEE 33 CFR 330.4(C)). THE DISTRICT ENGINEER OR STATE OR TRIBE MAY REQUIRE ADDITIONAL WATER QUALITY MANAGEMENT MEASURES TO ENSURE THAT THE AUTHORIZED ACTIVITY DOES NOT RESULT IN MORE THAN MINIMAL DEGRADATION OR WATER QUALITY.
27. REGIONAL AND CASE-BY-CASE CONDITIONS. THE ACTIVITY MUST COMPLY WITH ANY REGIONAL CONDITIONS THAT MAY HAVE BEEN ADDED BY THE DIVISION ENGINEER (SEE 33 CFR 330.4(E)) AND WITH ANY CASE SPECIFIC CONDITIONS ADDED BY THE CORPS OR BY THE STATE, INDIAN TRIBE, OR U.S. EPA IN ITS SECTION 401 WATER QUALITY CERTIFICATION, OR BY THE STATE IN ITS COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION.

FOR A COMPLETE LIST OF GENERAL CONDITIONS GO TO:

<http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/NationwideGeneralPermits.aspx>

USACE - PERMIT #14

AS APPLICABLE TO  
THIS PROJECT

ACTIVITIES REQUIRED FOR CROSSINGS OF WATERS OF THE UNITED STATES ASSOCIATED WITH THE CONSTRUCTION, EXPANSION, MODIFICATION, OR IMPROVEMENT OF LINEAR TRANSPORTATION PROJECTS (E.G., ROADS, HIGHWAYS, RAILWAYS, TRAILS, AIRPORT RUNWAYS, AND TAXIWAYS) IN WATERS OF THE U.S. FOR LINEAR TRANSPORTATION PROJECTS IN NON-TIDAL WATERS, THE DISCHARGE CANNOT CAUSE THE LOSS OF GREATER THAN 1/2-ACRE OF WATERS OF THE U.S. ANY STREAM CHANNEL MODIFICATION, INCLUDING BANK STABILIZATION, IS LIMITED TO THE MINIMUM NECESSARY TO CONSTRUCT OR PROTECT THE LINEAR TRANSPORTATION PROJECT; SUCH MODIFICATIONS MUST BE IN THE IMMEDIATE VICINITY OF THE PROJECT.

THIS NWP ALSO AUTHORIZES TEMPORARY STRUCTURES, FILLS, AND WORK NECESSARY TO CONSTRUCT THE LINEAR TRANSPORTATION PROJECT. APPROPRIATE MEASURES MUST BE TAKEN TO MAINTAIN DOWNSTREAM FLOWS AND MINIMIZE FLOODING TO THE MAXIMUM EXTENT PRACTICABLE, WHEN TEMPORARY STRUCTURES, WORK, AND DISCHARGES, INCLUDING COFFERDAMS, ARE NECESSARY FOR CONSTRUCTION ACTIVITIES, ACCESS FILLS, OR DEWATERING OF CONSTRUCTION SITES. TEMPORARY FILLS MUST CONSIST OF MATERIALS, AND BE PLACED IN A MANNER THAT WILL NOT BE ERODED BY EXPECTED HIGH FLOWS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AREAS AFFECTED BY TEMPORARY FILLS MUST BE REVEGETATED, AS APPROPRIATE.

THIS NWP CANNOT BE USED TO AUTHORIZE NON-LINEAR FEATURES COMMONLY ASSOCIATED WITH TRANSPORTATION PROJECTS, SUCH AS VEHICLE MAINTENANCE OR STORAGE BUILDINGS, PARKING LOTS, TRAIN STATIONS, OR AIRCRAFT HANGARS.


NOTIFICATION: THE PERMITTEE MUST SUBMIT A PRE-CONSTRUCTION NOTIFICATION (PCN) TO THE DISTRICT ENGINEER PRIOR TO COMMENCING THE ACTIVITY IF: (1) THE LOSS OF WATERS OF THE U.S. EXCEEDS 1/10-ACRE; OR (2) THERE IS A DISCHARGE IN A SPECIAL AQUATIC SITE, INCLUDING WETLANDS.

NOTE:

THE PROJECT CROSSES JURISDICTIONAL WATERS OF THE U.S. AND A NWP #14 WITH NO PCN HAS BEEN UTILIZED. THIS PERMIT AUTHORIZES THE ACTIVITIES WHICH WILL IMPACT WATERS OF THE U.S. THE NWP GENERAL CONDITIONS AND THE NWP #14 LIMITS MUST BE FOLLOWED IN ORDER TO MAINTAIN COMPLIANCE WITH THE NWP. NO COORDINATION HAS TAKEN PLACE WITH THE USACE BECAUSE IMPACTS WILL NOT EXCEED THE ABOVE CRITERIA. IF COORDINATION MAY BE NEEDED, CONTACT THE TXDOT LUFKIN DISTRICT ENVIRONMENTAL SECTION AT 1-800-687-8087.

ENVIRONMENTAL PERMITS,  
ISSUES AND COMMITMENTS (EPIC) □

USACE



EPIC

(ENVIRONMENTAL PERMITS,  
ISSUES AND COMMITMENTS)

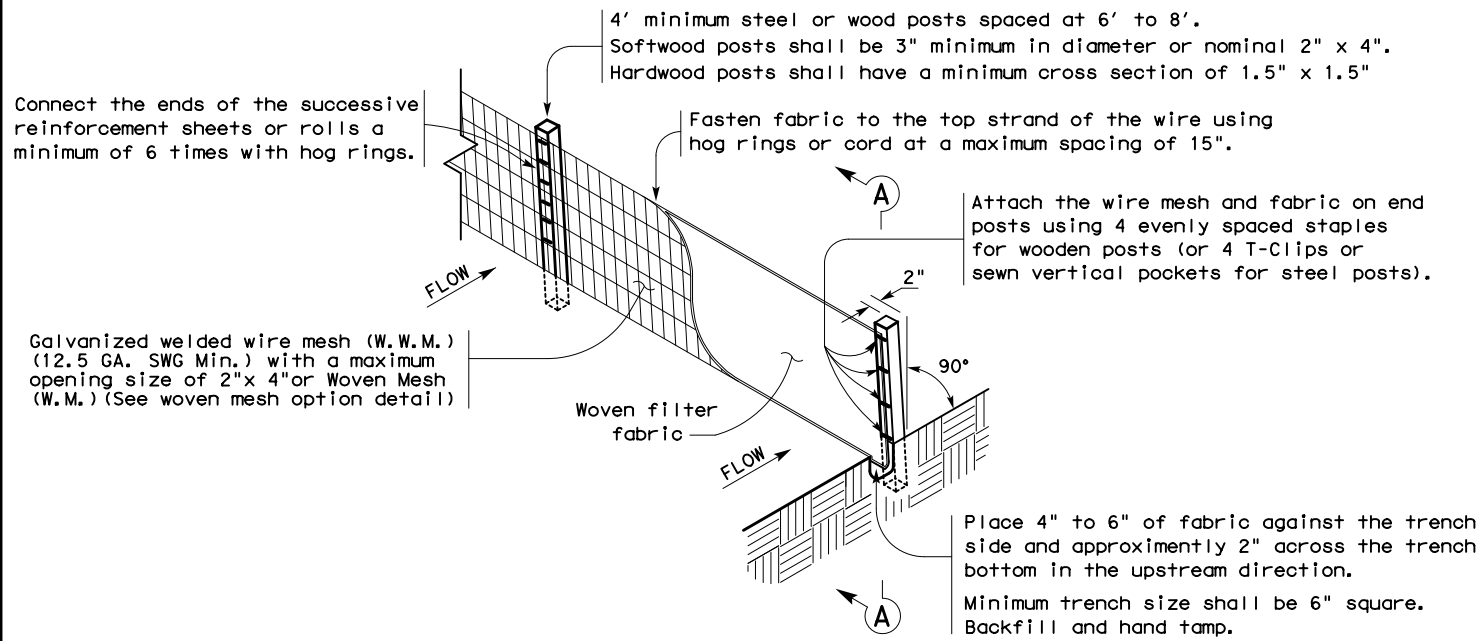
SHEET 2 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS	0911	04	089	CR
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LFK	POLK		79

DATE: 2/2/2022 \$TIME\$ FILE: ...\\0911-04-089\_EPIC\_2of2\_NWP14\_non-PCN.dgn

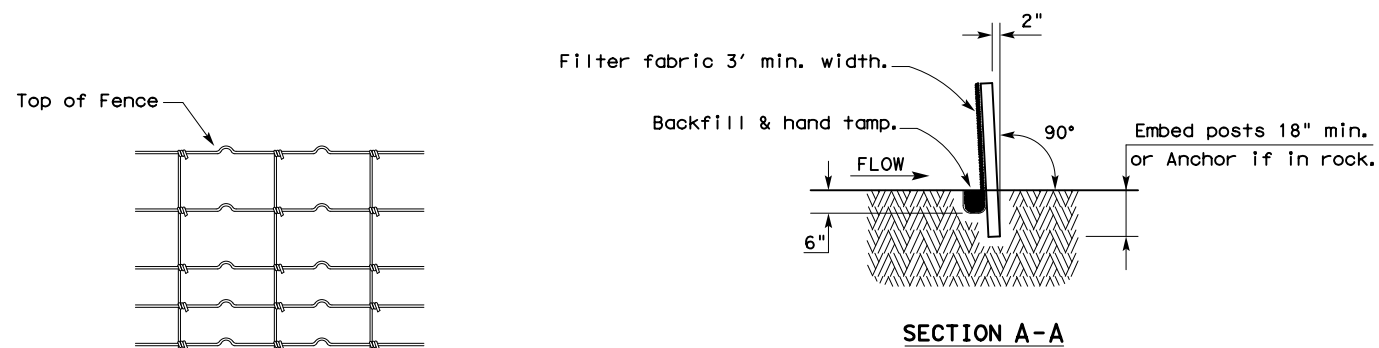
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DATE: 2/2/2022  
 FILE: ... \10\_SWP3\Standards.ec116.dgn



**TEMPORARY SEDIMENT CONTROL FENCE**

SCF



**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<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

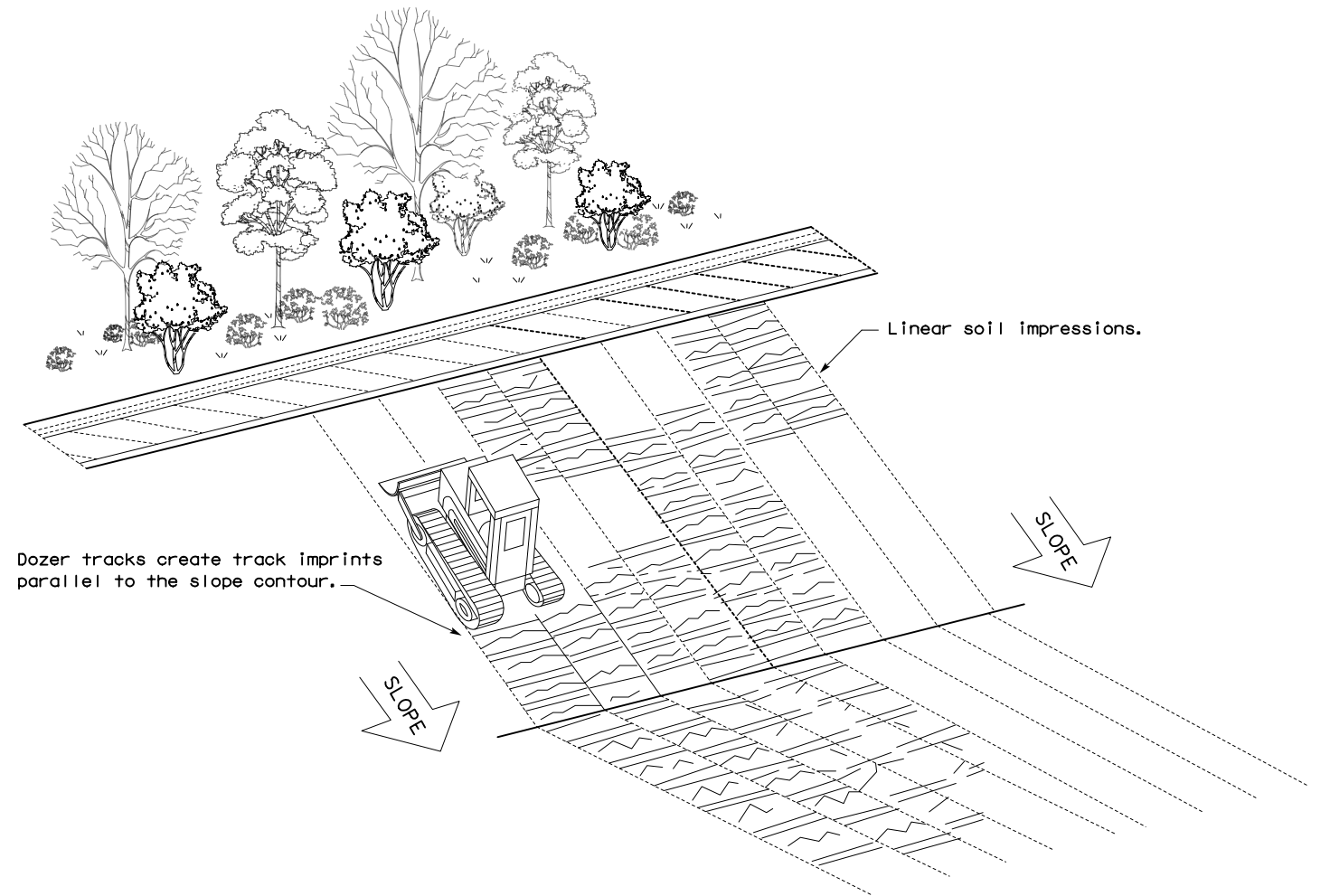
**LEGEND**

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 continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.

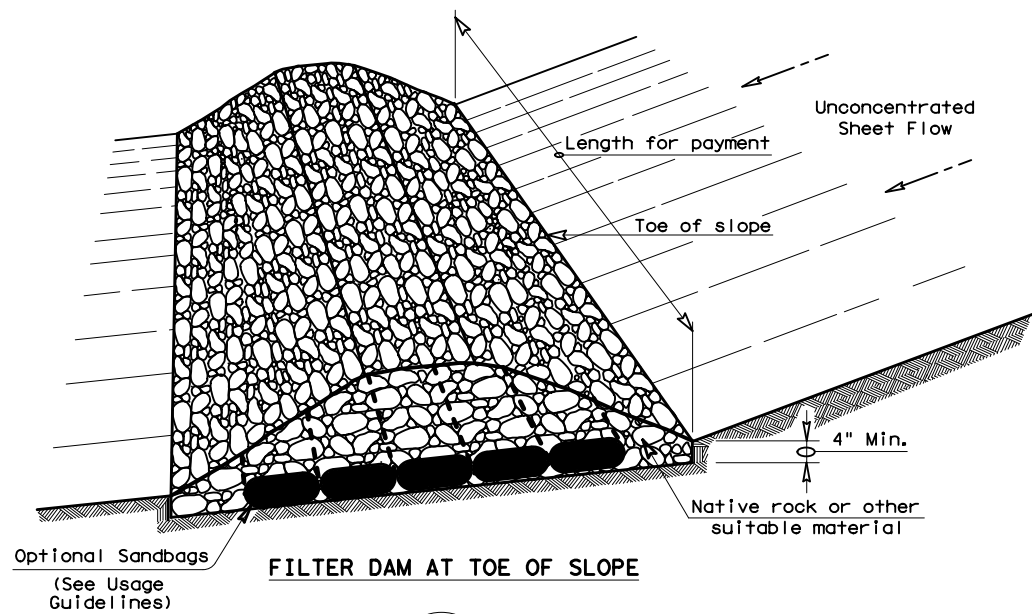


**VERTICAL TRACKING**

				Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE &amp; VERTICAL TRACKING</b>					
<b>EC(1)-16</b>					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0911	04	089	CR	
	DIST	COUNTY		SHEET NO.	
	LFK	POLK		80	

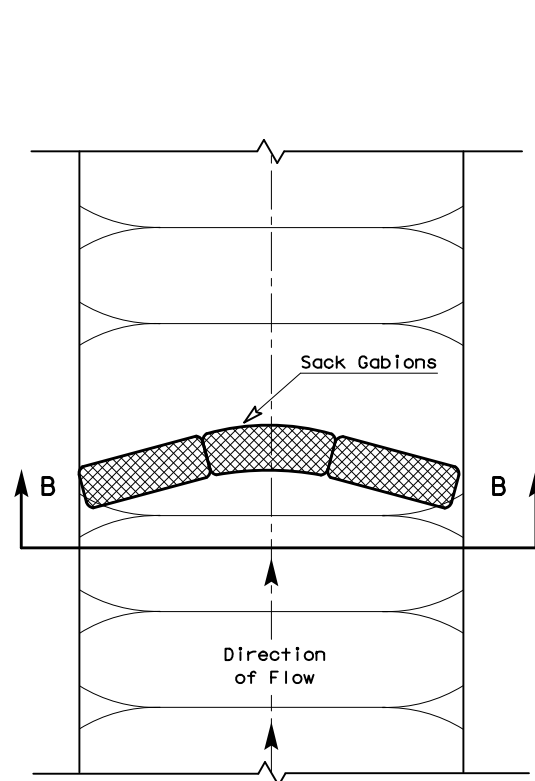
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DATE: 2/2/2022  
 FILE: \\10 SWP3\Standards\ec216.dgn

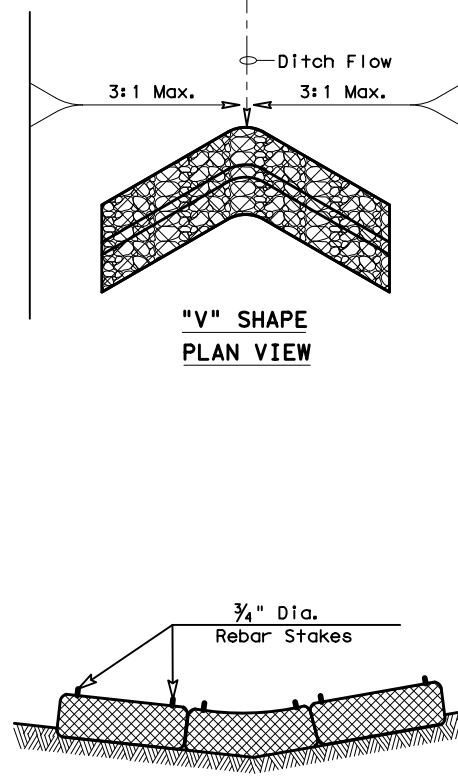


**FILTER DAM AT TOE OF SLOPE**

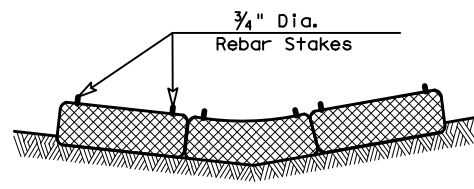
(RFD1)



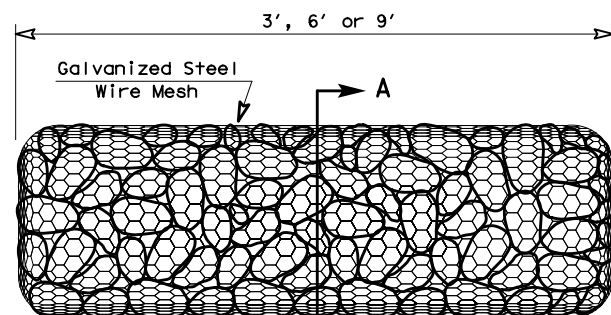
**PLAN VIEW**



**"V" SHAPE PLAN VIEW**

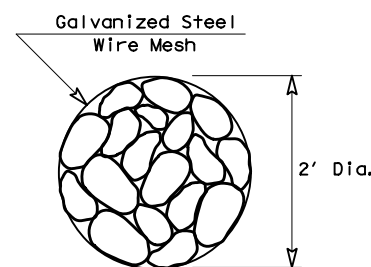


**SECTION B-B**

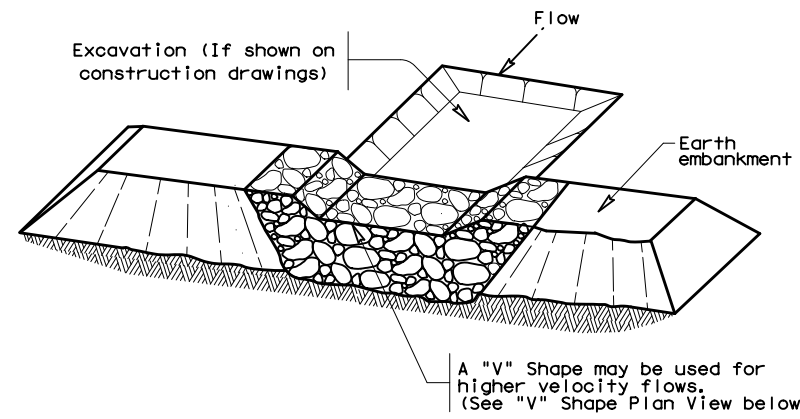


**TYPE 4 (SACK GABIONS)**

(RFD4)

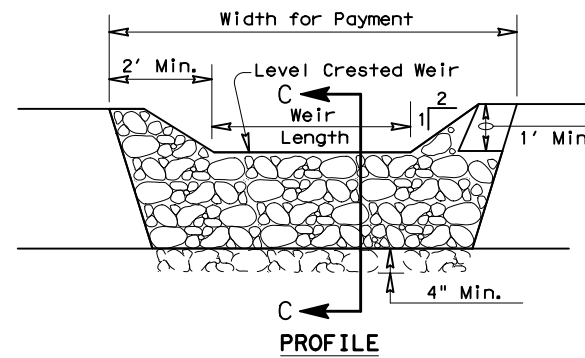


**SECTION A-A**

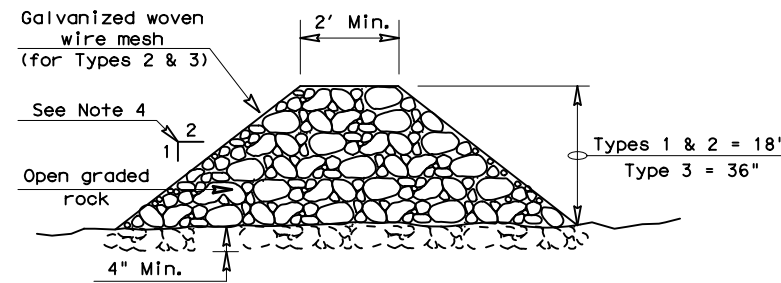


**FILTER DAM AT SEDIMENT TRAP**

(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<sup>2</sup> of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

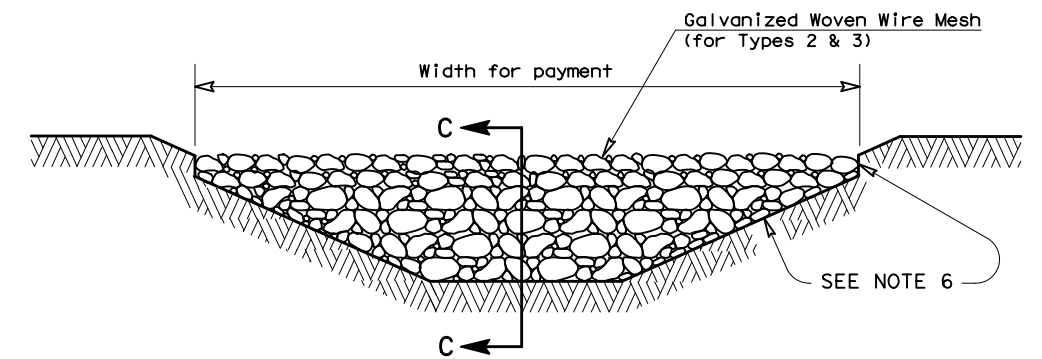
**Type 1 (18" high with no wire mesh) (3" to 6" aggregate):** Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 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 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
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.

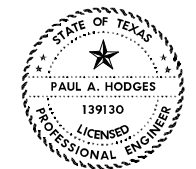
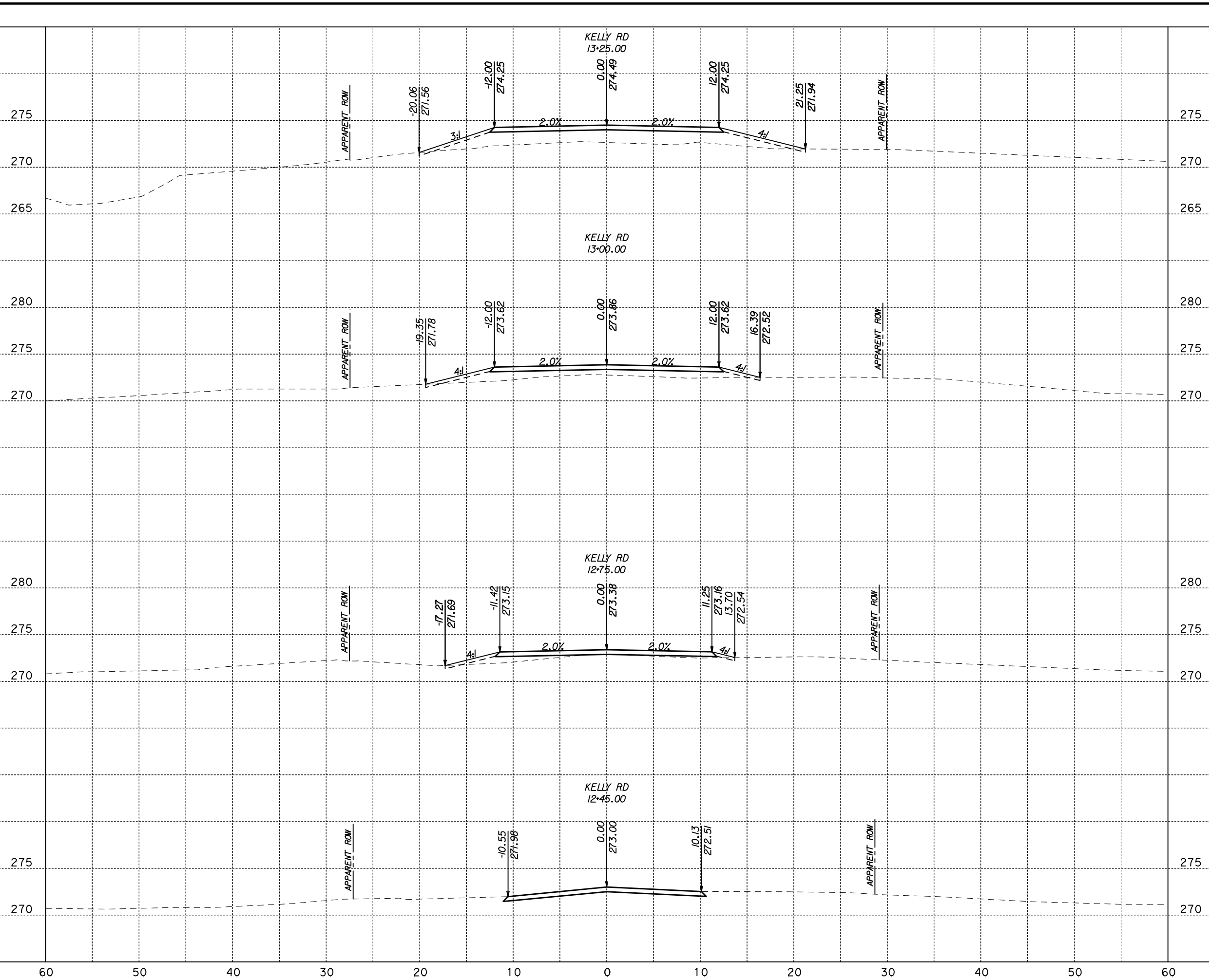
**PLAN SHEET LEGEND**

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)

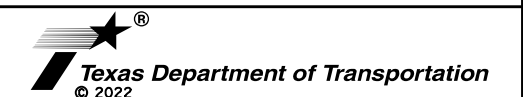
		Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>ROCK FILTER DAMS</b> <b>EC(2)-16</b>			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT: 0911	SECT: 04	JOB: 089
REVISIONS	DIST: LFK	COUNTY: POLK	SHEET NO.: 81

FILENAME: ...PS&E1\*XSEC.dgn

DRAWING DATE: 2/2/2022



**Civil Consulting Group**  
 1575 HERITAGE DRIVE, STE. 308  
 MCKINNEY, TEXAS 75069  
 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



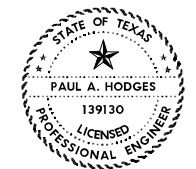
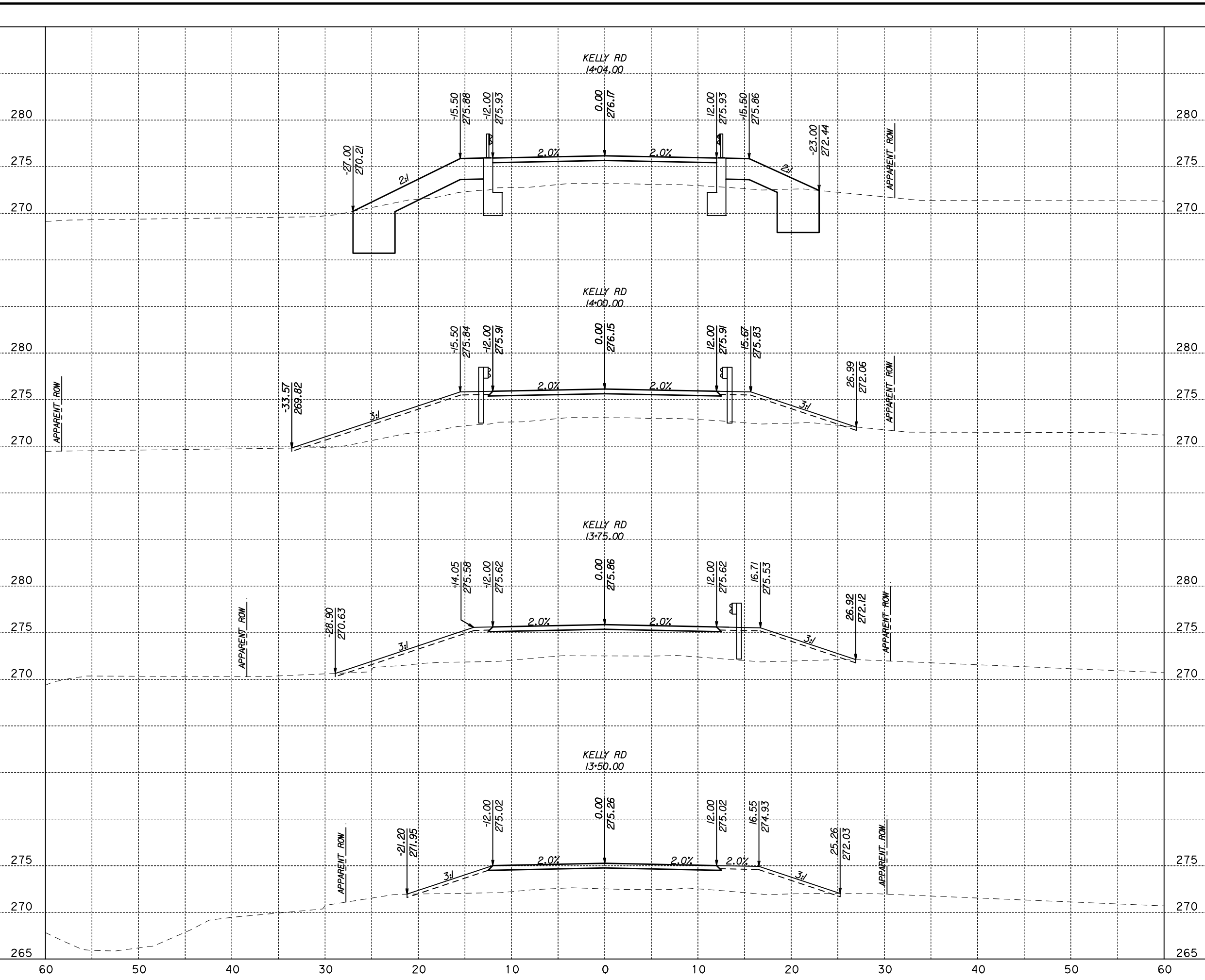
**CROSS SECTIONS**  
 (KELLY RD AT BLUFF CREEK)

(SHEET 1 OF 5)

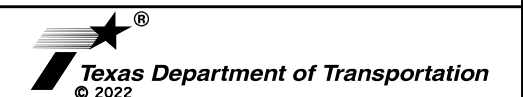
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STATE	DISTRICT	COUNTY	
TEXAS	LFK	POLK	
CONTROL	SECTION	JOB	
0911	04	089	
			SHEET NO.
			82

FILENAME: ...PS&E1\*XS&E.dgn

DRAWING DATE: 2/2/2022



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1575 HERITAGE DRIVE, STE. 308  
MCKINNEY, TEXAS 75069  
P 972.569.9193 F 972.569.9197  
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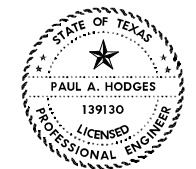
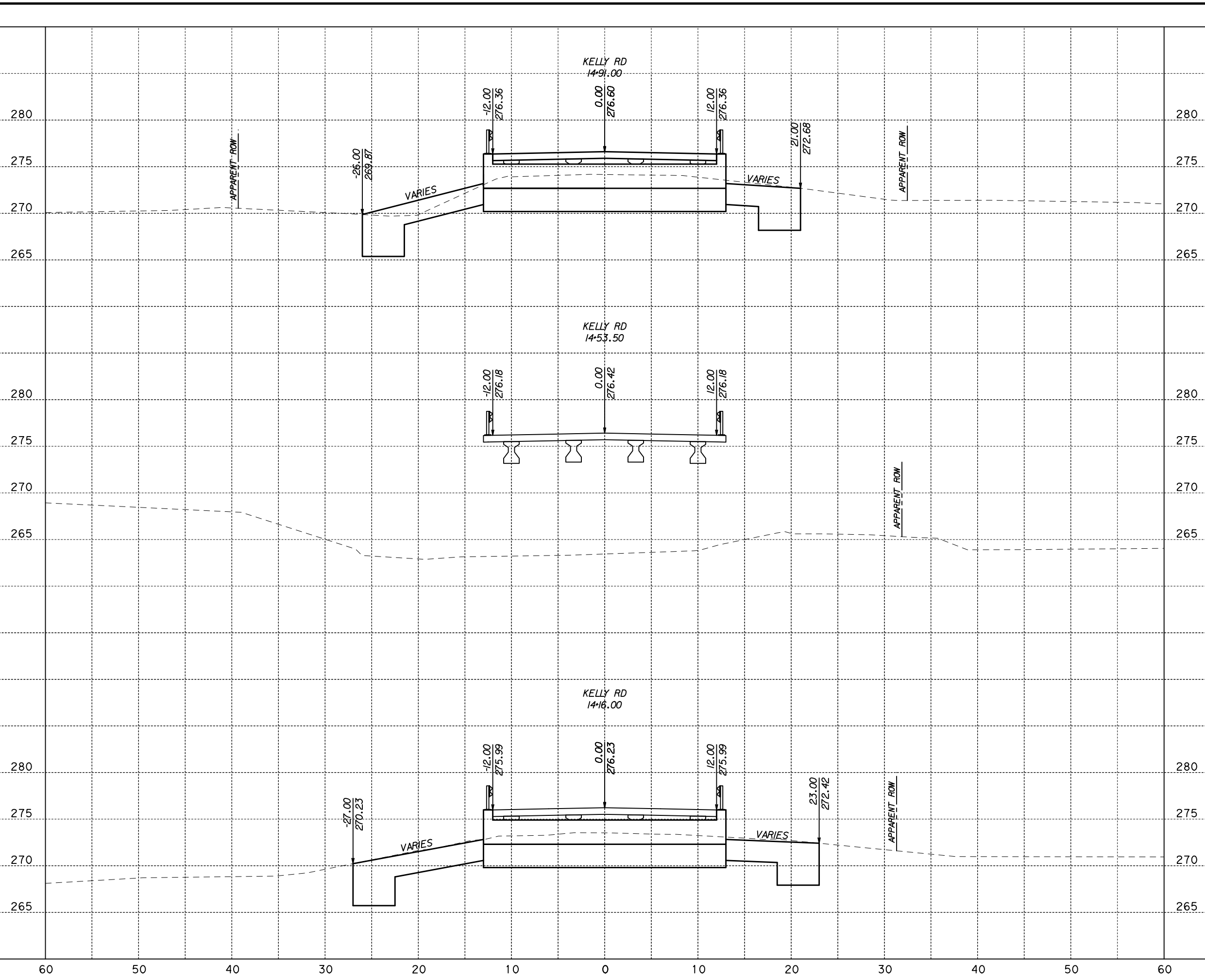
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(KELLY RD AT BLUFF CREEK)

(SHEET 2 OF 5)

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STATE	DISTRICT	COUNTY
TEXAS	LFK	POLK
CONTROL	SECTION	JOB
0911	04	089
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FILENAME: ...PS&E1\*XSEC.dgn

DRAWING DATE: 2/2/2022



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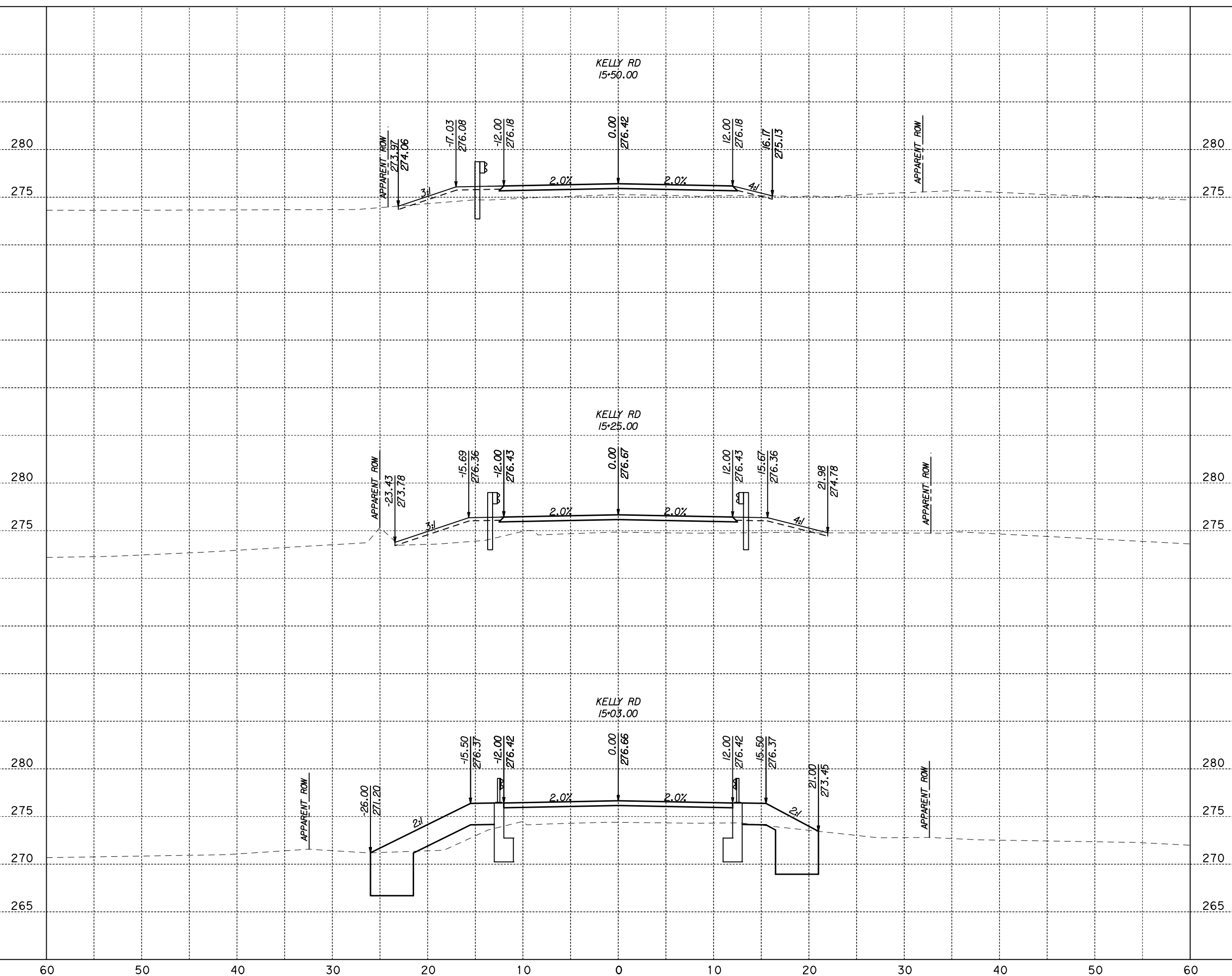
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 (KELLY RD AT BLUFF CREEK)

(SHEET 3 OF 5)

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CONTROL	SECTION	JOB
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FILENAME: ...PS&E1\*XSEC.dgn

DRAWING DATE: 2/2/2022



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 P 972.569.9193 F 972.569.9197  
 TEXAS REGISTERED ENGINEERING FIRM NO. F-9356



**CROSS SECTIONS**  
 (KELLY RD AT BLUFF CREEK)

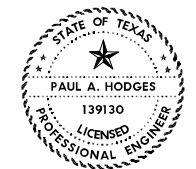
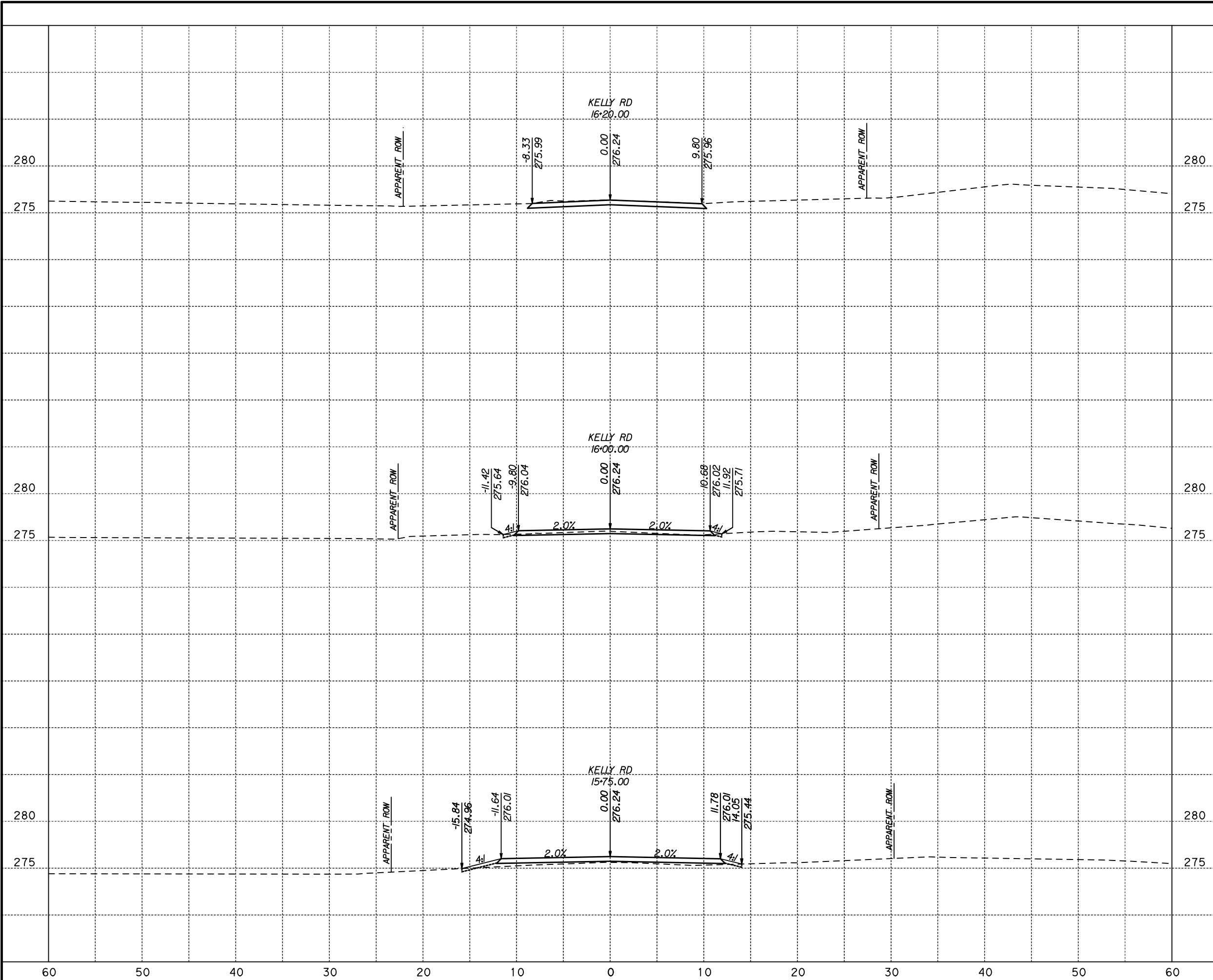
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CONTROL	SECTION	JOB
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FILENAME: ...PS&E1 \*XSEC.dgn

DRAWING DATE: 2/2/2022



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**CROSS SECTIONS**  
(KELLY RD AT BLUFF CREEK)

(SHEET 5 OF 5)

FED. RD. DIST. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
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TEXAS	LFK	POLK	
CONTROL	SECTION	JOB	
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