

TIME: 5:21:56 PM  
DATE: 1/25/2023

DESIGN MBT	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS BDG	6	BR2021 (146)		CS
CHECK JDB	STATE	DISTRICT	COUNTY	
CHECK PKC	TEXAS	FTW	TARRANT	
	CONTROL	SECTION	JOB	
	0902	90	132	
			1	

STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION

INDEX OF SHEETS  
(SEE SHEET 2)

PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT NO. BR2021 (146)

DESIGN SPEED = 30 MPH

AADT (2019) = 4,990  
AADT (2040) = 6,986

FUNCTIONAL CLASS: MINOR URBAN ARTERIAL

FINAL PLANS

TDLR INSPECTION REQUIRED

NAME OF CONTRACTOR: \_\_\_\_\_  
DATE OF LETTING: \_\_\_\_\_  
DATE WORK BEGAN: \_\_\_\_\_  
DATE WORK COMPLETED: \_\_\_\_\_  
DATE WORK ACCEPTED: \_\_\_\_\_

CS (JACKSON POOL)  
TARRANT COUNTY

LIMITS: AT LITTLE BEAR CREEK

TOTAL LENGTH OF PROJECT = 

ROADWAY	=	335.00 FT.	=	0.063 MI.
BRIDGE	=	80.00 FT.	=	0.015 MI.
TOTAL	=	415.00 FT.	=	0.078 MI.

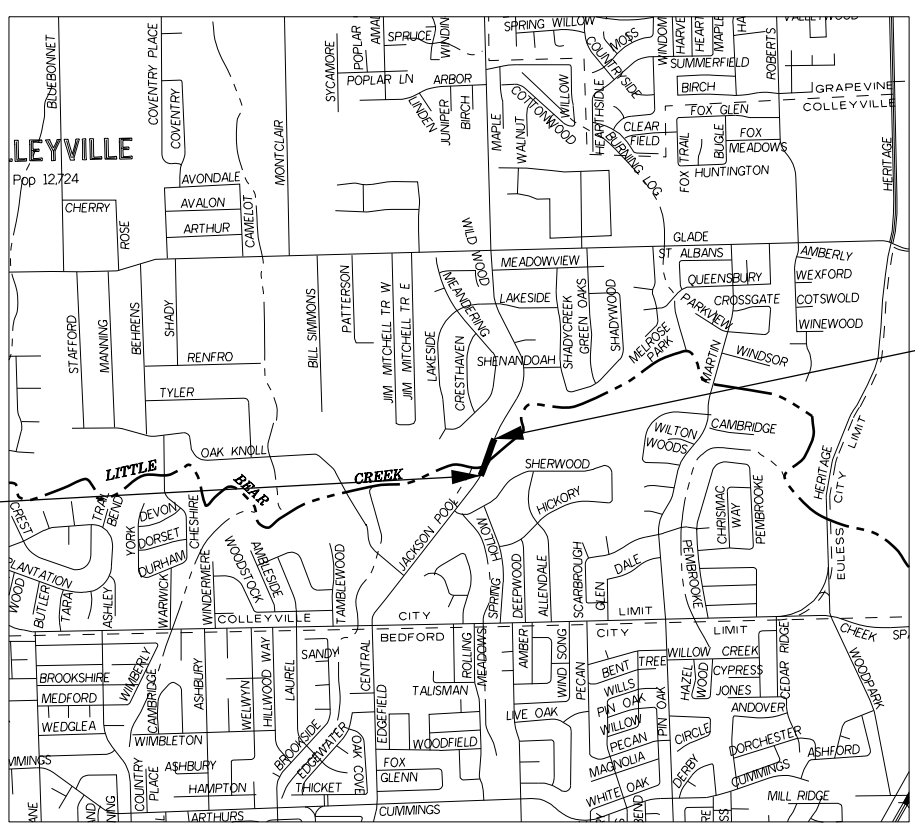
FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT  
CONSISTING OF: REPLACE BRIDGES AND APPROACHES.



1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966

SUBMITTED FOR LETTING: 1/26/2023  
*[Signature]*, P.E.  
PROJECT MANAGER

TARRANT COUNTY  
FORT WORTH DISTRICT  
(SEE PROJECT LAYOUT SHEET  
FOR ADDITIONAL LOCATION INFO)



END PROJECT  
CSJ 0902-90-132  
STA 17+00.00  
N = 7,004,301.8988  
E = 2,390,730.9632

BEGIN PROJECT  
CSJ 0902-90-132  
STA 12+85.00  
N = 7,003,926.7288  
E = 2,390,560.6587

REGISTERED ACCESSIBILITY SPECIALIST (RAS)  
INSPECTION REQUIRED TDLR NO. EABPRJ: TABS2023003649

TEXAS DEPARTMENT OF TRANSPORTATION

NOTE:

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

THE CONTRACTOR SHALL PROVIDE AND ERECT BARRICADES AND WARNING SIGNS IN ACCORDANCE WITH BC(1)-21 THROUGH BC(12)-21 AT POINTS INDICATED AND AT OTHER POINTS AS DIRECTED BY THE ENGINEER.

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

EQUATIONS: NONE  
EXCEPTIONS: NONE  
RAILROAD CROSSINGS: NONE

\_\_\_\_\_, P.E.  
Signature of Registrant & Date

SUBMITTED FOR LETTING: 2/23/2023

DocuSigned by:  
AREA ENGINEER

RECOMMENDED FOR LETTING: 3/9/2023  
*[Signature]*, P.E.  
DIRECTOR OF TRANSPORTATION  
PLANNING & DEVELOPMENT

APPROVED FOR LETTING: 3/9/2023  
*[Signature]*, P.E.  
DISTRICT ENGINEER

FILE: ... \WF\08702 - WA2\GEN\132T\SOI.sht

# INDEX OF SHEETS

TIME: 7:39:08 AM  
DATE: 1/26/2023

SHEET	DESCRIPTION
<b><u>I. GENERAL</u></b>	
1	TITLE SHEET
2	INDEX OF SHEETS
3	PROJECT LAYOUT
4 - 5	TYPICAL SECTIONS
6, 6A - 6H	GENERAL NOTES
7, 7A	ESTIMATE & QUANTITIES
8	QUANTITY SUMMARIES

<b><u>II. TRAFFIC CONTROL</u></b>	
9	TRAFFIC CONTROL NARRATIVE
10	TRAFFIC CONTROL DETOUR LAYOUT
11	TRAFFIC CONTROL DETOUR DETAIL LAYOUT

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24	*WZ(RCD)-13

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25	CONTROL DATA INDEX SHEET
26	HORIZONTAL AND VERTICAL CONTROL
27	ROADWAY HORIZONTAL ALIGNMENT DATA
28	ROADWAY REMOVAL PLANS
29	ROADWAY PLAN AND PROFILE
30	ROADWAY GRADING LAYOUT

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32	#GF(31)-19
33	#GF(31)DAT-19
34	#GF(31)LS-19
35	#GF(31)MS-19
36	#GF(31)TRL2-19
37	#SGT(10S)31-16
38	#SGT(11S)31-18
39	#SGT(12S)31-18
40	#SGT(15)31-20
41	#TE(HMAC)-11

**IV. DRAINAGE**

42 - 48	BRIDGE HYDRAULIC DATA SHEET
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**V. UTILITIES**

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50	EXISTING UTILITY LEGEND AND NOTES

**VI. BRIDGES**

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52	BORINGS JACKSON RD AT LITTLE BEAR CREEK
53	TYPICAL TRANSVERSE SECTIONS JACKSON RD AT LITTLE BEAR CREEK
54	FOUNDATION LAYOUT JACKSON RD AT LITTLE BEAR CREEK
55	ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS JACKSON RD AT LITTLE BEAR CREEK
56	ABUTMENT 1 JACKSON RD AT LITTLE BEAR CREEK
57	ABUTMENT 2 JACKSON RD AT LITTLE BEAR CREEK
58	ABUTMENT DETAILS JACKSON RD AT LITTLE BEAR CREEK
59	BRIDGE FRAMING PLAN JACKSON RD AT LITTLE BEAR CREEK
60 - 61	80.00' PRESTRESSED CONCRETE GIRDER SPAN JACKSON RD AT LITTLE BEAR CREEK
62	IGND

**BRIDGE STANDARDS**

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64	#BS-EJCP
65	#CSAB(FTW)
66 - 67	#FD
68	#IGCS
69 - 70	#IGD
71 - 73	#IGEB

**BRIDGE STANDARDS (cont.)**

74 - 75	#IGFRP
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78	#IGSK
79	#IGTS
80 - 81	#MEBR(C)
82 - 85	#PCP
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87 - 88	#PCP(O)
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96 - 99	#C223
100 - 101	#PR11

**VII. TRAFFIC ITEMS**

102	SIGNING AND PAVEMENT MARKINGS
103	SUMMARY OF SMALL SIGNS

**TRAFFIC STANDARDS**

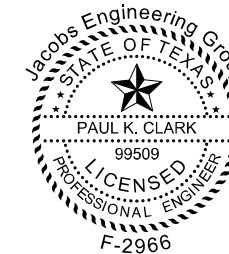
104 - 106	#D & OM(1)-20 THRU D & OM(3)-20
107	#D & OM(5)-20
108	#D & OM(VIA)-20
109	#SMD(GEN)-08
110 - 112	#SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
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**VIII. ENVIRONMENTAL**

115 - 116	STORM WATER POLLUTION PREVENTION PLAN (SW3P)
117	EROSION CONTROL PLAN

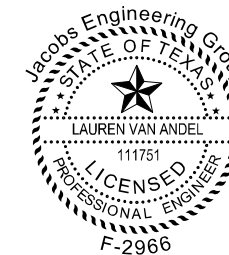
**ENVIRONMENTAL STANDARDS**

118	ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)
119 - 121	*EC(1)-16 THRU EC(3)-16
122	*TSCD-FTW



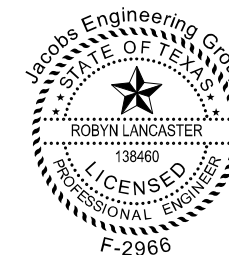
\* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

*Paul K. Clark*, P.E. 1/26/2023  
Signature of Registrant & Date



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

*Lauren Van Andel*, P.E. 2/6/2023  
Signature of Registrant & Date



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

*Robyn Lancaster*, P.E. 2/6/2023  
Signature of Registrant & Date

**Jacobs** 1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966

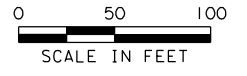


## JACKSON POOL INDEX OF SHEETS

SCALE: N.T.S. SHEET 1 OF 1

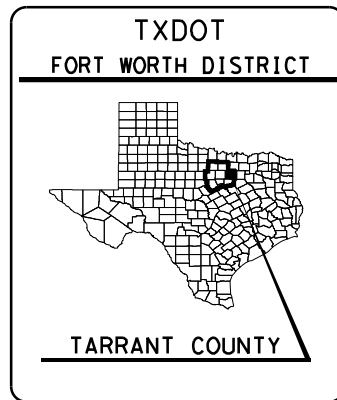
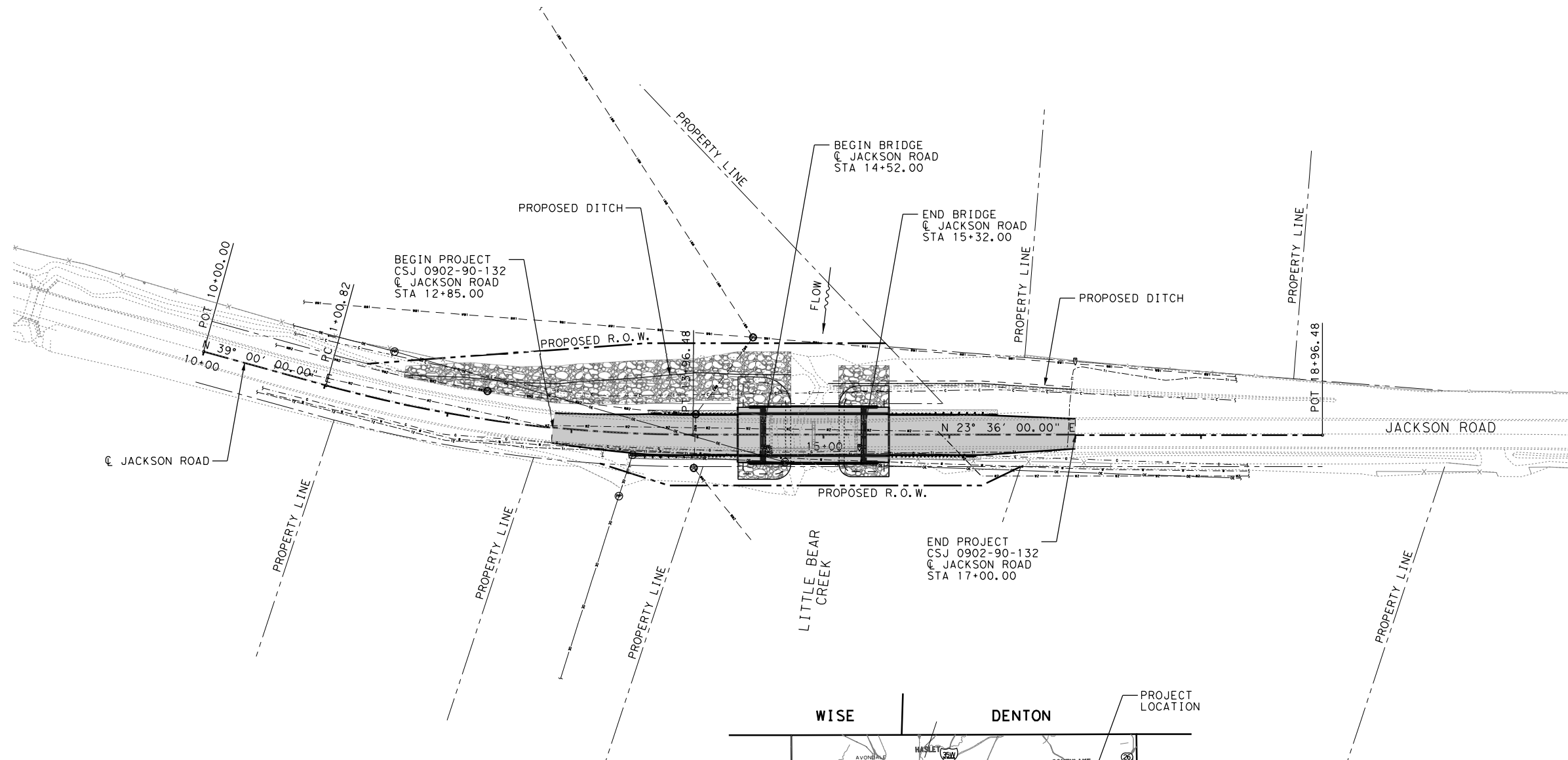
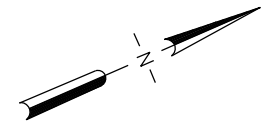
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CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	2
GRAPHICS	CONTROL	SECTION	JOB	
BDG	0902	90	132	
CHECK	PKC			

FILE: ... \GEN\132INDX01.sht

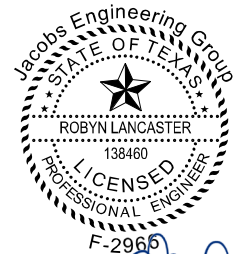
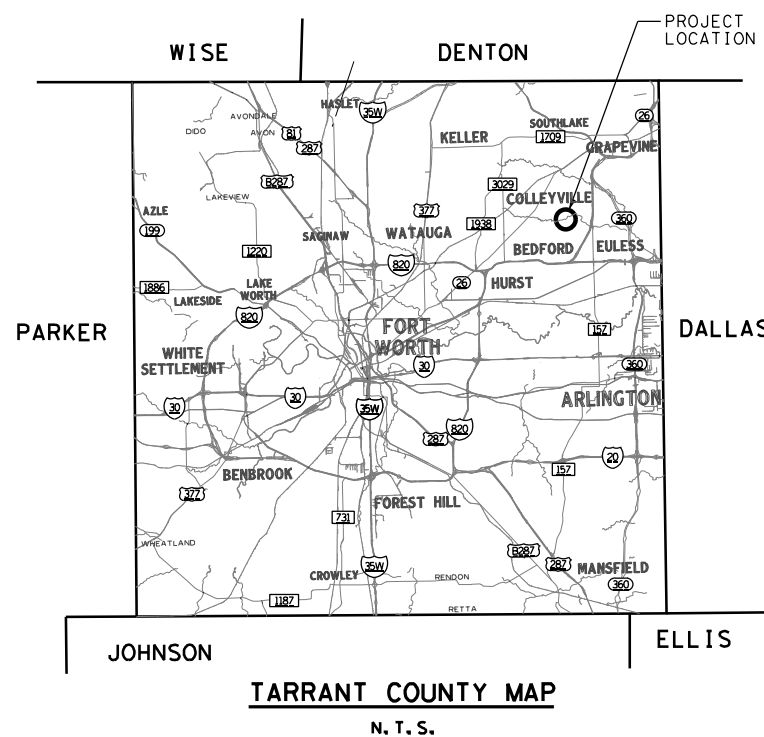


**LEGEND**

- PROPOSED PAVEMENT/BRIDGE
- PROPOSED RIPRAP



**STATE MAP**  
N. T. S.



*[Signature]*  
2/7/2023

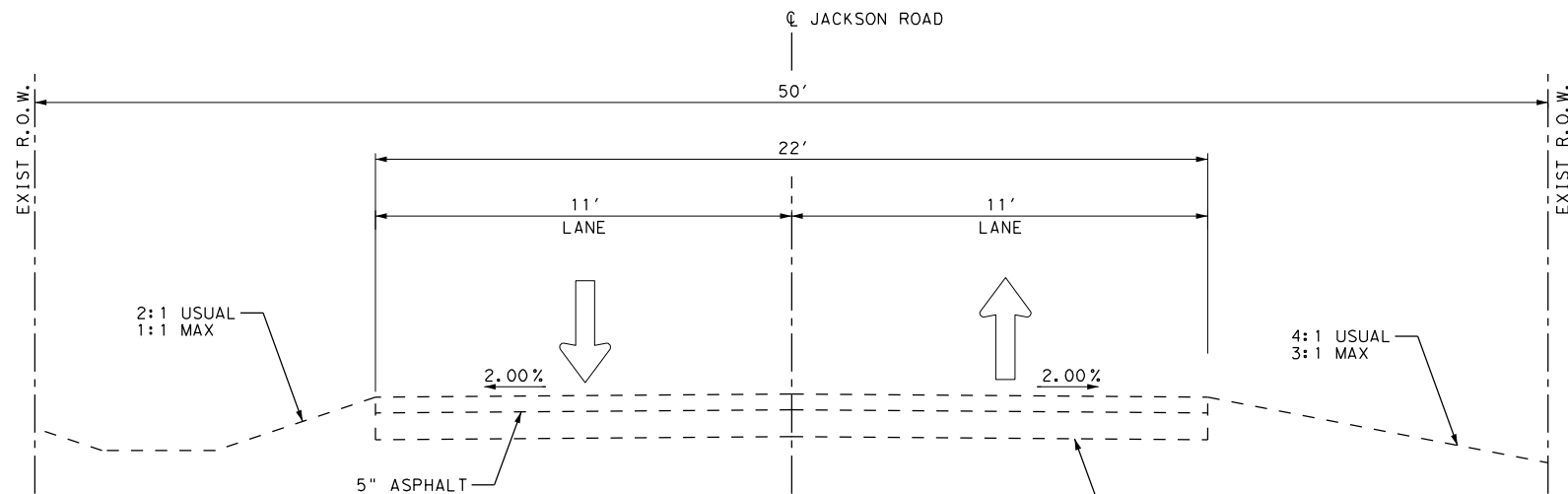
**Jacobs** 1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966

**Texas Department of Transportation**  
© 2023

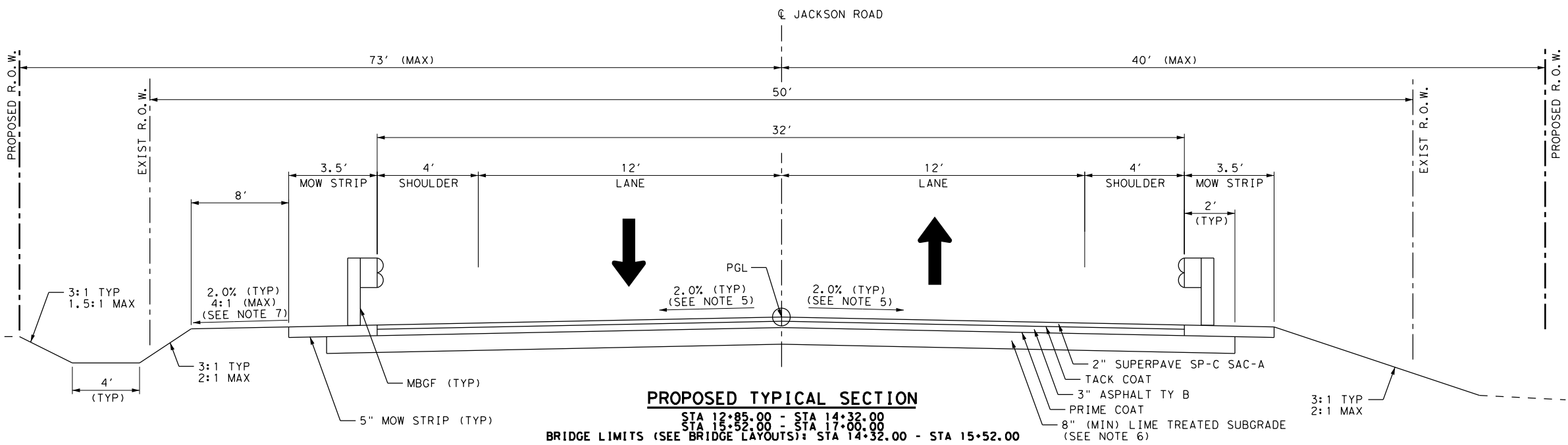
**JACKSON POOL**  
PROJECT LAYOUT

SCALE: 1"=100' (H) SHEET 1 OF 1

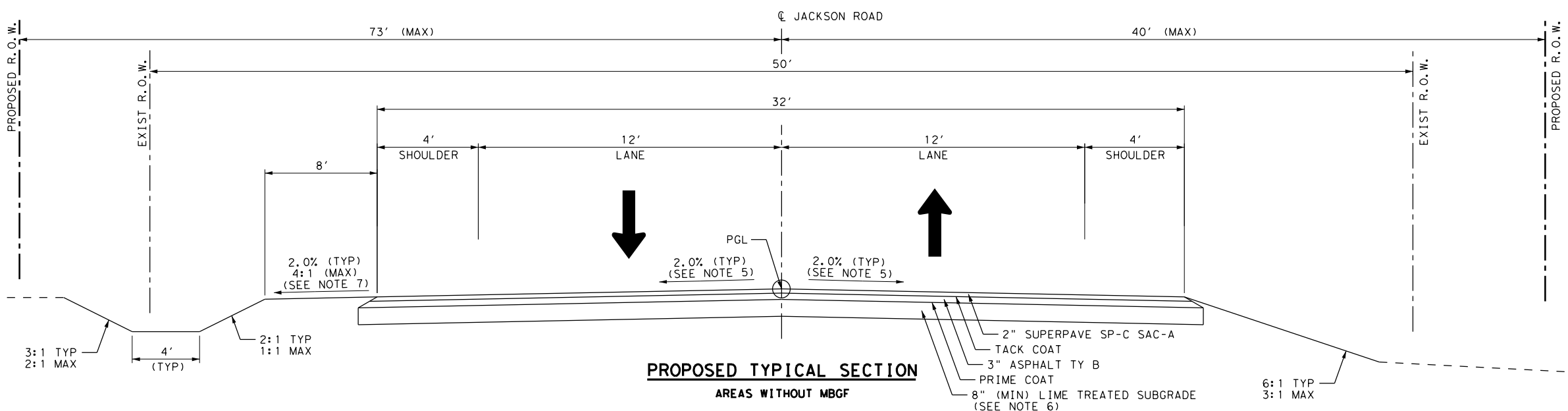
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MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	3
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	90	132	
CHECK	PKC			



**EXISTING TYPICAL SECTION**  
 STA 10+00.00 - STA 14+58.20  
 STA 15+26.06 - STA 18+96.48  
 BRIDGE LIMITS (SEE BRIDGE LAYOUTS): STA 14+58.20 - STA 15+26.06



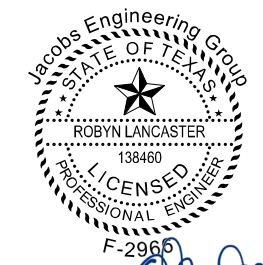
**PROPOSED TYPICAL SECTION**  
 STA 12+85.00 - STA 14+32.00  
 STA 15+52.00 - STA 17+00.00  
 BRIDGE LIMITS (SEE BRIDGE LAYOUTS): STA 14+32.00 - STA 15+52.00



**PROPOSED TYPICAL SECTION**  
 AREAS WITHOUT MBGF

**NOTES:**

1. SEE PLAN & PROFILE SHEETS FOR SPECIFIC LIMITS OF RETAINING WALLS, MBGF, RAILS, FLUMES AND MOW STRIPS.
2. THE AXIS OF ROTATION FOR ALL PAVEMENTS IS LOCATED AT THE PGL.
3. ALL SAWCUTS TO BE FULL DEPTH AND AWAY FROM WHEELPATHS.
4. EXISTING PAVEMENT STRUCTURE OBTAINED FROM BORING LOG INFORMATION.
5. CROSS-SLOPE TRANSITIONS TO 1.5% PRIOR TO BRIDGE APPROACH SLAB. SEE ROADWAY PLAN AND PROFILE FOR LIMITS OF TRANSITION.
6. SEE TYPICAL SECTIONS SHEET 2 OF 2 FOR SUBGRADE DETAILS.
7. SEE CROSS SECTIONS AND ROADWAY GRADING LAYOUT FOR FINISHED GRADE SLOPES. 8' WIDE BERM AT 2% CROSS-SLOPE TO BE PROVIDED ADJACENT TO ROADWAY AND BEHIND MBGF ON SOUTHWEST QUADRANT TO ACCOMMODATE FUTURE CITY OF COLLEYVILLE SIDEWALK.



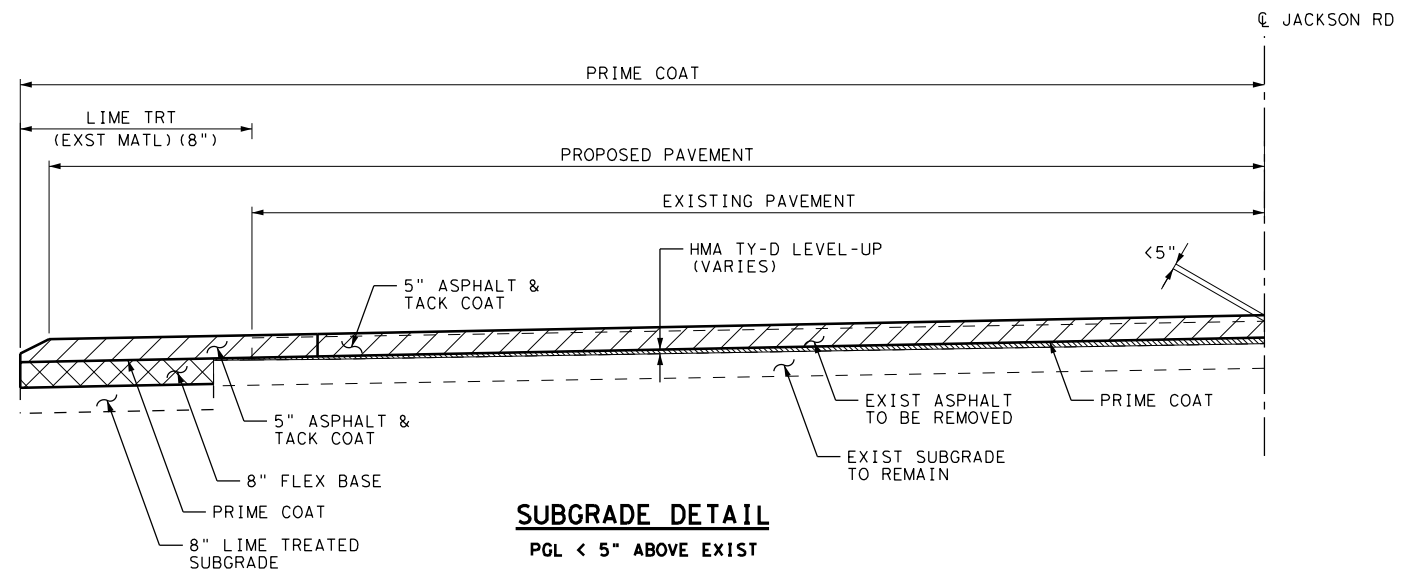
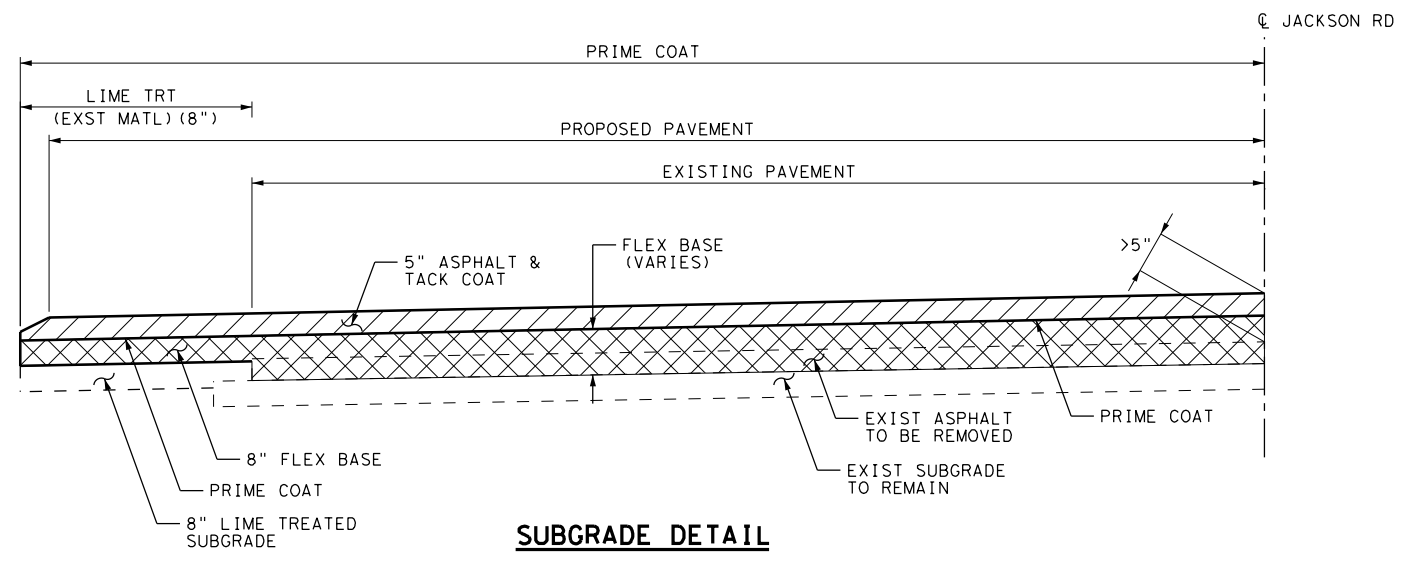
*[Signature]*  
2/17/2023



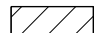


**JACKSON POOL**  
**TYPICAL SECTIONS**

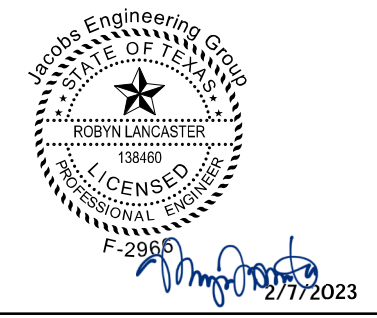
SCALE: N.T.S. SHEET 1 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	4
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	90	132	
CHECK	PKC			



**LEGEND**

-  5" ASPHALT & TACK COAT
-  8" FLEX BASE
-  LEVEL-UP



**Jacobs**  
1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966



**JACKSON POOL**  
TYPICAL SECTIONS

SCALE: N.T.S. SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	REL	STATE	DISTRICT	COUNTY
GRAPHICS	BHK	TEXAS	FTW	TARRANT
CHECK	PKC	CONTROL	SECTION	JOB
		0902	90	132

5

County: Tarrant

Highway: CS (Jackson Rd)

Specification Data

**Basis of Estimate**

Item	Description	Rate	Unit
166	Fertilizer (16-8-8)	600 lb./acre**	ton
168	Vegetative Watering	169,400 gal./acre	1,000 gal.
260	Lime (Hydrated, Commercial Or Quicklime)(Slry)	150 lb./cu. yd.	ton
310	Asph Mat'l (EC-30) (Subgrade) (Priming)	0.20 gal./sq. yd.*	gal.
3076	Hot Mix (All Types)	115 lb./sq. yd.-in.	ton
3076	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.
3077	SP Mixes SP-C	115 lb./sq. yd.-in.	ton
3077	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.

- \* Based On 50% Asphalt Residue.
- \*\* Non-Pay, for Contractor's Information Only.

**Compaction Requirements for Base Courses**

Item	Material	Course	Min. Density
247	Flex Base	All	100 %

(Minimum Density is the percentage of density required based on results of Tex-113-E, Tex-114-E, Tex-120-E, and/or Tex-121-E)

**Special Notes**

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

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

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at <https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/>.

County: Tarrant

Highway: CS (Jackson Rd)

Access is read-only.

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

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

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

Area Engineer's Email: [Minh.Tran@txdot.gov](mailto:Minh.Tran@txdot.gov)  
 Assistant Area Engineer's Email: [Daniel.Poole@txdot.gov](mailto:Daniel.Poole@txdot.gov)  
 Design Manager's Email: [Sam.Yacoub@txdot.gov](mailto:Sam.Yacoub@txdot.gov)

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

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

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

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

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

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

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

**Modifications to Lane Closure / Work Restrictions:**

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

County: Tarrant

Highway: CS (Jackson Rd)

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

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

Special Events/ Special Situations will be handled on a case-by-case basis. No work restricting lane closures is allowed from 3 PM a day before to 9 AM the day after the Special Event or Special Situation.

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines, and grades are to be established in the field.

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

Plugging of pipes or culverts will not be paid for directly, but will be subsidiary to the various bid items, unless otherwise shown on the plans.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

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

Install all required concrete riprap flumes immediately following the construction of ditches in which they are to be placed. In addition, apply all erosion control measures as shown on the plans or as directed, immediately following construction of channels to their required line, grade, and section.

#### Item 4 – Scope of Work

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

County: Tarrant

Highway: CS (Jackson Rd)

#### Item 5. Control of the Work

Provide beam erection drawings which shall be signed and sealed by licensed engineer.

When supplementary bridge plans, shop drawings, shop details, erection drawings, working drawings, forming plans, or other drawings are required, prepare and submit drawings on sheets 8-1/2 by 11 inches, 17 by 22 inches, or full size drawings reduced to half scale if completely legible. If, in the opinion of the Engineer, the drawings are not completely legible, prepare and submit on sheets 22 by 34 inches, with a 1-1/2 inch left margin, and 1/2 inch top, right, and bottom margins.

Submit all sheets with a title in the lower right hand corner. The title must include the sheet index data shown on the lower right corner of the project plans, name of the structure or element or stream, sheet numbering for the shop drawings, name of the fabricator and the name of the Contractor.

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.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with “Standard Operating Procedure for Alternate Precast Proposal Submission” found online at <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design>. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

#### Item 6. Control of Materials

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

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

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

County: Tarrant

Highway: CS (Jackson Rd)

**Item 7. Legal Relations and Responsibilities**

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to haul roads, equipment staging areas, borrow and disposal sites. "Associated" as defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The contractor will be responsible for all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the Department with a copy of all consultations or approvals from the USACE prior to initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, prior to any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

- (1) Restricted Use of Materials for Previously Evaluated Permit Areas.** Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
- Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
  - Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
  - Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.
- (2) Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:
- Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
  - Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

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The total area disturbed for this project is 1.11 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

When a bridge deck is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean and repair all of these features if they weren't properly protected at contractor's expense. This work is subsidiary work to applicable bid items.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, avoid nests containing migratory birds and perform no work in the nesting areas until the young birds have fledged.

Structures

Do not begin bridge and culvert construction operations until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

- By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.
- By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.



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No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

The following Holiday/Event lane closure restriction requirements apply to this project:  
No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

Holiday Lane Closure Restrictions	
<b>New Year's Eve and New Year's Day</b> (December 29 through January 1)	3 PM December 28 through 9 AM January 2
<b>Easter Holiday Weekend</b> (Friday through Sunday)	3 PM Thursday through 9 AM Monday
<b>Memorial Day Weekend</b> (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
<b>Independence Day</b> (July 3 through July 5)	3 PM July 3 through 9 AM July 5
<b>Labor Day Weekend</b> (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
<b>Thanksgiving Holiday</b> (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
<b>Christmas Holiday</b> (December 22 through December 26)	3 PM December 21 through 9 AM December 26

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

Event Lane Closure Restrictions
3 PM the day before Event to 9 AM the day after the Event
Within 1-mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through Jan 2)

**Item 8. Prosecution and Progress**

The maximum number of working days for the completion of the project is 128 days.

Working days will be computed and charged in accordance with Section 8.3.1.1, 'Five-Day Workweek.'

Prepare the progress schedule as a bar chart, include all planned work activities and sequences and show Contract completion within the number of working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

Nighttime work is not allowed.

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A 90-day delay start is included in the project for contractor mobilization.

**Item 100. Preparing Right of Way**

Measurement for this item will be along the centerline of the project with the limits of measurements as shown on the plans.

**Item 104. Removing Concrete**

When associated with a structure to be removed, removal of riprap as required, approach slabs, and shoulder drains are to be included in the unit price bid for Item 496, "Removing Structures."

**Item 110. Excavation**

Review proposed waste sites to determine if any site is located in a "Base Floodplain" or "Floodway" as defined by the Federal Emergency Management Agency (FEMA).

If waste material from this project is placed in a base floodplain as defined by FEMA, obtain a permit from the local community responsible for enforcing National Flood Insurance Program (NFIP) regulations. Ensure that the owner of the property receiving the waste has obtained the necessary permit.

**Items 110, 112, and 132. Excavation, Subgrade Widening, and Embankment**

Off-Site Borrow Sources. In addition to meeting pertinent specification requirements, test off-site borrow sources for sulfate content. Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E and provide documentation that supports compliance with previously stated requirements. The Engineer will perform additional testing for sulfates of this material upon delivery to the project. Only material that is placed within one foot vertically or laterally of subgrade treatment will require testing for sulfates. Remove and replace failing material (sulfate concentrations >7,000 PPM by dry weight).

**Item 132. Embankment**

Furnish test results per Test Procedures Tex-104, 105, and 106-E (PIs), Tex-113 or 114-E (M-D Curves), and Tex-145 and/or Tex-146-E (Sulfates) for each material sample provided by the Engineer. Perform field density tests (Tex-115-E, Part I) at a frequency for each worked section to produce passing results prior to testing by the Engineer per Tex-115-E, Part I.

When embankment is placed as a bridge header bank, test each lift for compliance with density requirements, near the center of each travel lane at the following locations:

1. At the "beginning of bridge" or "end of bridge" station (if abutment is on retaining wall, location may be adjusted by not more than 5 feet.)

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- 2. At 25-foot intervals for a distance of 150 feet in advance of the “beginning of bridge” station.
- 3. At 25-foot intervals for a distance of 150 feet after the “end of bridge” station.

Density tests must be conducted by a department-certified independent testing laboratory. Results of tests will be furnished to TxDOT within 24 hours after testing; a final copy of all test reports must be signed and sealed by a Professional Engineer in the State of Texas and furnished within five (5) working days after testing. Areas which do not meet minimum density requirements will be removed, re-compacted, and re-tested for compliance at the contractor’s entire expense. Testing and reporting of test results will not be paid for directly, but will be subsidiary to this item.

Construct embankments for bridge header banks to final subgrade elevation prior to excavation for abutment caps and placement of foundation course at approach slabs. Payment for structural excavation and/or excavation for placement of foundation course will not be paid for directly, but will be subsidiary to the pertinent bid items.

At all locations where guardrail is shown to flare, widen the embankment as necessary to accommodate the guardrail.

**Item 161. Compost**

Place approximately 4" of compost manufactured topsoil (CMT) on all cut and fill slopes (except drainage channels where flexible channel liners are indicated), at other locations shown on the plans, or as directed.

Where “pre-blended” CMT is specified, amend suitable soil material, as directed, with 25% compost, by volume, to produce the compost manufactured topsoil. Place the compost manufactured topsoil in a loose layer approximately 4" thick, as shown on the plans.

Use the processed material from Item 100 as the wood chips to blend with the compost to produce the Erosion Control Compost required for this project. This is considered subsidiary to Item 161.

Blending compost on site is not permitted.

**Item 164. Seeding for Erosion Control**

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

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**Item 168. Vegetative Watering**

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

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

Average weekly rainfall rates for the District are:

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

**Item 247. Flexible Base**

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

**Item 260. Lime Treatment (Road-Mixed)**

Apply lime by the “slurry placement” method. Allow the mixture to mellow for a minimum of 4 days after initial mixing. If moderate sulfates are present, or for other extenuating circumstances as determined by the Engineer, allow the mixture to mellow for 7 days after initial mixing.

Except as noted below, treat the raw subgrade to a depth of 8".

**Item 301. Asphalt Antistripping Agent**

Furnish a liquid antistripping agent unless otherwise directed.

**Item 305. Salvaging, Hauling, and Stockpiling Reclaimed Asphalt Pavement (RAP)**

Contractor retains ownership of the RAP.

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**Item 310. Prime Coat**

Provide an EC-30 for this Item.

**Item 400. Excavation and Backfill for Structures**

Class B bedding will be permitted in lieu of Class C bedding. Recycled flex base and RAP are allowed individually or combined for use as granular material and backfill in Class B and C bedding at the discretion of the Engineer. These materials must meet the requirements of Table 1. The Engineer may require the mixing of one or both of these materials with the local soil to provide a cohesive material for compaction and stability of the backfill around the pipe or box culvert.

**Item 420. Concrete Substructures**

Restrict large aggregate size to 3/4" maximum for class "C" concrete used in aesthetic details requiring form liners.

Provide weepholes at bridge ends in the wingwalls as directed.

Concrete for "Column" and "Bents" will be paid for as a plan quantity.

**Item 421. Hydraulic Cement Concrete**

For Class P (Item 360) and S (Item 421) Concrete Only: For concrete plants equipped with 2 aggregate bins or no calibrated metering system, blend manufactured and natural sand at the aggregate source only. For concrete plants equipped with a minimum of 3 bins and a calibrated metering system, blending of the separate sands on-site is permitted to meet gradation and AIR requirements.

Strength/cylinder testing equipment must be equipped with a printer for an electronic print out of all test results.

Air entrainment requirements are waived for all classes of concrete except all Class S and all Class P concrete.

Concrete will not be rejected for low air content. Adjustment to the dosage of air entrainment will be as directed or allowed by the Engineer.

Include the approved mix design number on each delivery ticket.

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**Item 427. Surface Finishes for Concrete**

Unless otherwise noted, provide a surface area (II) with a slurry coat finish on the bridge(s).

**Item 432. Riprap**

Provide weep holes as directed.

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

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

Provide a toe wall at all exposed edges of all protection stone riprap, unless otherwise directed.

Locations and lengths of riprap flumes shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

**Item 440. Reinforcement for Concrete**

Top and bottom layers of slab reinforcing steel shall be epoxy coated.

**Item 454. Bridge Expansion Joints**

For header-type expansion joints refer to the following TxDOT website for the approved systems:

<http://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html>

**Item 496. Removing Structures**

When required by the plans, partial or complete removal of a structure for staged construction shall be accomplished in a manner which does not cause damage to the remainder of the structure or its supporting members. The Contractor shall submit a demolition plan for all structures to be replaced and/or removed in accordance with Item 496. Submit the procedure for removal of superstructure or substructure in writing or plan drawing for approval prior to implementation.

Notify the Texas Department of State Health Services (DSHS) prior to demolition or renovation of bridges or other structures, using DSHS Form APB#5, "Demolition/Renovation Notification Form". The form and instructions may be found on the DSHS Asbestos Programs Branch web page at <http://www.dshs.state.tx.us/asbestos/notification.shtm>. The DSHS notification form must

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be hand-delivered or mailed to (received at) the DSHS Austin office at least ten working days (10) days prior to commencing demolition or renovation. Fax or e-mail notifications will not be accepted. For projects with multiple bridges, a single notification, with a listing of all bridges or structures to be demolished or renovated and the expected start dates of their demolition or renovation (the start date is defined as the first date of visible demolition activities). Notify the DSHS Regional or Local inspector of all start date changes. The expected project completion date may be used as the "end" date.

Removal of riprap as required, approach slabs and shoulder drains to be included in the unit price bid.

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

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

Permanent signs may be installed when construction in an area is complete and they will not conflict with the traffic control plan for the remainder of the job.

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

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

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

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

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

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**Item 504. Field Office and Laboratory**

The Contractor shall furnish the following structures for this project:

Type	No.
Field Office TY C	1
Field Lab TY A	1
Field Lab TY D	1

The field office shall be furnished and functional with all pertinences prior to beginning work. In addition to the other requirements the field office shall be equipped with the following:

- a) Minimum of 6 desks with chairs
- b) A meeting table capable of seating 10 people with chairs
- c) Two (2) equipment storage closets. Each closet shall provide a minimum of 3ftx3ft of floor space or equivalent and shall have provisions for locking securely.
- d) Three (2) four drawer metal locking filing cabinets
- e) One (1) refrigerator (minimum 18 CF)
- f) One (1) microwave oven
- g) One (1) water cooler with water service
- h) One Wireless Capable Plain Paper Copier/Printer/Scanner/Fax machine, 30 ppm, 2GB memory, and 11x17 paper size capable.
- i) Two (2) Laptop Computers.
- j) Internet Service with minimum of 30 GB connectivity.
- k) Wireless Router
- l) Weekly janitorial service
- m) Minimum 4Ft x 4 Ft top and bottom landing at all steps to field office

The office and its contents will be subject to approval by the engineer. Upon final completion and acceptance by the engineer of the project, computers, refrigerator, water cooler, and copier will become the property of the contractor. The contractor shall be responsible for all maintenance and supplies (both permanent and consumable) for the aforementioned electronic equipment for the duration of the project. All electronic equipment shall meet current department standards.

The field laboratory shall be furnished with laboratory equipment necessary for testing of contract items.

Provide a secure all-weather, lighted parking area of a minimum of 1,500 square feet adjacent to the field office. This area is to be for the sole exclusive use of the department. Storage of contractor's material or equipment will not be allowed.

Enclose the field office or laboratory and the parking area with a 6-ft. chain-link fence, a top-mounted 3-strand barbed wire, and a 12-ft. gate.

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

The SW3P for this project will consist of using the following items as directed:

- Temporary rock filter dams
- Temporary sediment control fence
- Construction exits

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

**Item 540. Metal Beam Guard Fence**

The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

**Item 585. Ride Quality for Pavement Surfaces**

Ride quality requirements are Surface Test Type A.

**Item 666. Reflectorized Pavement Markings with Retroreflective Requirements**

Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

**Item 3076. Dense-Graded Hot-Mix Asphalt**

RAP aggregate must meet the requirements of Table 1.

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Provide aggregate with a Surface Aggregate Classification (SAC) value of A for the travel lanes and shoulders.

No blending, of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the surface course and levelup course, if applicable.

Furnish a trackless tack with greater than 50% asphalt residue for the tack coat on this project.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

Grade substitution per Table 5 is not allowed.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Temporary detours are subject to in-place air void determination for this project.

**Item 3077. Superpave Mixtures**

RAP aggregate must meet the requirements of Table 1.

Provide aggregate with a Surface Aggregate Classification (SAC) value of A for the travel lanes and shoulders.

No blending, of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

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Provide a PG 70-28 asphalt for the surface course and levelup course, if applicable.

Furnish a trackles tack with greater than 50% asphalt residue for the tack coat on this project.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

Only Department-owned RAP is to be used on this project. The stockpile location is

Grade substitution per Table 5 is not allowed.

Provide a mix design with the gradation curve below the restricted zone.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Temporary detours are subject to in-place air void determination for this project.

**Item 6001. Portable Changeable Message Signs**

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

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

Each sign must have programmed in its permanent memory the following 15 messages:

- 1. Exit Closed Ahead

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- 2. Use Other Routes
- 3. Right Lane
- 4. Left Lane
- 5. Closed Ahead
- 6. Two Lane
- 7. Detour Ahead
- 8. Thru Traffic
- 9. Prepare To Stop
- 10. Merging Traffic
- 11. Expect 15 Minute Delay
- 12. Max Speed \*\* MPH
- 13. Merge Right
- 14. Merge Left
- 15. No Exit Next \*\* Miles



CONTROLLING PROJECT ID 0902-90-132

DISTRICT Fort Worth  
HIGHWAY JACKSON POOL

COUNTY Tarrant

# Estimate & Quantity Sheet

CONTROL SECTION JOB				0902-90-132		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00061097			
COUNTY				Tarrant			
HIGHWAY				JACKSON POOL			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	5.440		5.440	
	110-6001	EXCAVATION (ROADWAY)	CY	1,015.000		1,015.000	
	132-6008	EMBANKMENT (FINAL)(DENS CONT)(TY D)	CY	980.000		980.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	2,093.000		2,093.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	2,093.000		2,093.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)	SY	1,047.000		1,047.000	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)	SY	1,047.000		1,047.000	
	168-6001	VEGETATIVE WATERING	MG	73.000		73.000	
	169-6006	SOIL RETENTION BLANKETS (CL 2) (TY F)	SY	483.000		483.000	
	247-6236	FL BS (RDWY DEL)(TY A GR 1-2)(FNAL POS)	CY	217.000		217.000	
	260-6002	LIME (HYDRATED LIME (SLURRY))	TON	5.000		5.000	
	260-6017	LIME TRT(MIX EXST MATL & NEW BASE)(8")	SY	280.000		280.000	
	305-6004	SALV, HAUL & STKPL RCL APH PV (4 TO 6")	SY	926.000		926.000	
	310-6001	PRIME COAT (MULTI OPTION)	GAL	215.000		215.000	
	400-6005	CEM STABIL BKFL	CY	177.000		177.000	
	416-6004	DRILL SHAFT (36 IN)	LF	360.000		360.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	55.200		55.200	
	422-6002	REINF CONC SLAB (HPC)	SF	3,680.000		3,680.000	
	422-6016	APPROACH SLAB (HPC)	CY	70.600		70.600	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	636.000		636.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	1,365.000		1,365.000	
	432-6046	RIPRAP (MOW STRIP)(5 IN)	CY	18.000		18.000	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB	271.000		271.000	
	450-6033	RAIL (TY C223)(HPC)	LF	240.000		240.000	
	450-6103	RAIL (TY PR11)	LF	204.000		204.000	
	454-6020	SEALED EXPANSION JOINT (4 IN) (SEJ - B)	LF	67.000		67.000	
	479-6004	ADJUSTING MANHOLES (SANITARY)	EA	3.000		3.000	
	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	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	275.000		275.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	275.000		275.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	225.000		225.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	225.000		225.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	915.000		915.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	915.000		915.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	100.000		100.000	

DISTRICT	COUNTY	CCSJ	SHEET
Fort Worth	Tarrant	0902-90-132	7



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0902-90-132

DISTRICT Fort Worth  
HIGHWAY JACKSON POOL

COUNTY Tarrant

CONTROL SECTION JOB				0902-90-132		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00061097			
COUNTY				Tarrant			
HIGHWAY				JACKSON POOL			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	540-6007	MTL BEAM GD FEN TRANS (TL2)	EA	4.000		4.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2.000		2.000	
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)	EA	1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2.000		2.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000		6.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	12.000		12.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	830.000		830.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	830.000		830.000	
	666-6225	PAVEMENT SEALER 6"	LF	1,660.000		1,660.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	11.000		11.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	480.000		480.000	
	678-6033	PAV SURF PREP FOR MRK (RPM)	EA	11.000		11.000	
	3076-6003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	176.000		176.000	
	3076-6038	D-GR HMA TY-D PG64-22 (LEVEL-UP)	TON	60.000		60.000	
	3076-6066	TACK COAT	GAL	207.000		207.000	
	3077-6027	SP MIXESSP-CSAC-A PG70-28	TON	114.000		114.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	788.000		788.000	
	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	



SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS		
LOCATION	502 6001	6001 6001
	BARRICADES, SIGNS AND TRAFFIC HANDLING	* PORTABLE CHANGEABLE MESSAGE SIGN
	MO	DAY
JACKSON RD	6	788
PROJECT TOTALS	6	788

\*FOUR SIGNS TO BE PLACED TWO WEEKS IN ADVANCE OF CLOSURE AND TO REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION.


SUMMARY OF REMOVAL ITEMS			
LOCATION	100 6002	305 6004	496 6009
	PREPARING ROW	SALV. HAUL & STKPL RCL APH PV (4 TO 6")	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	STA	SY	EA
JACKSON RD	5.44	926	1
PROJECT TOTALS	5.44	926	1

SUMMARY OF ROADWAY ITEMS																		
LOCATION	110 6001	132 6008	247 6236	260 6002	260 6027	310 6001	432 6046	432 6031	479 6004	540 6001	540 6007	540 6016	540 6033	544 6001	3076 6003	3076 6066	3076 6038	3077 6027
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (D ENS CONT) (TY D)	FL BS (RDWY DEL) (TY A GR 1-2) (FNAL POS)	LIME (HYDRATED LIME (SLURRY))	LIME TRT (EXST MATL) (8")	PRIME COAT (MULTI OPTION)	RIPRAP (MOW STRIP) (5 IN)	RIPRAP (STONE PROTECTIO N) (12 IN)	ADJUSTING MANHOLES (SANITARY)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (TL2)	DOWNSTREAM ANCHOR TERMINAL SECTION	MTL BM GD FEN (LONG SPAN SYSTEM)	GUARDRAIL END TREATMENT (INSTALL)	D-GR HMA TY-B PG64-22 (EXEMPT)	TACK COAT	D-GR HMA TY-D PG64-22 (LEVEL-UP)	SP MIXES SP-C SAC-A PG70-28
	CY	CY	CY	TON	SY	GAL	CY	CY	EA	LF	EA	EA	EA	EA	TON	GAL	TON	TON
JACKSON RD	1015	980	217	5	280	215	18	1365	3	100	4	2	1	2	176	207	60	114
PROJECT TOTALS	1015	980	217	5	280	215	18	1365	3	100	4	2	1	2	176	207	60	114


SUMMARY OF SIGNING ITEMS			
LOCATION	644 6001	658 6014	658 6062
	IN SM RD SN SUP&AM TY10BWC (1 ) SA (P)	INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
	EA	EA	EA
JACKSON RD	2	6	12
PROJECT TOTALS	2	6	12

SUMMARY OF PAVEMENT MARKING ITEMS						
LOCATION	666 6174	666 6210	666 6225	672 6009	678 6002	678 6033
	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (Y) 6" (SLD)	PAVEMENT SEALER 6"	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (RPM)
	LF	LF	LF	EA	LF	EA
JACKSON RD	830	830	1660	11	480	11
PROJECT TOTALS	830	830	1660	11	480	11

SUMMARY OF EROSION CONTROL ITEMS												
LOCATION	161 6017	164 6001	164 6029	164 6031	168 6001	169 6006	506 6001	506 6011	506 6020	506 6024	506 6038	506 6039
	COMPOST MANUF TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	CELL FBR MLCH SEED (TEMP ) (WARM)	CELL FBR MLCH SEED (TEMP ) (COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 2) (TY F)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTI ON EXITS (INSTALL) (TY 1)	CONSTRUCTI ON EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	SY	MG	SY	LF	LF	SY	SY	LF	LF
JACKSON RD	2093	2093	1047	1047	73	483	275	275	225	225	915	915
PROJECT TOTALS	2093	2093	1047	1047	73	483	275	275	225	225	915	915



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## JACKSON POOL

### QUANTITY SUMMARIES

SCALE: N.T.S.

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
REL	6	(See Title Sheet)		CS
CHECK	PKC	STATE	DISTRICT	COUNTY
GRAPHICS	BHK	TEXAS	FTW	TARRANT
CHECK	PKC	CONTROL	SECTION	JOB
		0902	90	132

8

## TCP NARRATIVE SEQUENCE OF CONSTRUCTION

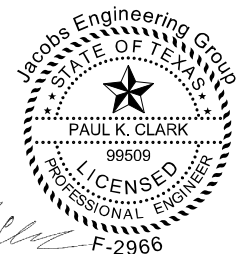
**GENERAL TCP NOTES:**

1. THE FOLLOWING SEQUENCE IS THE METHOD OF PROSECUTION OF THE CONSTRUCTION. THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGE TO THE OVERALL PROJECT SCHEDULE AND COST, ETC. IF THE PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH A CHANGE ORDER. THE CONTRACTOR SHALL NOT PROCEED WITH ANY CONSTRUCTION OPERATIONS UNTIL THIS REQUIREMENT IS MET.
2. THE CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE OF WORK TO THE PROJECT ENGINEER FOR APPROVAL PRIOR TO THE BEGINNING OF CONSTRUCTION AND WILL SUBMIT REQUESTS TO ALTER THE SEQUENCE OF OPERATION OF TCP PLANS TO THE ENGINEER FOR WRITTEN APPROVAL.
3. ALL BARRICADES, WARNING SIGNS, AND CHANNELIZING DEVICES FOR THE GUIDANCE AND PROTECTION OF TRAFFIC AND PEDESTRIANS MUST CONFORM TO THE INSTALLATION SHOWN IN THE 2011 TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AS CURRENTLY AMENDED AND STANDARD HIGHWAY SIGN DESIGNS (2014).
4. ALL TRAFFIC CONTROL SIGNS WILL FOLLOW THE MINIMUM SIGN SPACING ACCORDING TO THE TRAFFIC CONTROL STANDARDS. CONTRACTORS SHALL MAINTAIN TEMPORARY SIGNS WITHIN THE PROJECT LIMITS AND WHEN NOT APPLICABLE OR IN USE, WILL NEED TO BE COVERED OR REMOVED TO AID THE TRAVELING PUBLIC.
5. SIGNS, BARRICADES, AND OTHER WARNING DEVICES SHOWN SHALL BE CONSIDERED MINIMUM AND ADDITIONAL SIGNS, BARRICADES AND OTHER WARNING DEVICES DEEMED NECESSARY BY THE ENGINEER OR DICTATED BY FIELD CONDITIONS SHALL BE PROVIDED ACCORDINGLY TO ALL APPLICABLE STANDARDS AND THEY WILL BE SUBSIDIARY TO THE BID ITEM BARRICADES, SIGNS, AND TRAFFIC HANDLING.
6. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL ONLY BE PLACED IN AREAS WHERE SOIL DISTURBANCE IS EXPECTED TO OCCUR WITHIN TWO WEEKS. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL BE REMOVED IN EACH AREA WITHIN TWO WEEKS OF VEGETATION ESTABLISHMENT OR AS APPROVED BY THE ENGINEER.
7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE ALL LANE AND STREET CLOSURES, NIGHT WORK, AND ACCOMMODATE PLANNED EVENTS WITH THE CITY OF COLLEYVILLE, TXDOT AND EMS PERSONNEL.
8. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EXISTING DRAINAGE FACILITIES IN GOOD ORDER UNTIL THOSE FACILITIES ARE REPLACED BY PERMANENT CONSTRUCTION OR THEIR FLOWS ARE REROUTED. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN INTERIM DRAINAGE IN AREAS THAT MAY BE AFFECTED BY DETOUR OR OTHER CONSTRUCTION THAT WERE NOT SPECIFICALLY ANTICIPATED HEREIN. POSITIVE DRAINAGE SHALL BE PROVIDED AND MAINTAINED FOR ALL DETOURS AND AFFECTED AREAS BY THE USE OF CROSS-SLOPE, DITCHES, TEMPORARY LINES, OR OTHER METHODS WETHER SPECIFICALLY SHOWN HEREIN OR NOT.
9. REFER TO THE STORM WATER POLLUTION PREVENTION PLAN FOR SW3P & EROSION CONTROL TREATMENTS AND DEVICES TO BE INSTALLED PRIOR TO EACH PHASE/STAGE/STEP OF CONSTRUCTION.
10. THE CONTRACTOR IS RESPONSIBLE FOR COMMUNICATING LANE CLOSURES, TRAFFIC SHIFTS AND OTHER CONSTRUCTION ACTIVITIES THAT WILL IMPACT TRAFFIC TO THE TRAVELING PUBLIC, ADJACENT PROPERTIES, AND EMS. THIS COMMUNICATION SHALL INCLUDE, BUT NOT BE LIMITED TO, THE PROJECT PCMS AND ISSUING NOTICES TO THE PRESS.

**PHASE 1 - DEMOLISH EXISTING BRIDGE AND CONSTRUCT PROPOSED BRIDGE**

1. CONTRACTOR TO COORDINATE ROADWAY CLOSURE WITH LOCAL GOVERNMENTS, BUSINESSES, EMERGENCY SERVICES, SCHOOL DISTRICTS, POST OFFICES, COUNTY, CITY, AND MAJOR EMPLOYERS.
2. PLACE CHANGEABLE MESSAGE SIGNS GIVING TRAFFIC AT LEAST 2 WEEKS NOTICE PRIOR TO ROAD CLOSURE.
3. INSTALL DETOUR SIGNAGE ALONG DETOUR ROUTE. INSTALL BARRICADES, TEMPORARY PAVEMENT MARKINGS, AND TEMPORARY SW3P MEASURES AS SHOWN IN THE PLANS.
4. DEMOLISH EXISTING BRIDGE AND ASSOCIATED ROADWAY PAVEMENT AS SHOWN IN THE PLANS. PERFORM PROPOSED GRADING.
5. CROSS STREETS AND DRIVEWAYS TO BE CONSTRUCTED IN HALVES TO MAINTAIN ACCESS THROUGHOUT CONSTRUCTION.
6. CONSTRUCT PROPOSED BRIDGE, APPROACHES, RIPRAP, RAIL, MBGF, AND ASSOCIATED ROADWAY PAVEMENT AS SHOWN IN THE PLANS.
7. INSTALL PERMANENT SIGNING AND PAVEMENT MARKINGS.
8. REMOVE SW3P AND RE-OPEN TO TRAFFIC.

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### JACKSON POOL TRAFFIC CONTROL NARRATIVE

SCALE: N.T.S. SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK REL	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT	9
CHECK	CONTROL	SECTION	JOB	
PKC	0902	90	132	

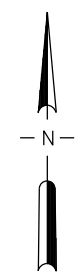
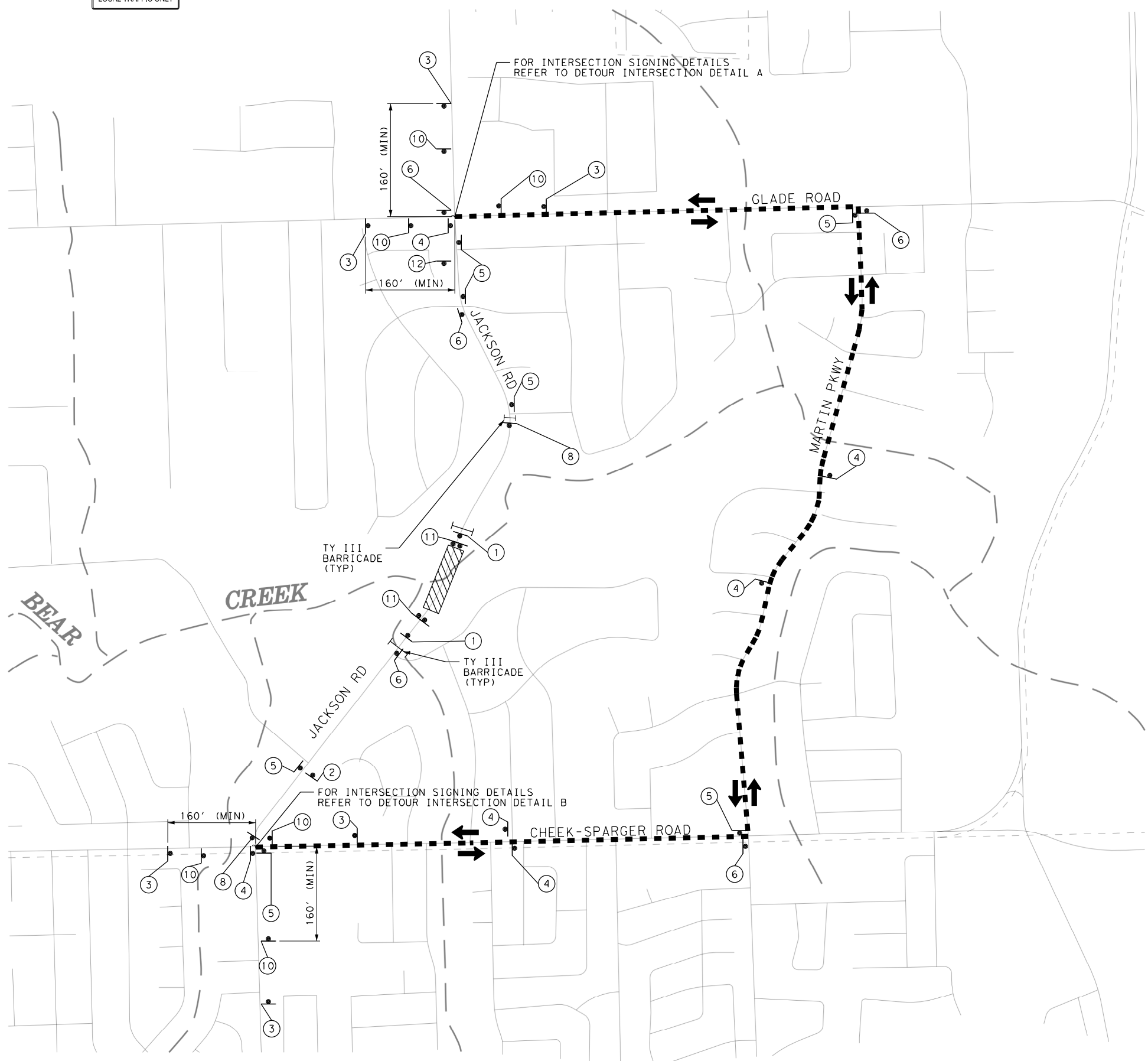
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DATE: 1/26/2023

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- ① ROAD CLOSED  
R11-2  
48" X 30"
- ② ROAD CLOSED AHEAD  
CW20-3D  
36" X 36"
- ③ DETOUR AHEAD  
CW20-2  
36" X 36"
- ④ JACKSON RD  
M4-9  
VARX18"
- ⑤ JACKSON RD  
M4-9  
VARX18"
- ⑥ JACKSON RD  
M4-9  
VARX18"
- ⑦ END DETOUR  
M4-8A  
24" X 18"
- ⑧ JACKSON RD  
M4-9  
VARX18"
- ⑨ ROAD CLOSED  
1000 FT AHEAD  
LOCAL TRAFFIC ONLY  
R11-3g  
60" X 30"
- ⑩ ROAD CLOSED  
AHEAD  
LOCAL TRAFFIC ONLY  
R11-3g  
60" X 30"
- ⑪ BRIDGE OUT  
PCMB

- ⑫ ROAD CLOSED  
LOCAL TRAFFIC ONLY  
R11-4  
60" X 30"

NAME  
ADDRESS  
CITY  
STATE  
CONTRACTOR  
G20-6T  
48" X 30"



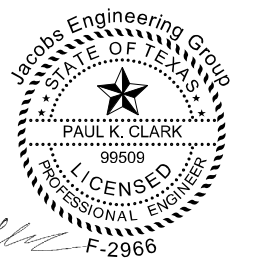
**LEGEND**

- BRIDGE CONSTRUCTION
- DETOUR ROUTE
- TYPE III BARRICADE
- TRAFFIC CONTROL SIGN
- PORTABLE CHANGABLE MESSAGE SIGN (PCMS)

**NOTES:**

1. REFER TO "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (TMUTCD) FOR TYPICAL CONVENTION WARNING SIGNS AND SPACING REQUIRED.
2. REFER TO TXDOT BARRICADE AND CONSTRUCTION STANDARDS.
3. COORDINATE WITH SCHOOLS, EMERGENCY SERVICES AND OTHER ONGOING CITY ENTITIES IN THE VICINITY.
4. COVER EXISTING SIGNAGE WHEN IS IN CONFLICT WITH DETOUR SIGNAGE.

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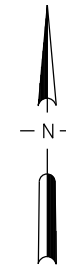
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**JACKSON POOL**

**TRAFFIC CONTROL  
DETOUR LAYOUT**

SCALE: N.T.S.			SHEET 1 OF 1
DESIGN MBT	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)	
CHECK REL	STATE	DISTRICT	COUNTY
GRAPHICS BHK	TEXAS	FTW	TARRANT
CHECK PKC	0902	90	132
			HIGHWAY NO. CS SHEET NO. 10

- ① JACKSON RD M4-9 VARX18"  
DETOUR M4-9S 30"X24"
- ② JACKSON RD M4-9 VARX18"  
DETOUR M4-9L 30"X24"
- ③ JACKSON RD M4-9 VARX18"  
ROAD CLOSED 1/4 MILE AHEAD LOCAL TRAFFIC ONLY R11-3G 60"X30"
- ④ JACKSON RD M4-9 VARX18"  
DETOUR M4-9S 30"X24"
- ⑤ JACKSON RD M4-9 VARX18"  
DETOUR M4-9R 30"X24"
- ⑥ JACKSON RD M4-9 VARX18"  
DETOUR M4-9 30"X24"

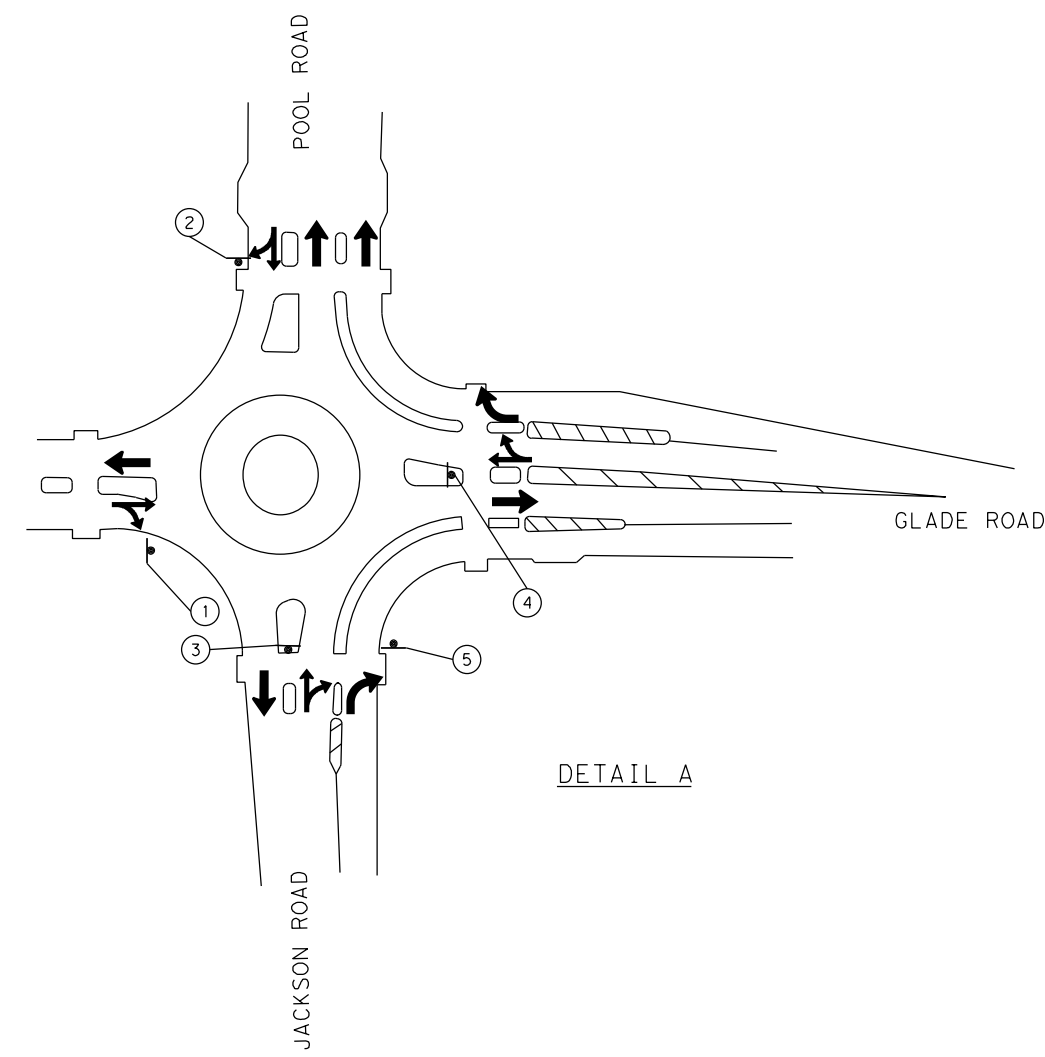


**LEGEND**

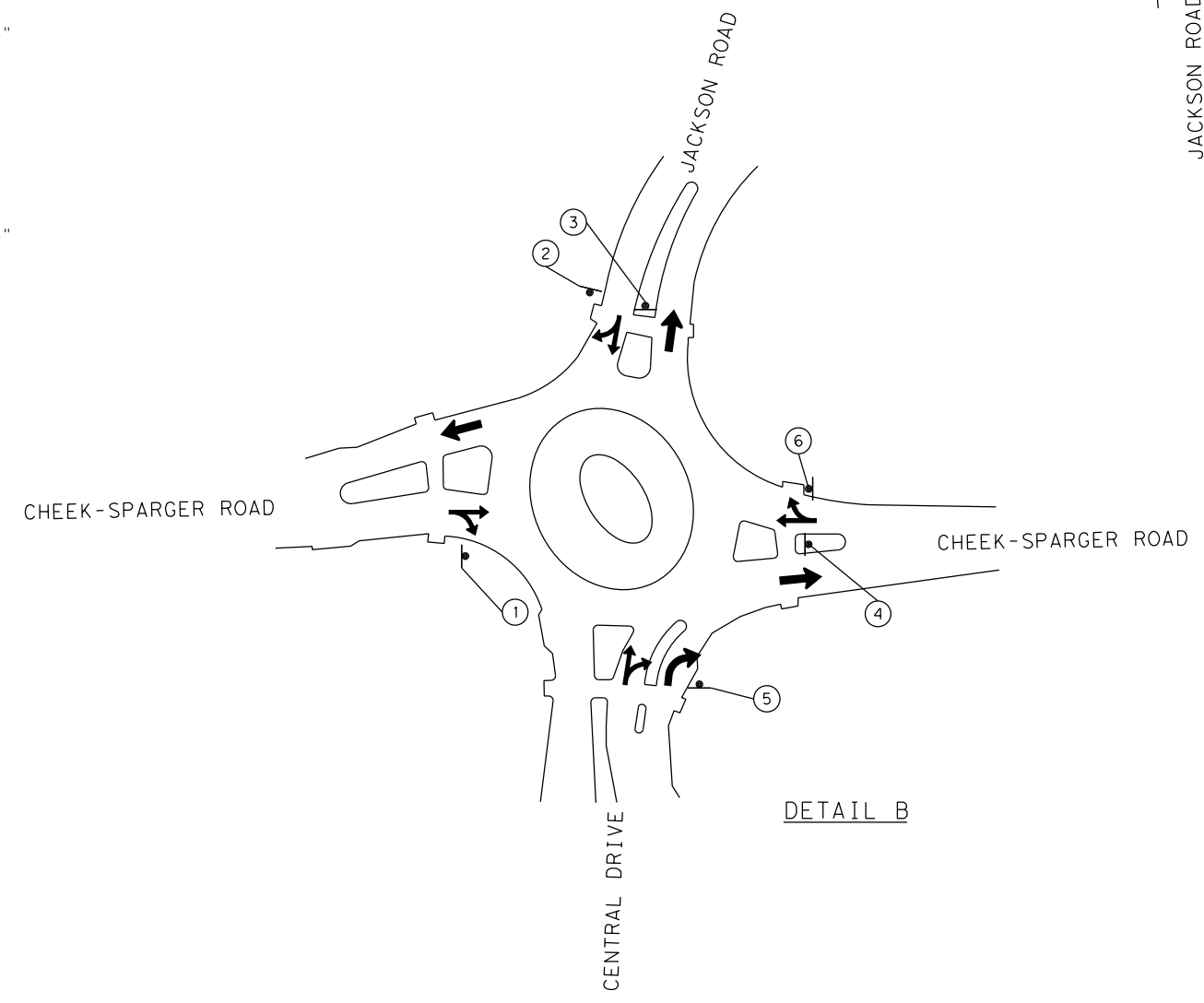
⊥ TRAFFIC CONTROL SIGN

**NOTES:**

1. REFER TO "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (TMUTCD) FOR TYPICAL CONVENTION WARNING SIGNS AND SPACING REQUIRED.
2. REFER TO TXDOT BARRICADE AND CONSTRUCTION STANDARDS.
3. COORDINATE WITH SCHOOLS, EMERGENCY SERVICES AND OTHER ONGOING CITY ENTITIES IN THE VICINITY.
4. COVER EXISTING SIGNAGE WHEN IS IN CONFLICT WITH DETOUR SIGNAGE.

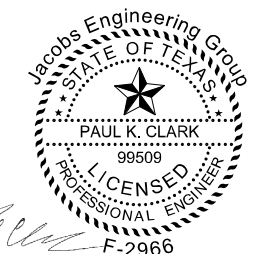


DETAIL A



DETAIL B

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**JACKSON POOL**

**TRAFFIC CONTROL  
DETOUR DETAIL LAYOUT**

SCALE: N.T.S. SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	REL	STATE	DISTRICT	COUNTY
GRAPHICS	BHK	TEXAS	FTW	TARRANT
CHECK	PKC	CONTROL	SECTION	JOB
		0902	90	132

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

- The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
- The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
- When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.



**WORKER SAFETY NOTES:**

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

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

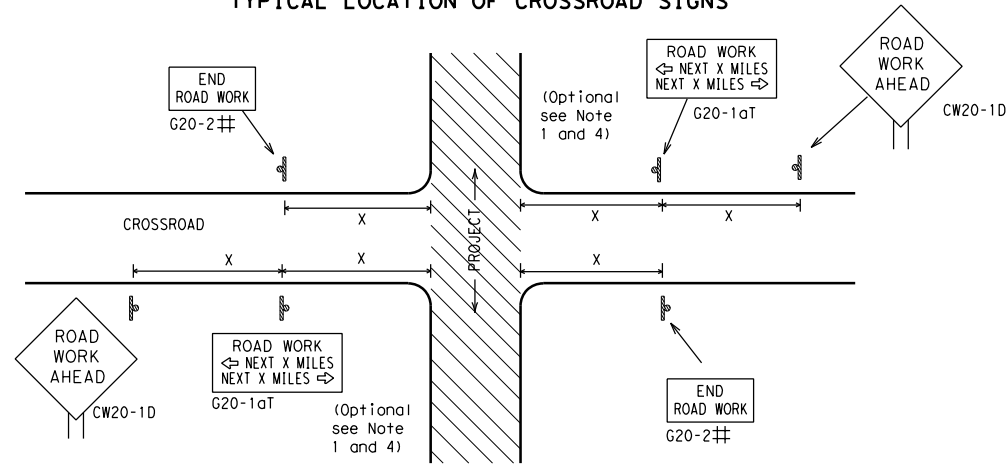
- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

		
<b>BARRICADE AND CONSTRUCTION          GENERAL NOTES          AND REQUIREMENTS</b>		
<b>BC (1) - 21</b>		
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT SECT	JOB HIGHWAY
	0902 90	132 CS
REVISIONS	DIST	COUNTY SHEET NO.
4-03 7-13		
9-07 8-14		
5-10 5-21	FTW	TARRANT 12

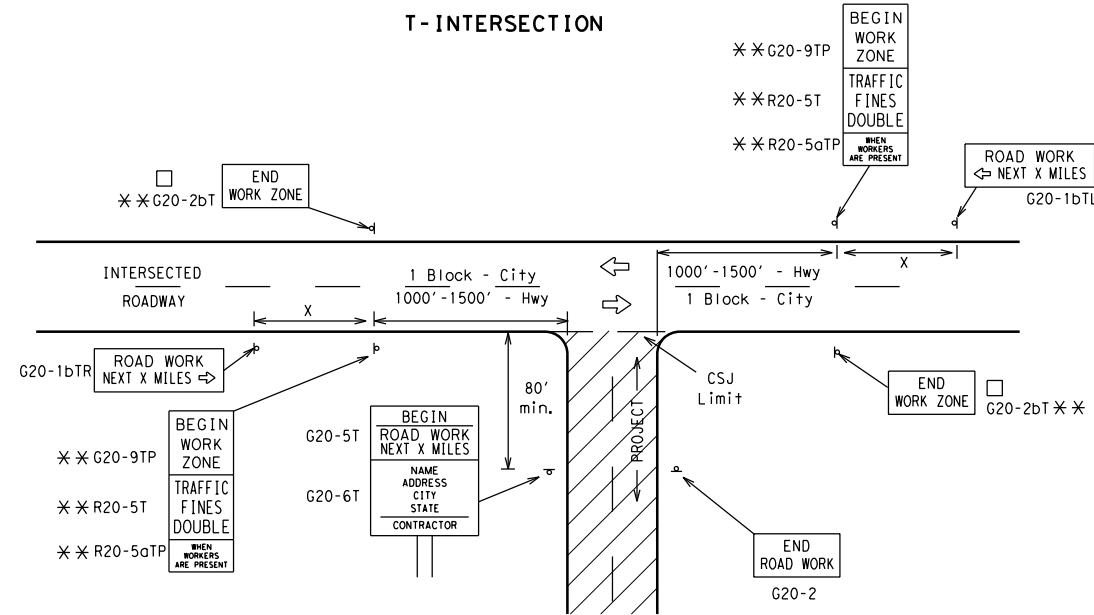
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- # 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>
			80	1000 <sup>2</sup>
*			*	* <sup>3</sup>

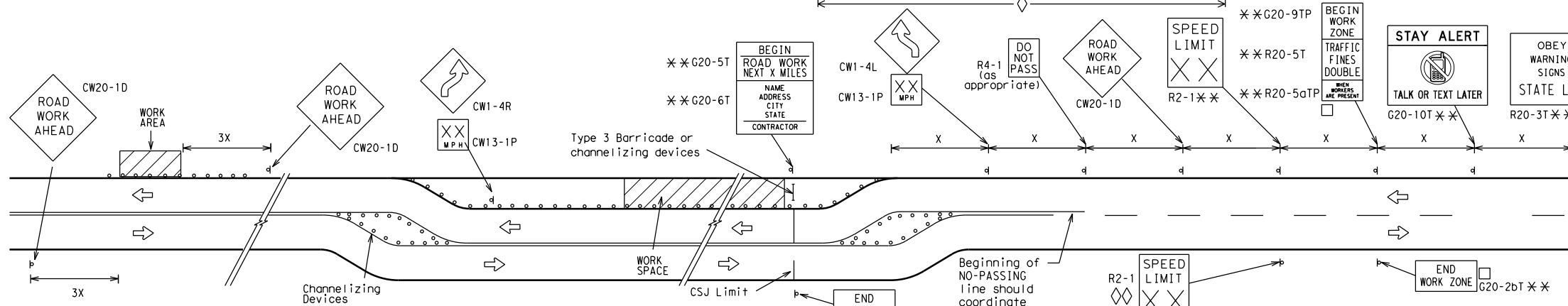
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

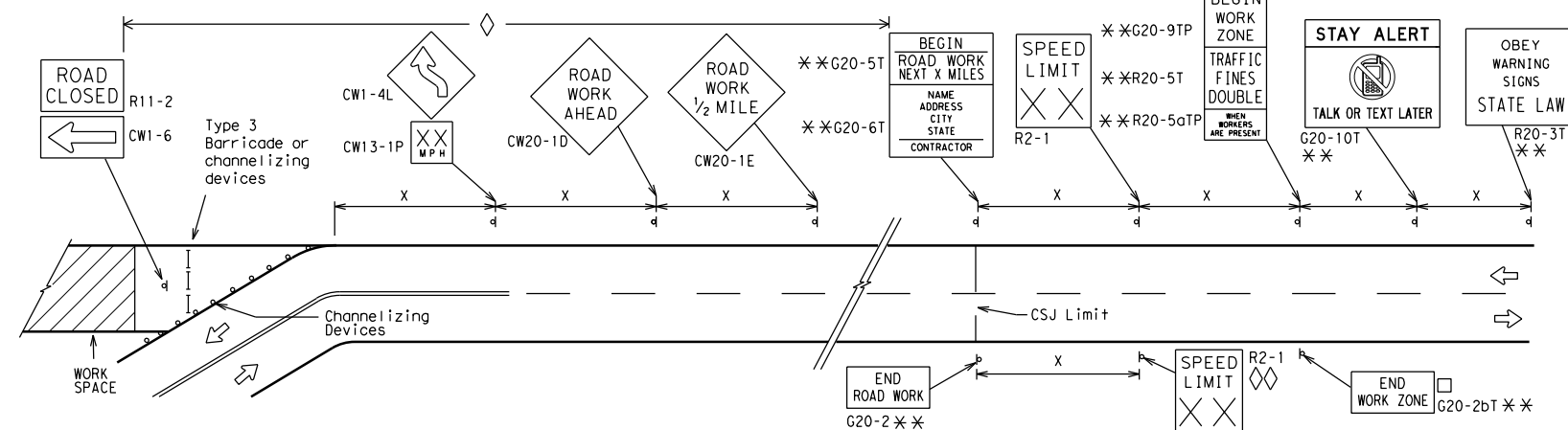
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

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

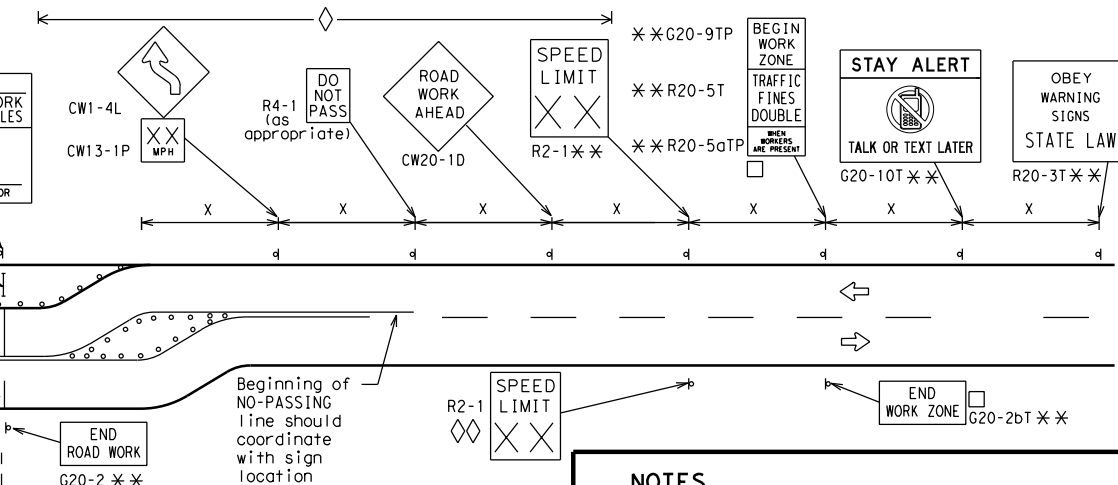


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



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



**NOTES**

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

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

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC (2) - 21**

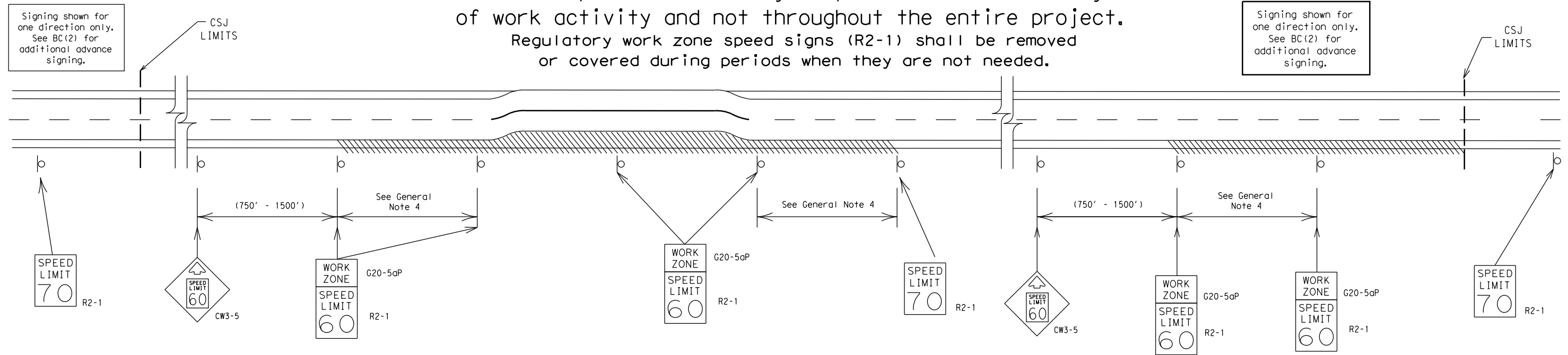
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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- 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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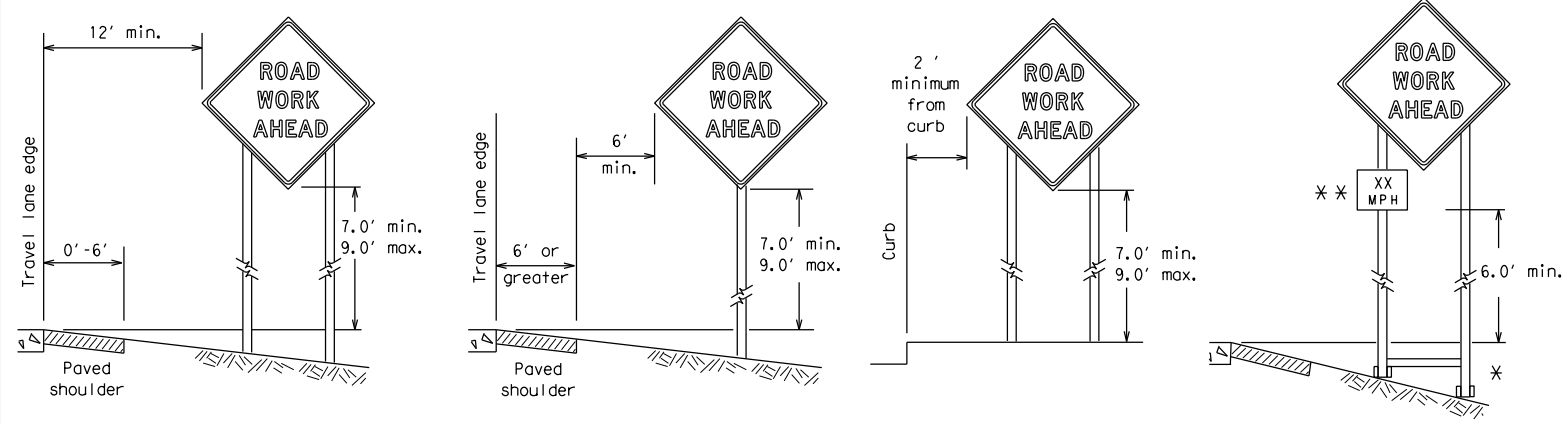
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SHEET 3 OF 12

<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
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7-13	5-21		SHEET NO.: 14

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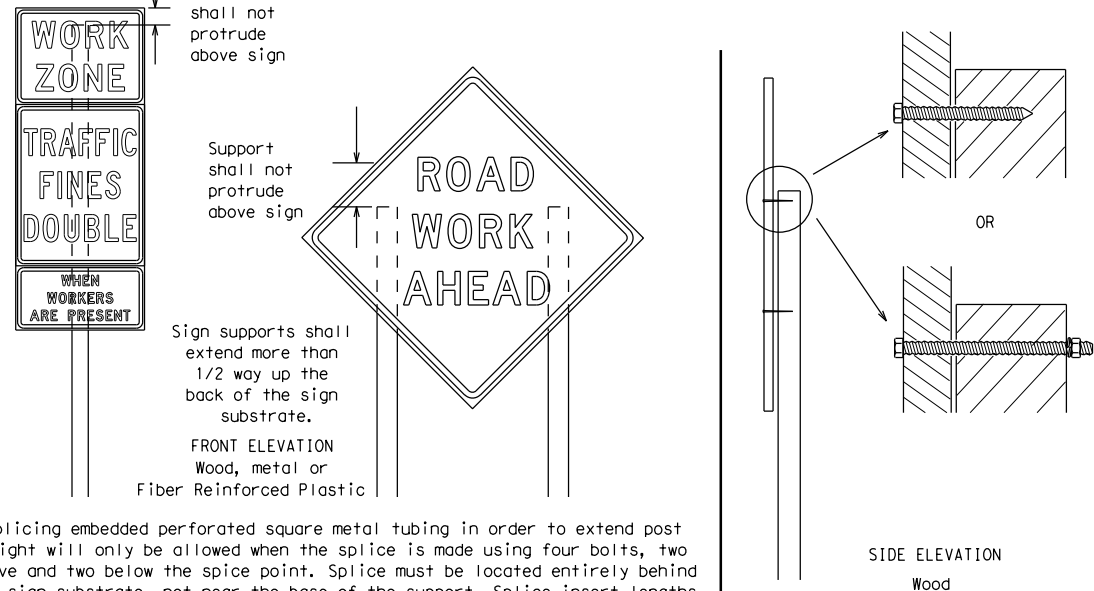
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



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

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

**ATTACHMENT FOR SIGN SUPPORTS**



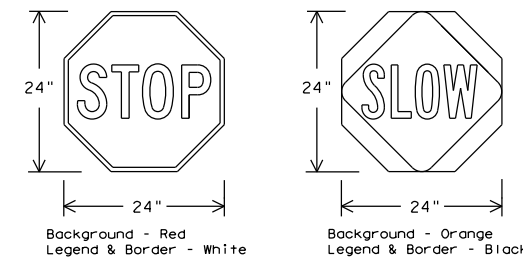
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the 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.

**STOP/SLOW PADDLES**

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B <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**

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

**GENERAL NOTES FOR WORK ZONE SIGNS**

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

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

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

**SIGN MOUNTING HEIGHT**

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

**SIZE OF SIGNS**

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

**SIGN SUBSTRATES**

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

**REFLECTIVE SHEETING**

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

**SIGN LETTERS**

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

**REMOVING OR COVERING**

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

**SIGN SUPPORT WEIGHTS**

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

**FLAGS ON SIGNS**

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



**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

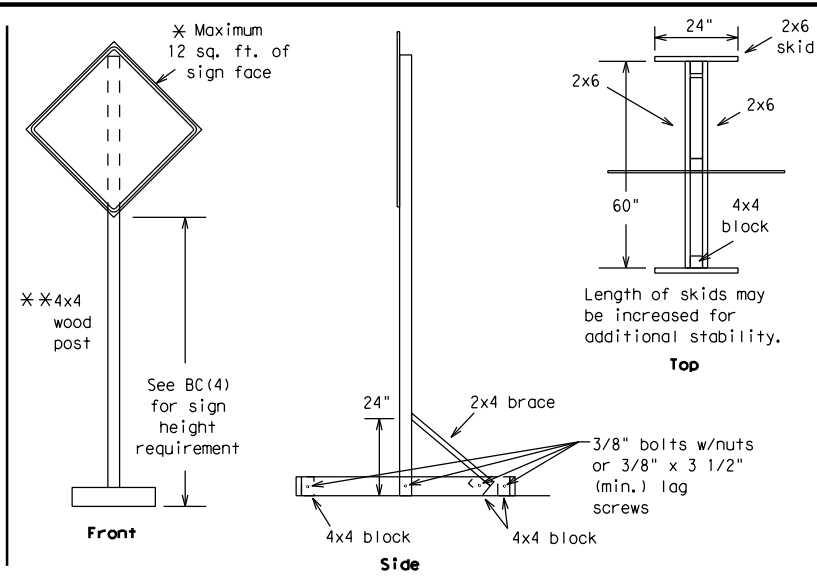
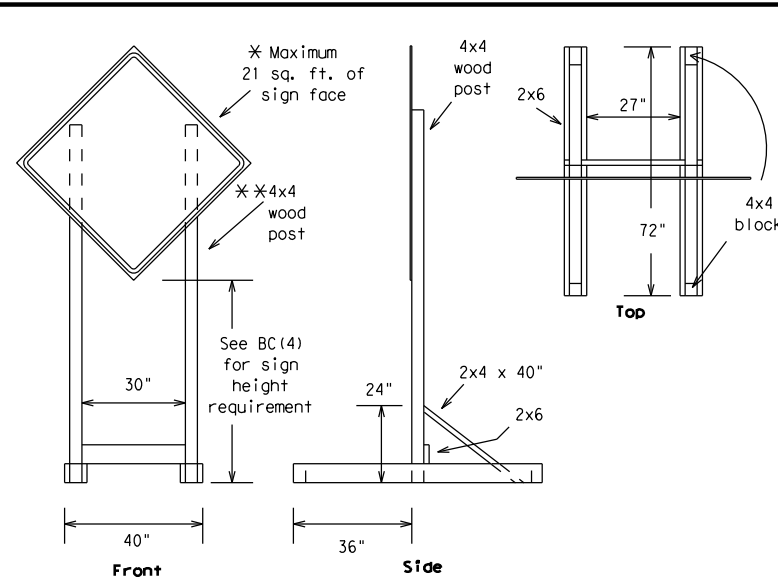
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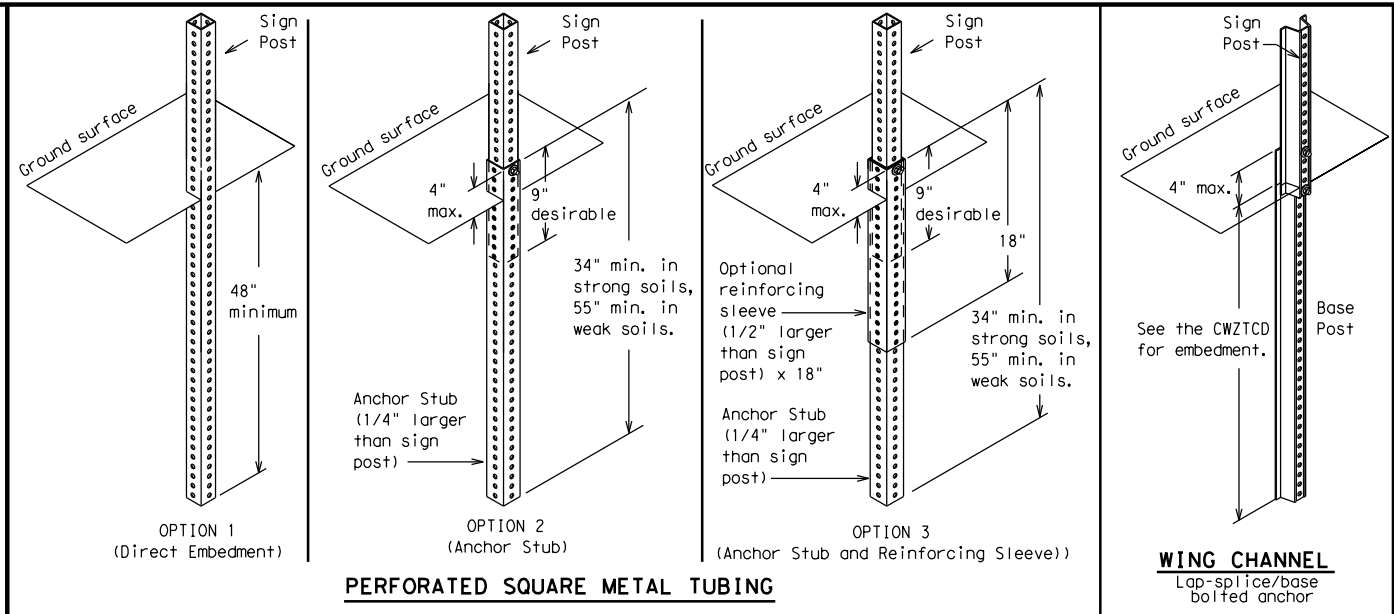


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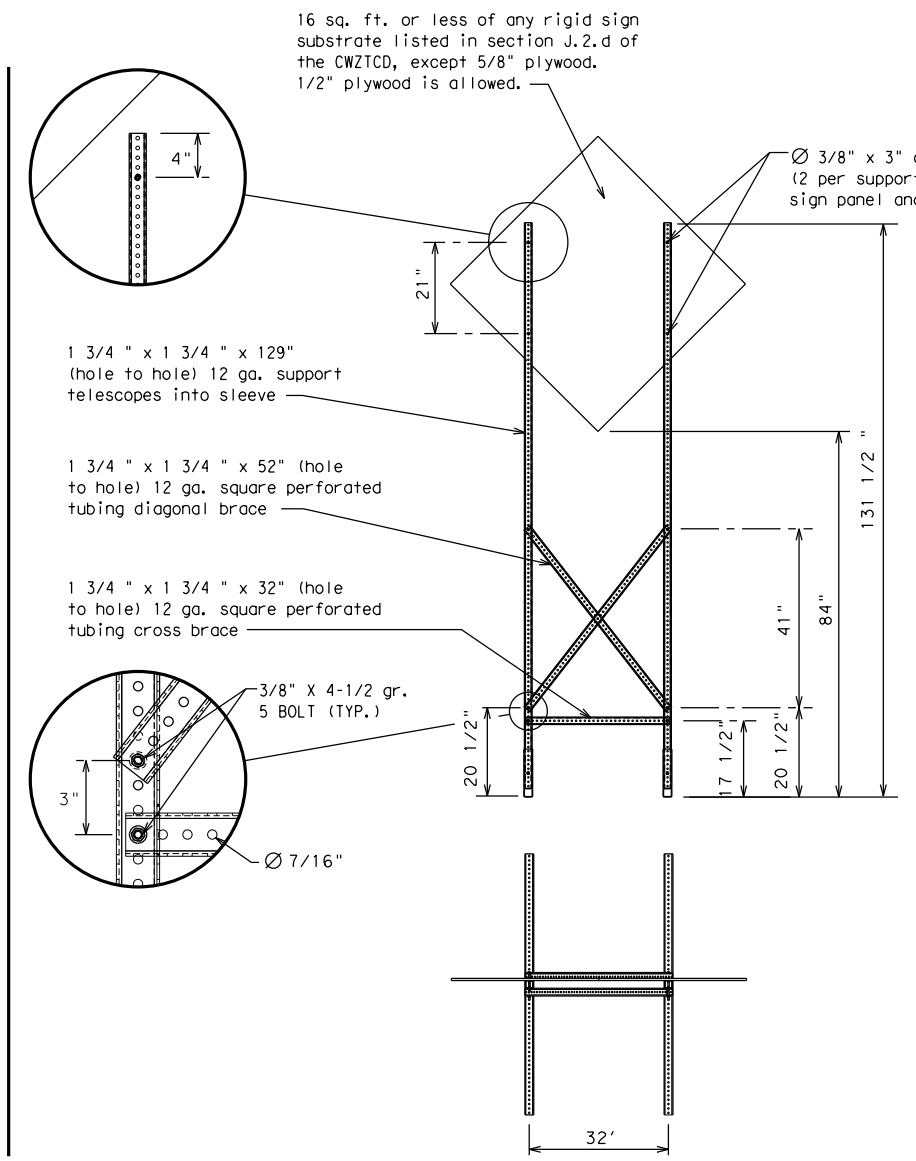
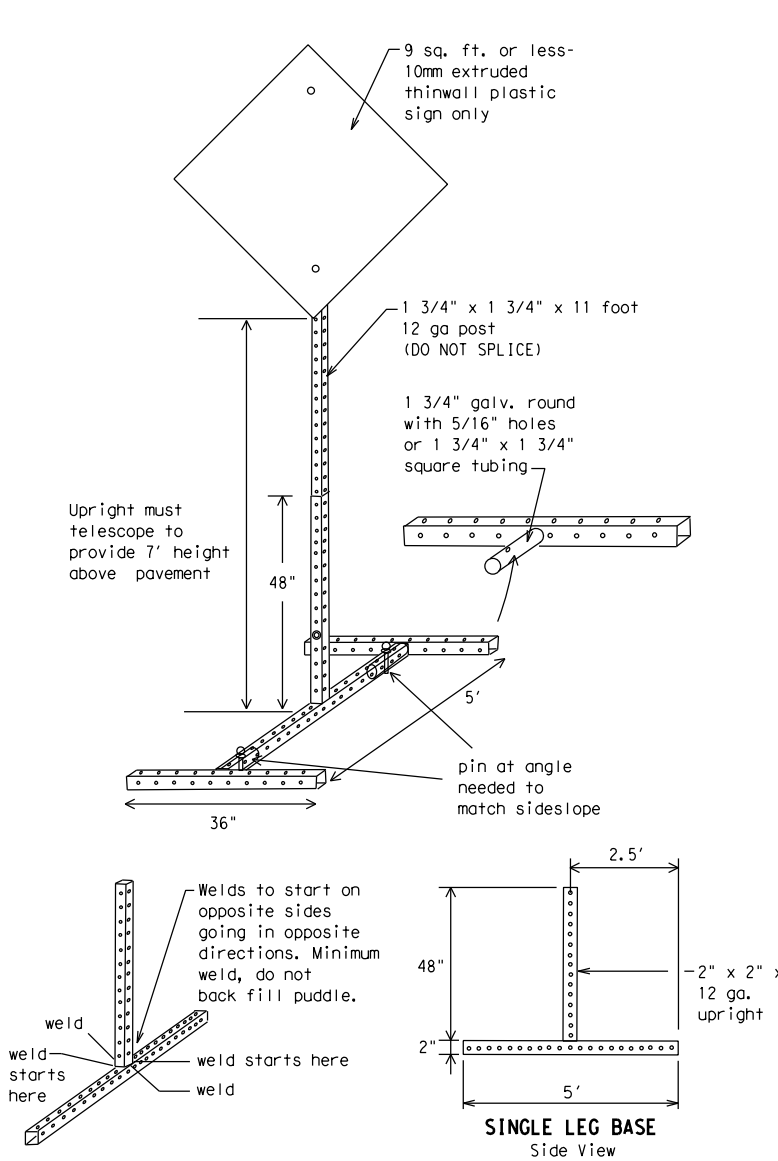
### SKID MOUNTED WOOD SIGN SUPPORTS

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



### GROUND MOUNTED SIGN SUPPORTS

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



### SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

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

## BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

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

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

## FULL MATRIX PCMS SIGNS

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

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
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
Highway	Hwy	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

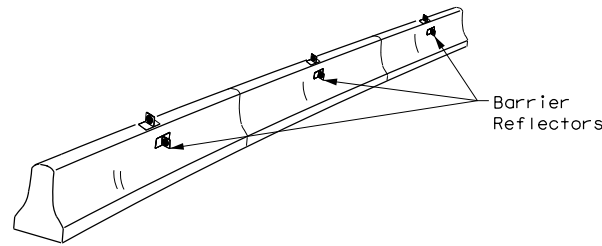
Roadway designation # IH-number, US-number, SH-number, FM-number

<h2>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h2>			
<h3>BC (6) - 21</h3>			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CONT:	0902
REVISIONS		SECT:	90
		JOB:	132
		HIGHWAY:	CS
9-07	8-14	DIST:	COUNTY
7-13	5-21	FTW:	TARRANT
		SHEET NO.:	17

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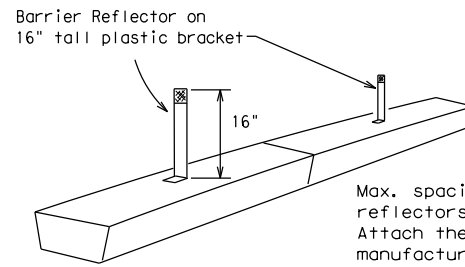
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



**CONCRETE TRAFFIC BARRIER (CTB)**

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

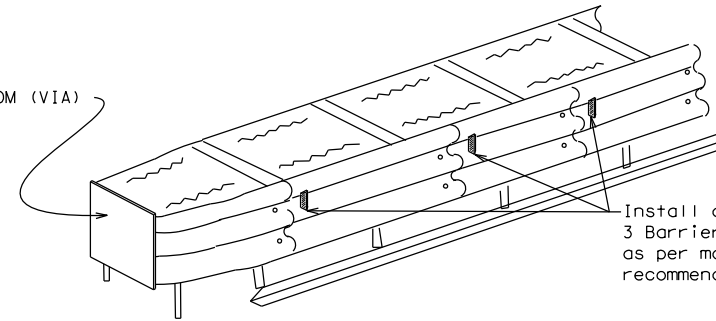


**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

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**

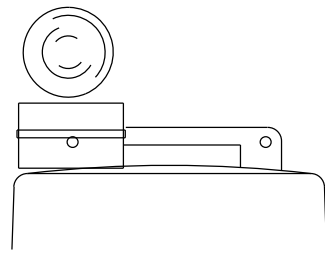
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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**

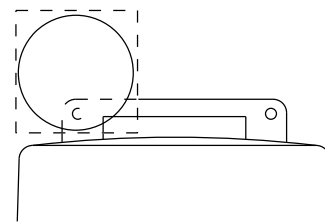
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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



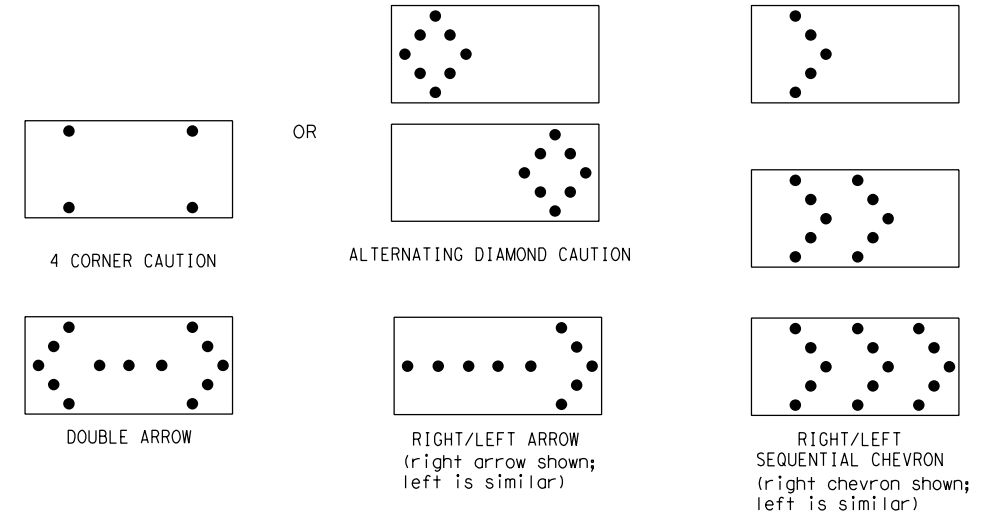
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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**

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0902	90	132	CS				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	FTW	TARRANT	18					

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**GENERAL NOTES**

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

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

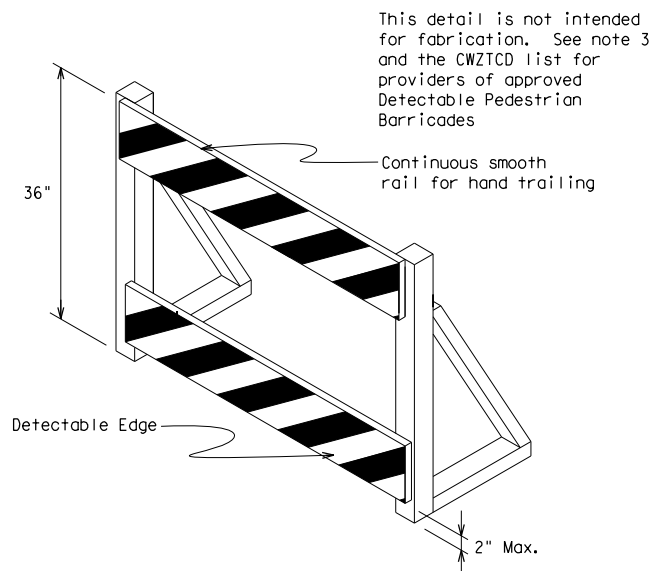
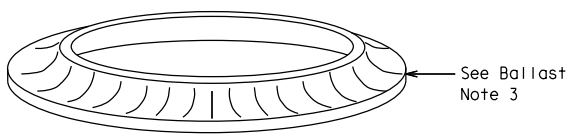
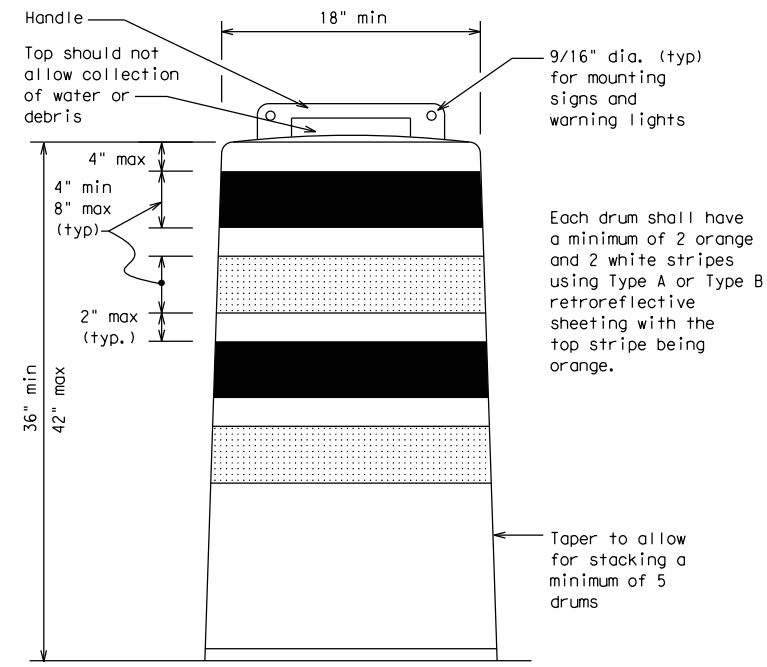
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

**RETROREFLECTIVE SHEETING**

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

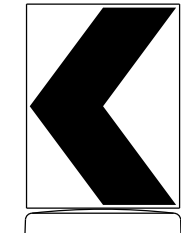
**BALLAST**

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

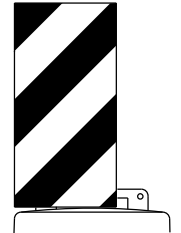


**DETECTABLE PEDESTRIAN BARRICADES**

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



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



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

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

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

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

SHEET 8 OF 12

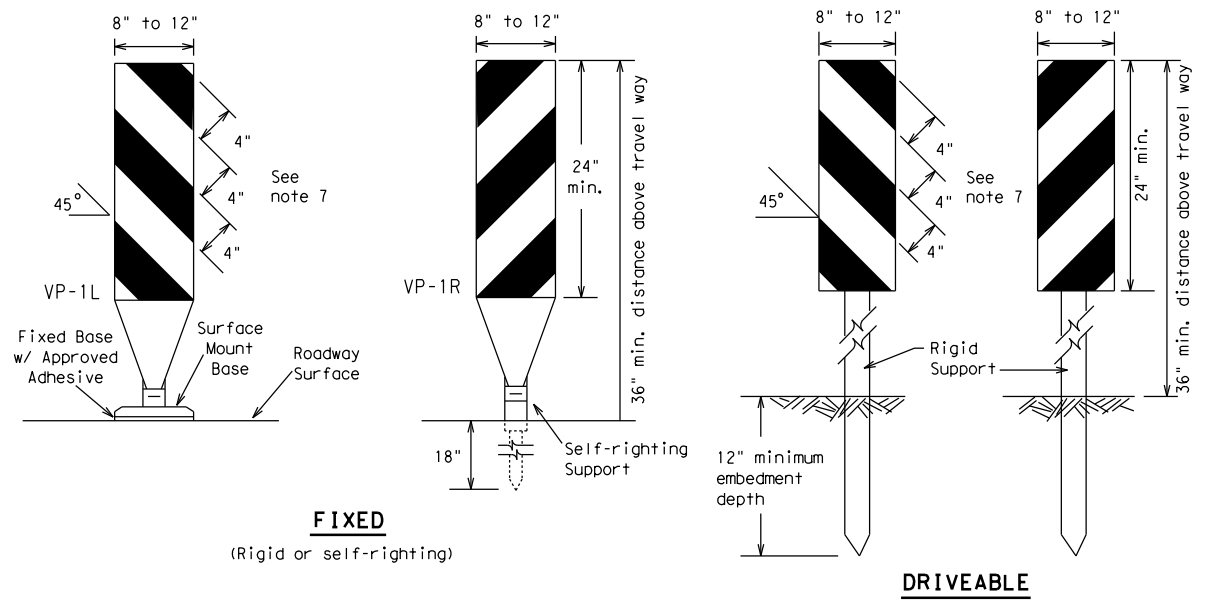


**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

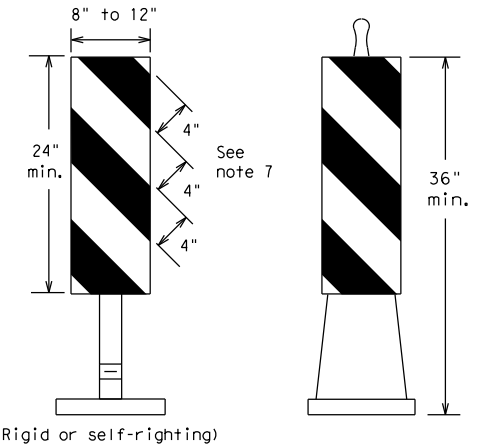
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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0902	90	132	CS				
4-03	8-14	DIST	COUNTY		SHEET NO.				
9-07	5-21	FTW	TARRANT		19				
7-13									

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

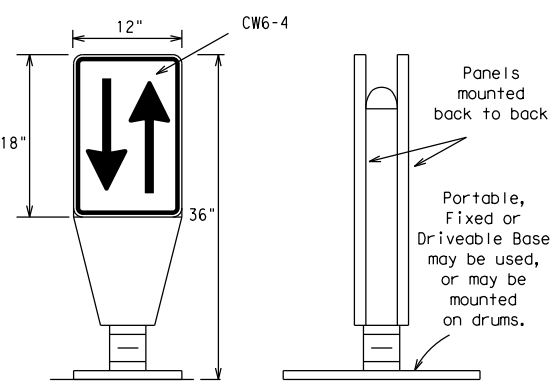
**DRIVEABLE**



**PORTABLE**

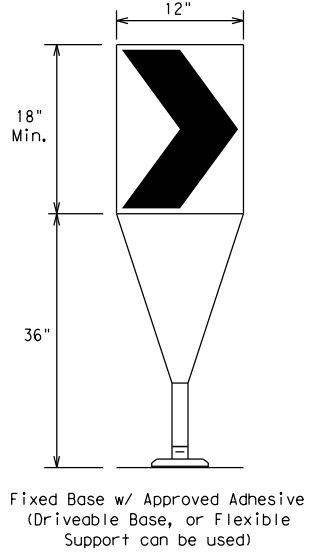
**VERTICAL PANELS (VPs)**

- 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.



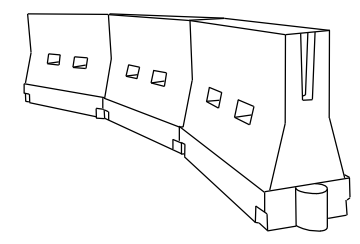
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

- 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	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75	L = WS	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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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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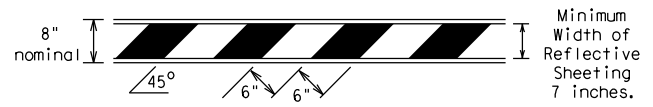
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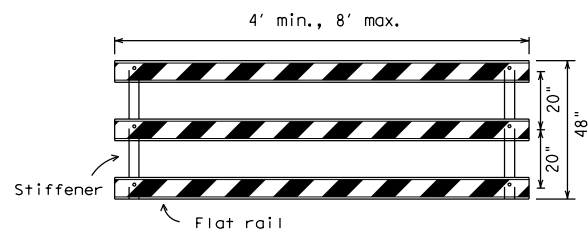
**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

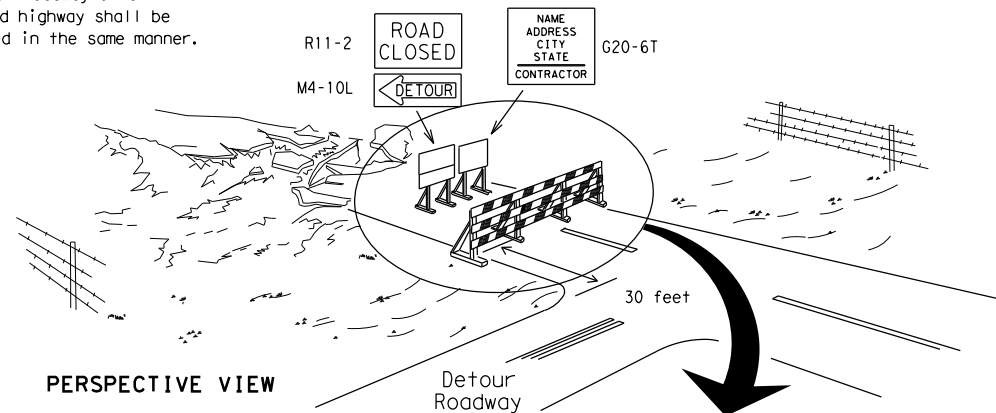


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



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

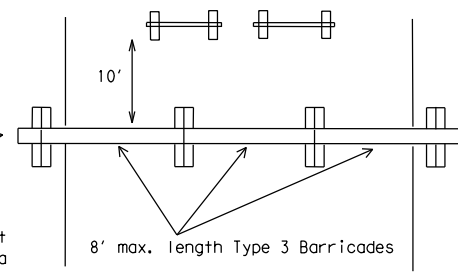
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

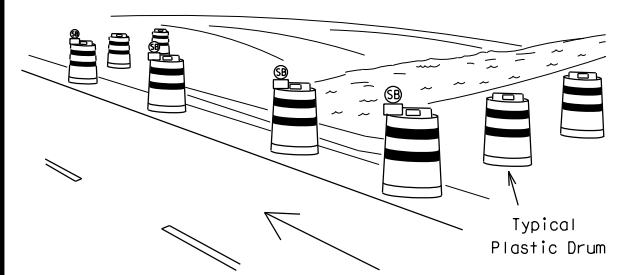
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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

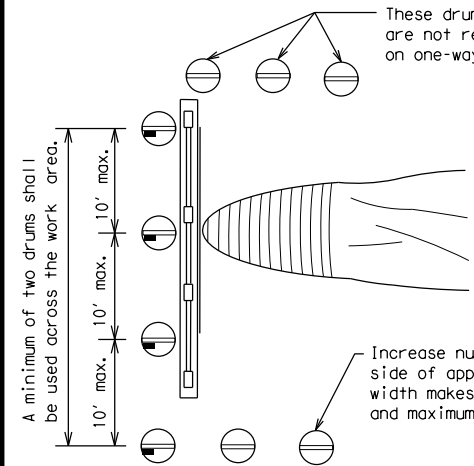


PLAN VIEW

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



PERSPECTIVE VIEW

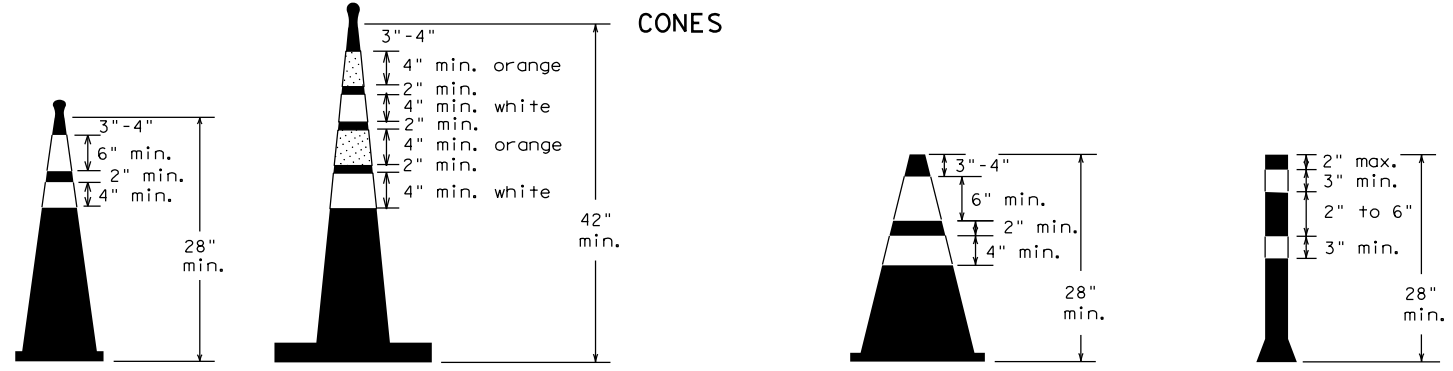


PLAN VIEW

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

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

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



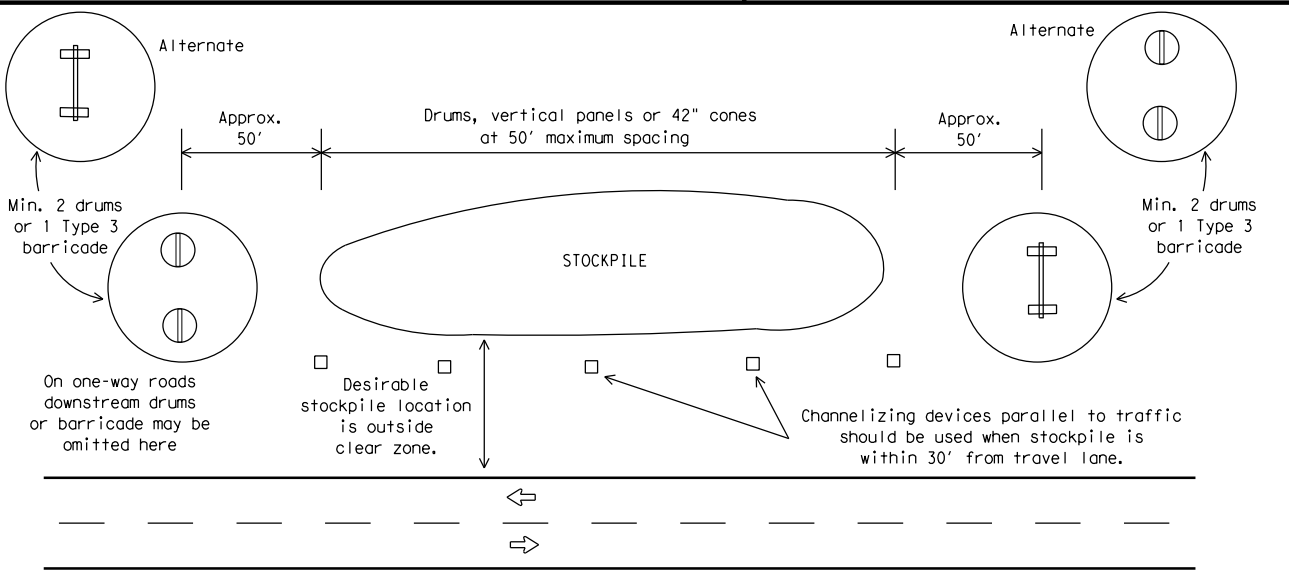
Two-Piece cones

One-Piece cones

Tubular Marker

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

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

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## WORK ZONE PAVEMENT MARKINGS

### GENERAL

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

### RAISED PAVEMENT MARKERS

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

### PREFABRICATED PAVEMENT MARKINGS

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

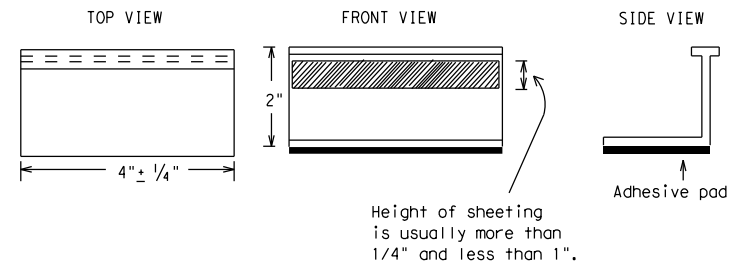
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

### REMOVAL OF PAVEMENT MARKINGS

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

## Temporary Flexible-Reflective Roadway Marker Tabs



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

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

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

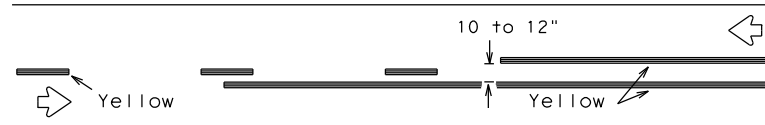
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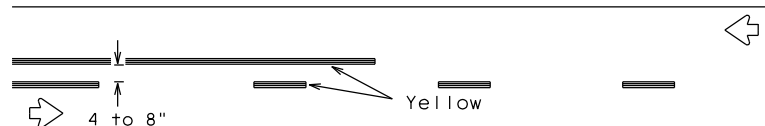
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## PAVEMENT MARKING PATTERNS

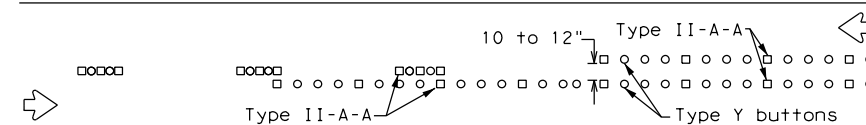


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

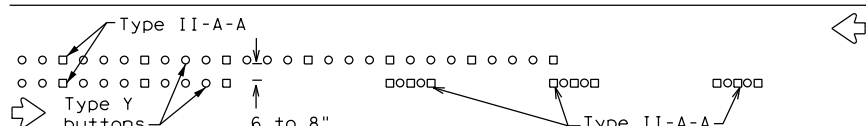


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

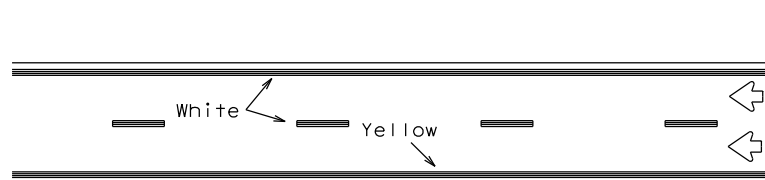


RAISED PAVEMENT MARKERS - PATTERN A



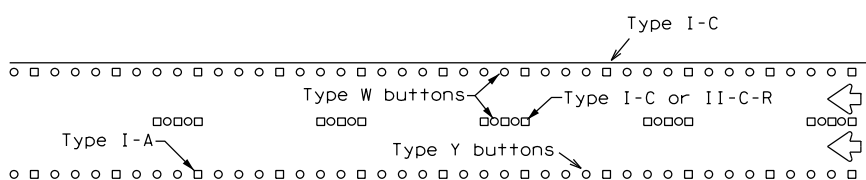
RAISED PAVEMENT MARKERS - PATTERN B

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



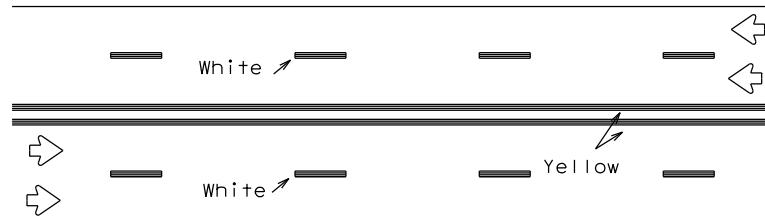
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



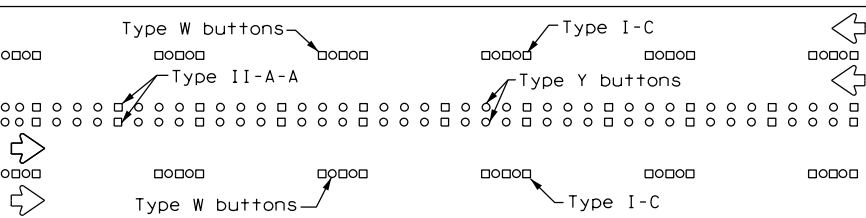
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



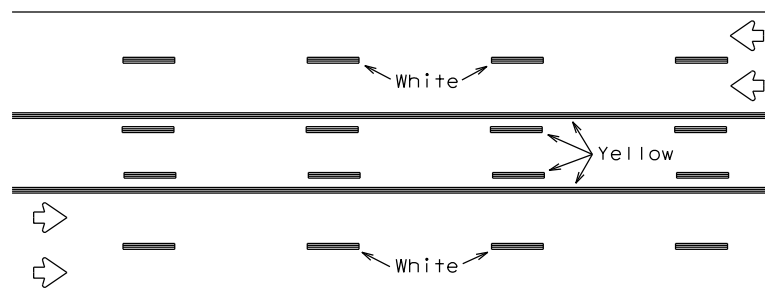
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



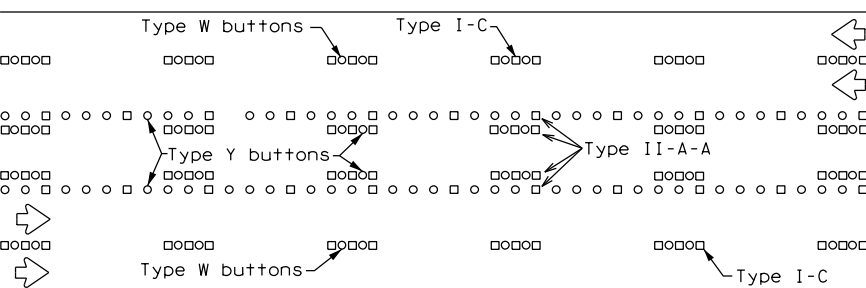
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

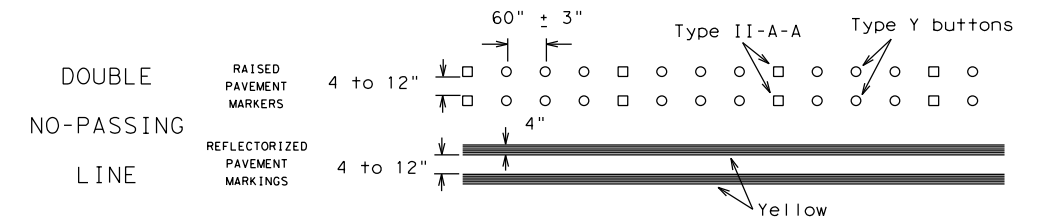
Prefabricated markings may be substituted for reflectORIZED pavement markings.



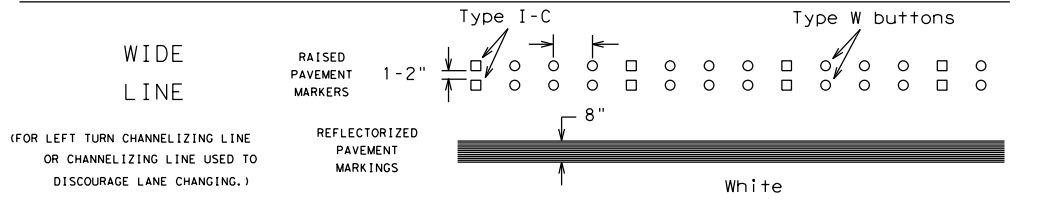
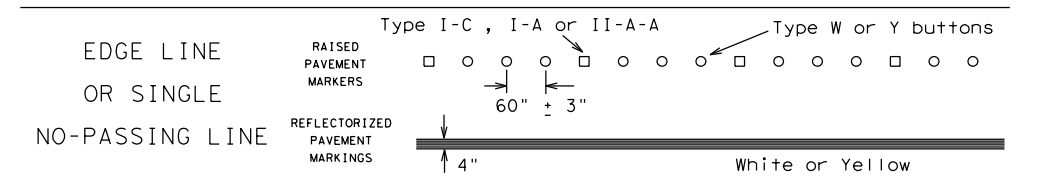
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

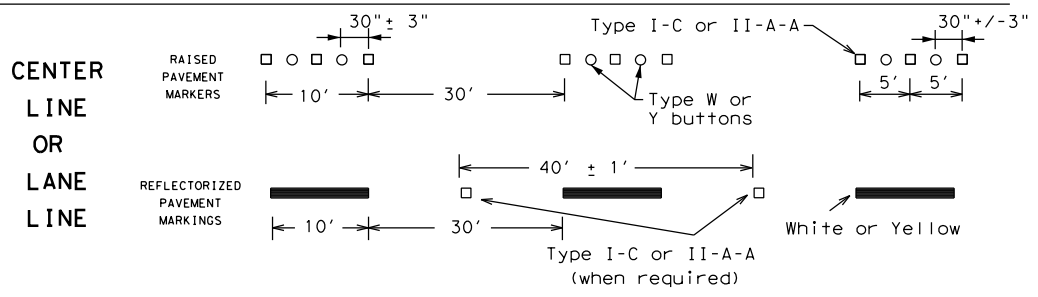
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



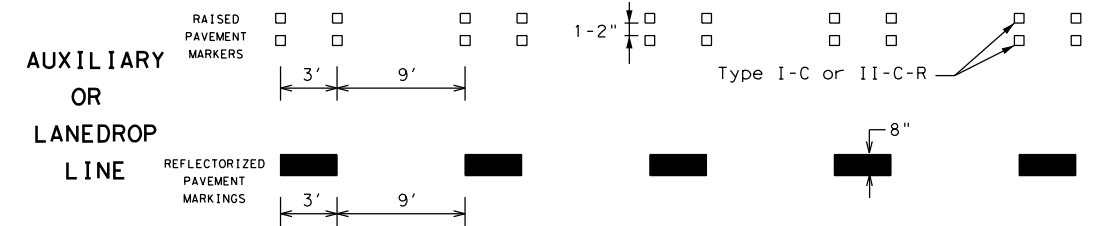
### SOLID LINES



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

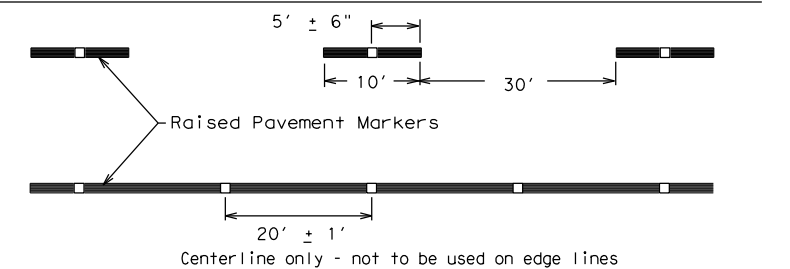


### BROKEN LINES



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC (12) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	FTW	TARRANT	23	
11-02 8-14				

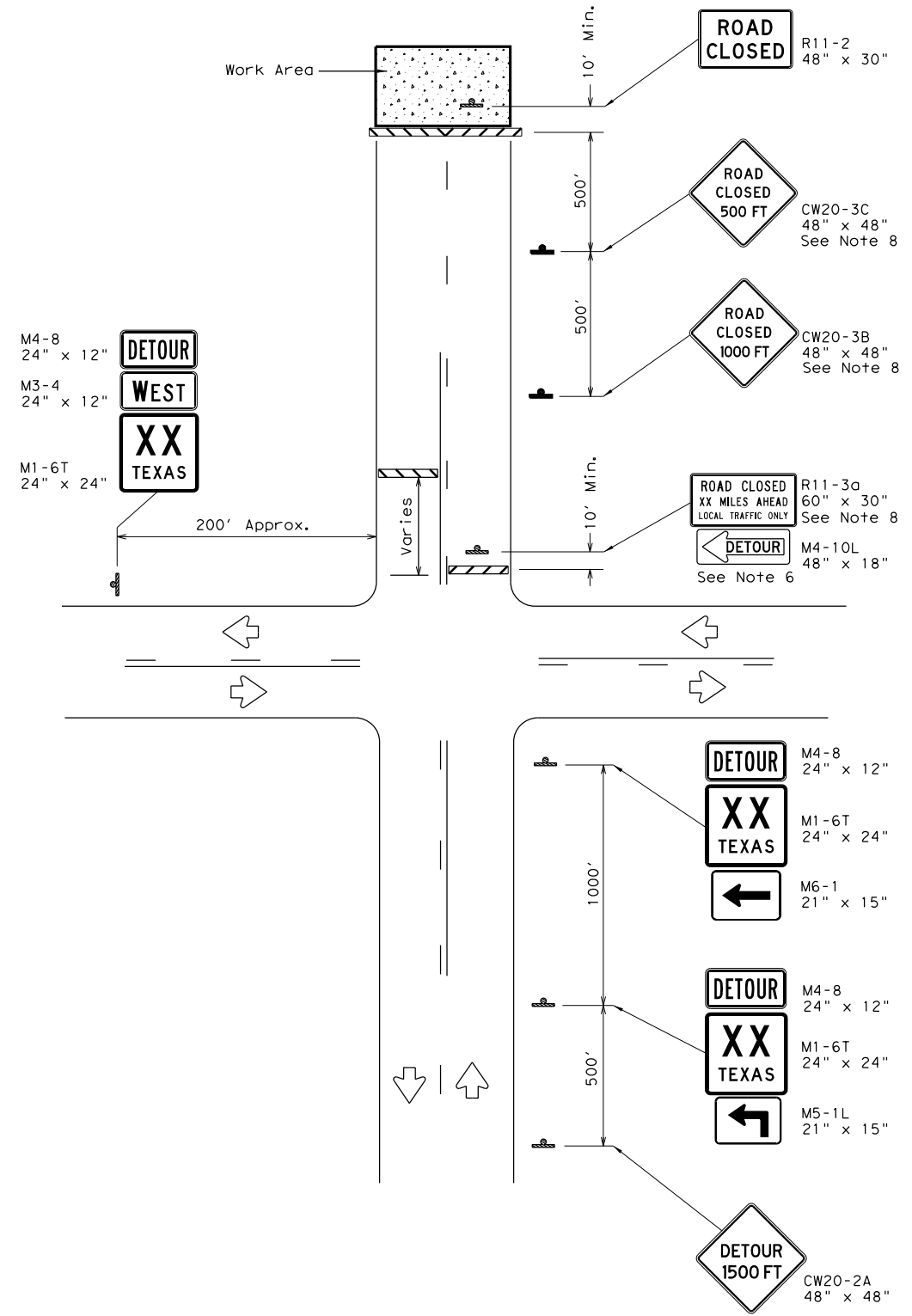
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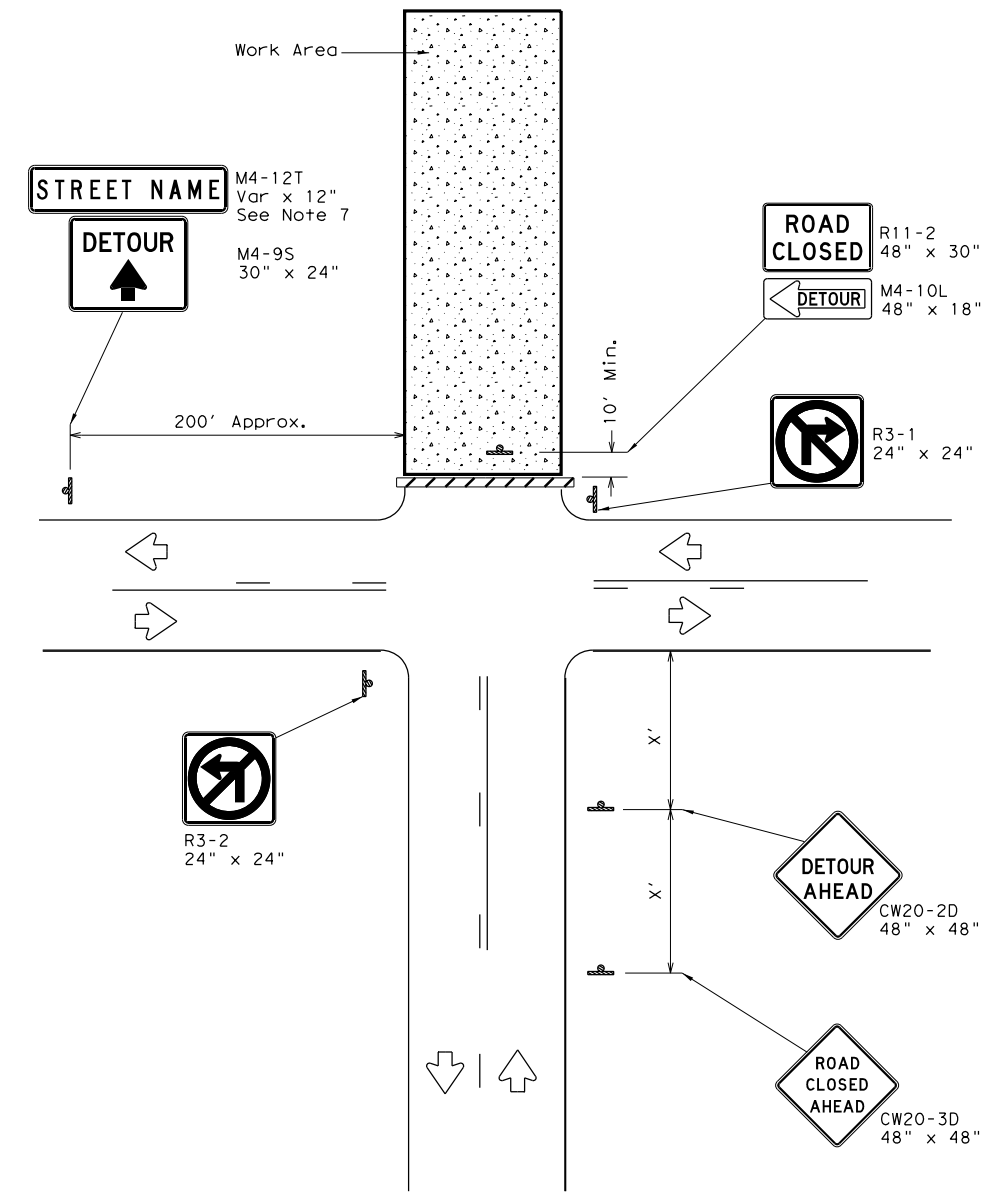


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DATE: 1/25/2023 5:26:19 PM  
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**ROAD CLOSURE BEYOND THE INTERSECTION**  
 Signing for a Numbered Route with an Off-Site Detour



**ROAD CLOSURE AT THE INTERSECTION**  
 Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

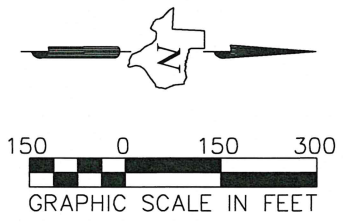
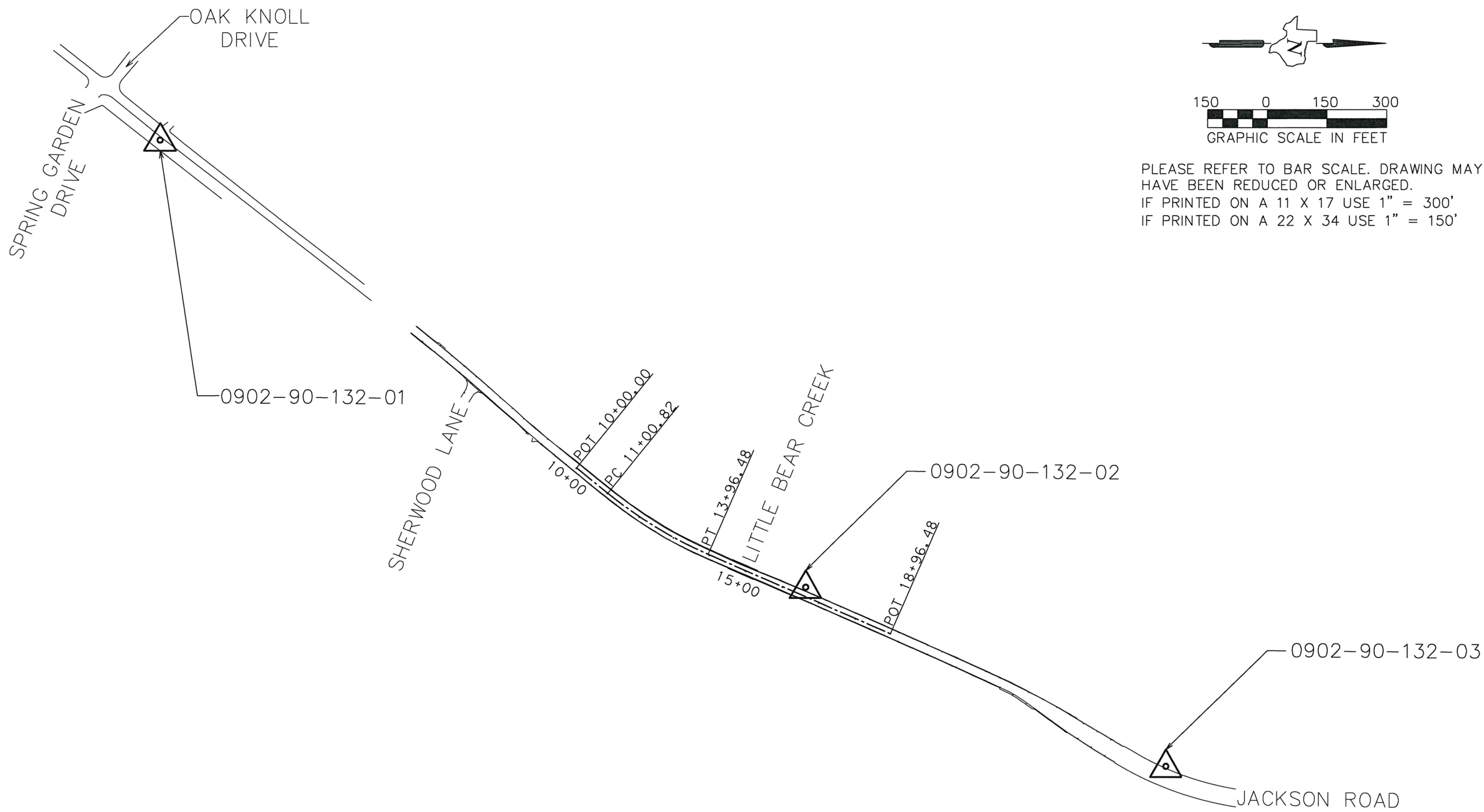
Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

**GENERAL NOTES**

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices List (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

		Traffic Operations Division Standard	
<b>WORK ZONE ROAD CLOSURE DETAILS</b>			
<b>WZ (RCD) - 13</b>			
FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
© TxDOT August 1995	CONT	SECT	JOB
REVISIONS	0902	90	132
1-97 4-98 7-13	DIST	COUNTY	SHEET NO.
2-98 3-03	FTW	TARRANT	24



PLEASE REFER TO BAR SCALE. DRAWING MAY HAVE BEEN REDUCED OR ENLARGED.  
IF PRINTED ON A 11 X 17 USE 1" = 300'  
IF PRINTED ON A 22 X 34 USE 1" = 150'

NOTES:  
HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE 4202 AND ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011), AND WERE DERIVED FROM THE TXDOT REAL TIME NETWORK UTILIZING VIRTUAL REFERENCE STATION METHODOLOGIES IN OCTOBER OF 2021. ALL SURFACE DISTANCES AND COORDINATES SHOWN HEREON MAY BE CONVERTED TO GRID VALUES BY MULTIPLYING THE SURFACE VALUES BY A COMBINED SCALE FACTOR OF 0.999880014398, OR BY DIVIDING THOSE SURFACE VALUES BY THE DENTON COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00012.  
  
I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WERE DETERMINED FROM MULTIPLE GNSS OBSERVATIONS MADE UTILIZING TXDOT'S VIRTUAL REFERENCE NETWORK AND FROM DIFFERENTIAL LEVELING, IN OCTOBER OF 2021 AND ARE AS SHOWN HEREON.



1/16/23

*Scott M. Posey*

Scott M. Posey  
Registered Professional Land Surveyor  
No. 5350

LAMB-STAR ENGINEERING, L.L.C.  
3801 PARKWOOD BOULEVARD, SUITE 550  
FRISCO, TX 75034  
TBPLS # 10048300

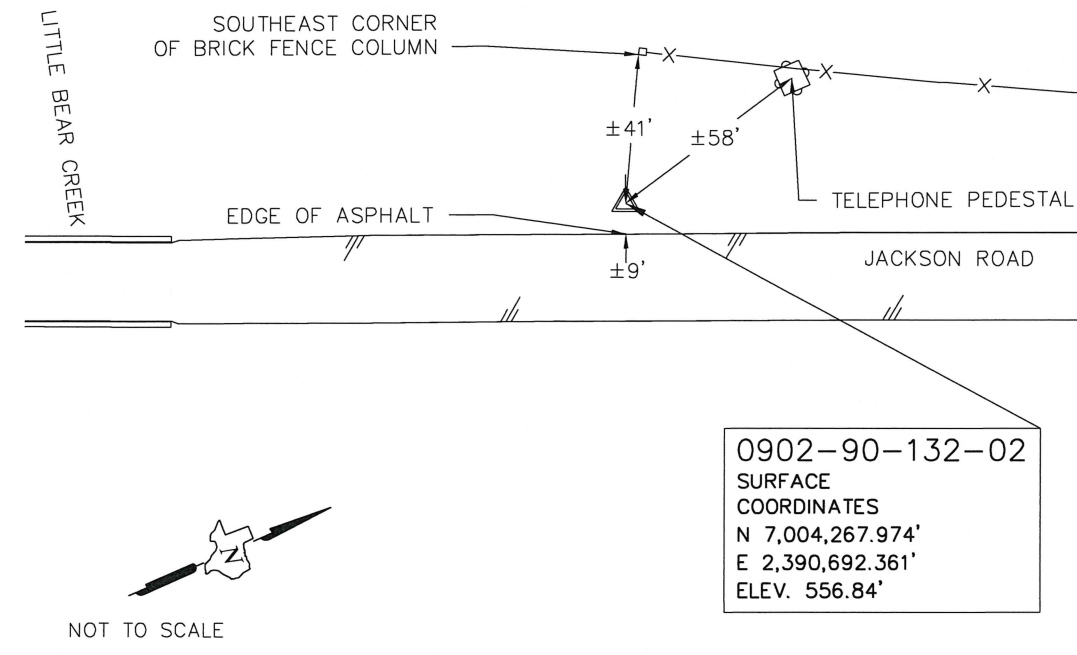
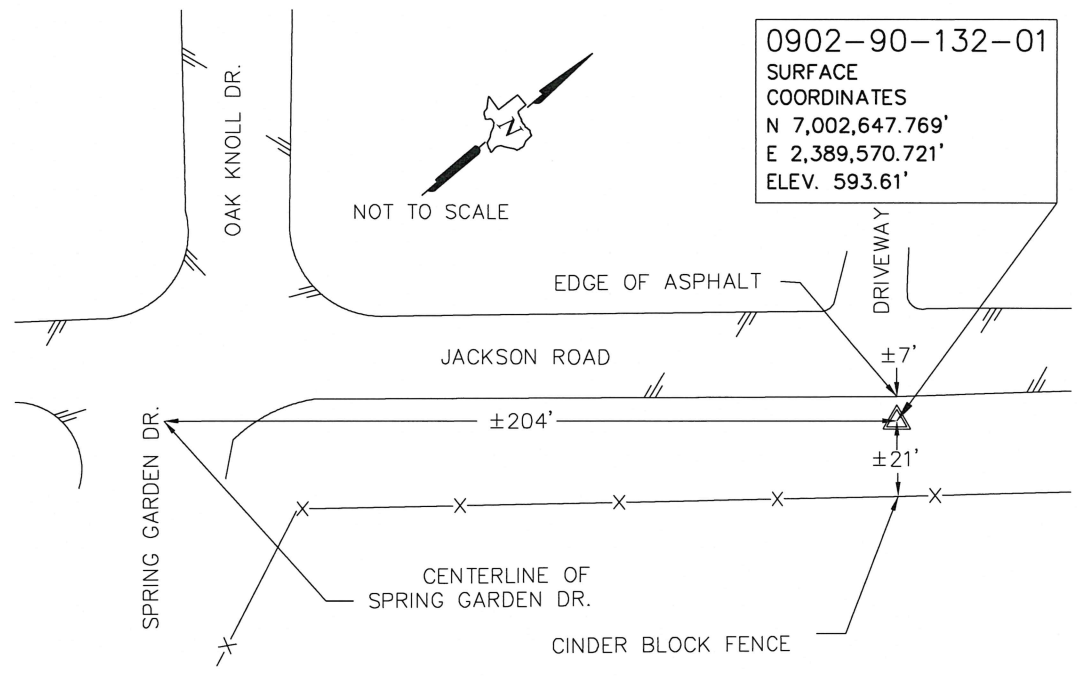


**JACKSON POOL**  
  
CONTROL DATA  
INDEX SHEET

CONTROL POINT	SURFACE COORDINATES			GRID COORDINATES		DESCRIPTION
	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	
0902-90-132-01	7,002,647.769	2,389,570.721	593.61'	7,001,807.552	2,389,284.007	3 1/2" ALUMINUM DISC IN CONCRETE
0902-90-132-02	7,004,267.974	2,390,692.361	556.84'	7,003,427.563	2,390,405.512	3 1/2" ALUMINUM DISC IN CONCRETE
0902-90-132-03	7,005,175.846	2,391,142.777	559.78'	7,004,335.326	2,390,855.875	3 1/2" ALUMINUM DISC IN CONCRETE

CONTROL POINT LEGEND	
	PRIMARY CONTROL POINT: 5/8" IRON ROD WITH ALUMINUM CAP IN CONCRETE STAMPED "TEXAS DEPT OF TRANSPORTATION CONTROL POINT" PROVIDED BY TxDOT

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER	HIGHWAY NO.
CHECK	6	(See Title Sheet)	JR
GRAPHICS	STATE	DISTRICT	COUNTY
CHECK	TEXAS	FW	TARRANT
	CONTROL	SECTION	JOB
	0902	90	132
			<b>25</b>

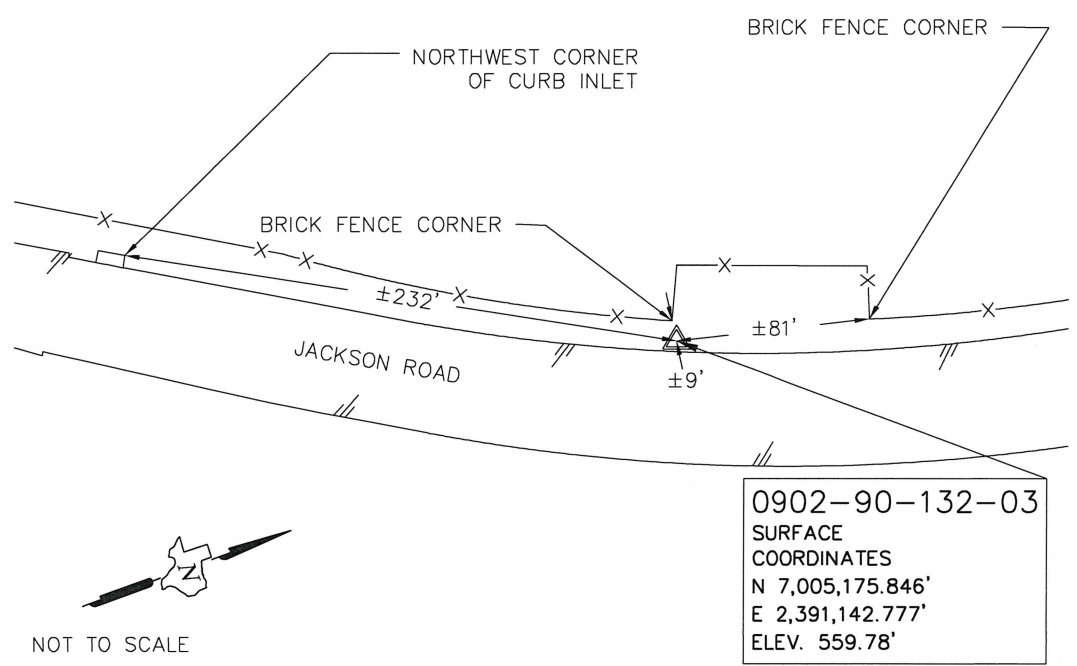


STAMPED  
0902-90-132  
01

A 3 1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-90-132-01" SET IN CONCRETE ON THE SE SIDE OF JACKSON ROAD, ±7' SE OF EDGE OF ASPHALT, ±21' NW OF THE CINDER BLOCK FENCE, ±204' NE OF THE CL OF SPRING GARDEN DR.

STAMPED  
0902-90-132  
02

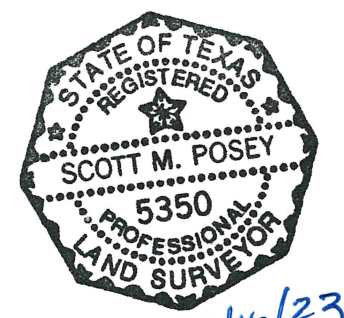
A 3 1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-90-132-02" SET IN CONCRETE ON THE NW SIDE OF JACKSON RD. NE OF SHERWOOD LN. ±981', ±9' NW OF THE EDGE OF ASPHALT, ±41' SE OF THE SE CORNER OF BRICK FENCE COLUMN, ±58' SE OF A TELEPHONE PEDESTAL.



STAMPED  
0902-90-132  
03

A 3 1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-90-132-03" SET IN CONCRETE ON THE NW SIDE OF JACKSON RD. SW OF SHENANDOAH PL. ±485', ±9' EAST OF THE SE BRICK FENCE CORNER, ±81' SOUTH OF THE NE CORNER OF BRICK FENCE CORNER, ±232' NE OF THE NW CORNER OF A CURB INLET.

NOTES:  
HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE 4202 AND ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011), AND WERE DERIVED FROM THE TxDOT REAL TIME NETWORK UTILIZING VIRTUAL REFERENCE STATION METHODOLOGIES IN OCTOBER OF 2021. ALL SURFACE DISTANCES AND COORDINATES SHOWN HEREON MAY BE CONVERTED TO GRID VALUES BY MULTIPLYING THE SURFACE VALUES BY A COMBINED SCALE FACTOR OF 0.999880014398, OR BY DIVIDING THOSE SURFACE VALUES BY THE DENTON COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00012.  
I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WERE DETERMINED FROM MULTIPLE GNSS OBSERVATIONS MADE UTILIZING TxDOT'S VIRTUAL REFERENCE NETWORK AND FROM DIFFERENTIAL LEVELING, IN OCTOBER OF 2021 AND ARE AS SHOWN HEREON.



1/16/23

*Scott M. Posey*

Scott M. Posey  
Registered Professional Land Surveyor  
No. 5350

LAMB-STAR ENGINEERING, L.L.C.  
3801 PARKWOOD BOULEVARD, SUITE 500  
FRISCO, TX 75034  
TBPLS # 10048300

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JACKSON POOL

HORIZONTAL AND VERTICAL CONTROL

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)		HIGHWAY NO. JR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS	TEXAS	FW	TARRANT	26
CHECK	CONTROL	SECTION	JOB	
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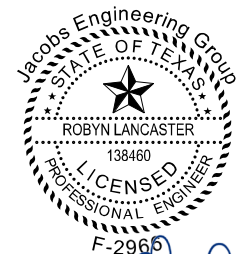
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DATE: 1/25/2023

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Beginning chain JACKSONROAD description
Feature: Geom_Centerline
=====
Point JACKSONROAD1  N  7,003,693.5428 E  2,390,392.8624 Sta  10+00.0000
Course from JACKSONROAD1 to PC JACKSONROAD_3 N 39° 00' 00.00" E Dist 100.8192

Curve Data
*-----*
Curve JACKSONROAD_3
P.I. Station = 12+49.5451 N 7,003,887.4757 E 2,390,549.9062
Delta = 15° 24' 00.00" (LT)
Degree = 5' 12' 31.35"
Tangent = 148.7258
Length = 295.6588
Radius = 1,100.0000
External = 10.0087
Long Chord = 294.7696
Mid. Ord. = 9.9185
P.C. Station = 11+00.8192 N 7,003,771.8940 E 2,390,456.3100
P.T. Station = 13+96.4780 N 7,004,023.7625 E 2,390,609.4484
C.C. = N 39° 00' 00.00" E 7,004,464.1465 E 2,389,601.4494
Back = N 39° 00' 00.00" E
Ahead = N 23° 36' 00.00" E
Chord Bear = N 31° 18' 00.00" E

Course from PT JACKSONROAD_3 to JACKSONROAD5 N 23° 36' 00.00" E Dist 500.0000
Point JACKSONROAD5  N  7,004,481.9439 E  2,390,809.6230 Sta  18+96.4780
=====
Ending chain JACKSONROAD description
  
```



*[Signature]*  
2/17/2023

**Jacobs** 1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966



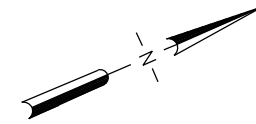
**JACKSON POOL**  
**ROADWAY**  
**HORIZONTAL ALIGNMENT DATA**

SCALE: N.T.S. SHEET 1 OF 1


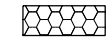
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CHECK REL	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT	align="center">27
CHECK PKC	CONTROL	SECTION	JOB	
	0902	90	132	

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DATE: 1/25/2023

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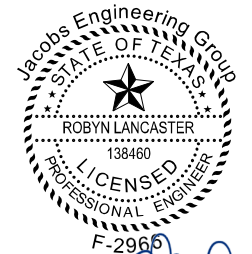
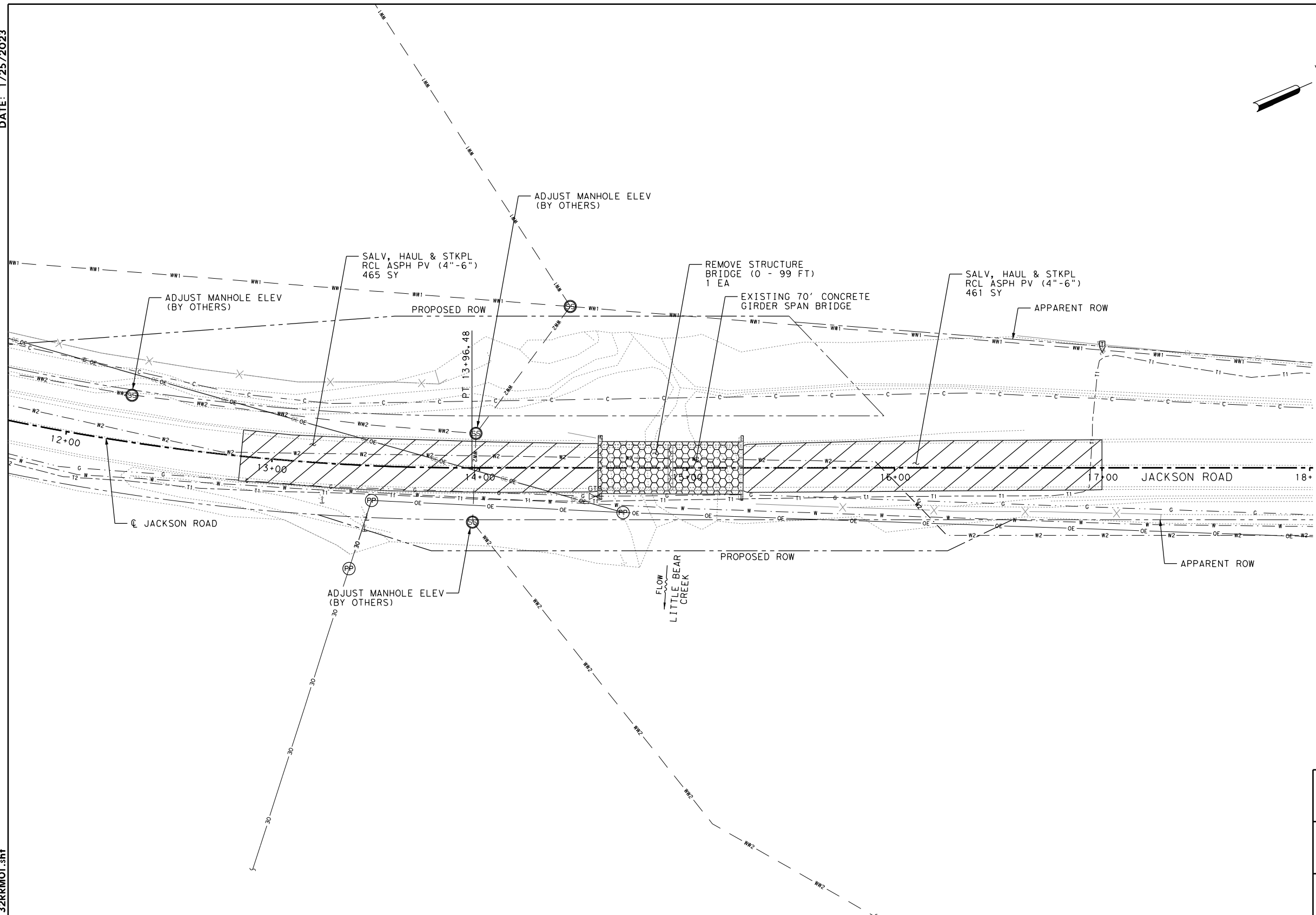


**LEGEND**

-  SALV, HAUL & STKPL  
RCL ASPH PV (4"-6")
-  REMOVE STRUCTURE  
(BRIDGE 0 - 99 FT)

**NOTES:**

1. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING UTILITIES PRIOR TO THE BEGINNING OF REMOVAL OPERATIONS.
2. ANY ITEMS REQUIRING REMOVAL THAT ARE NOT DIRECTLY CALLED OUT SHALL BE CONSIDERED SUBSIDIARY TO PREP ROW.
3. EXISTING TREES WITHIN PROPOSED CONSTRUCTION LIMITS SHALL BE REMOVED UNDER ITEM 100 - PREP ROW.



*[Signature]*  
2/17/2023

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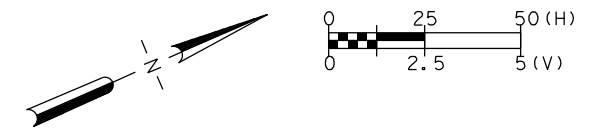
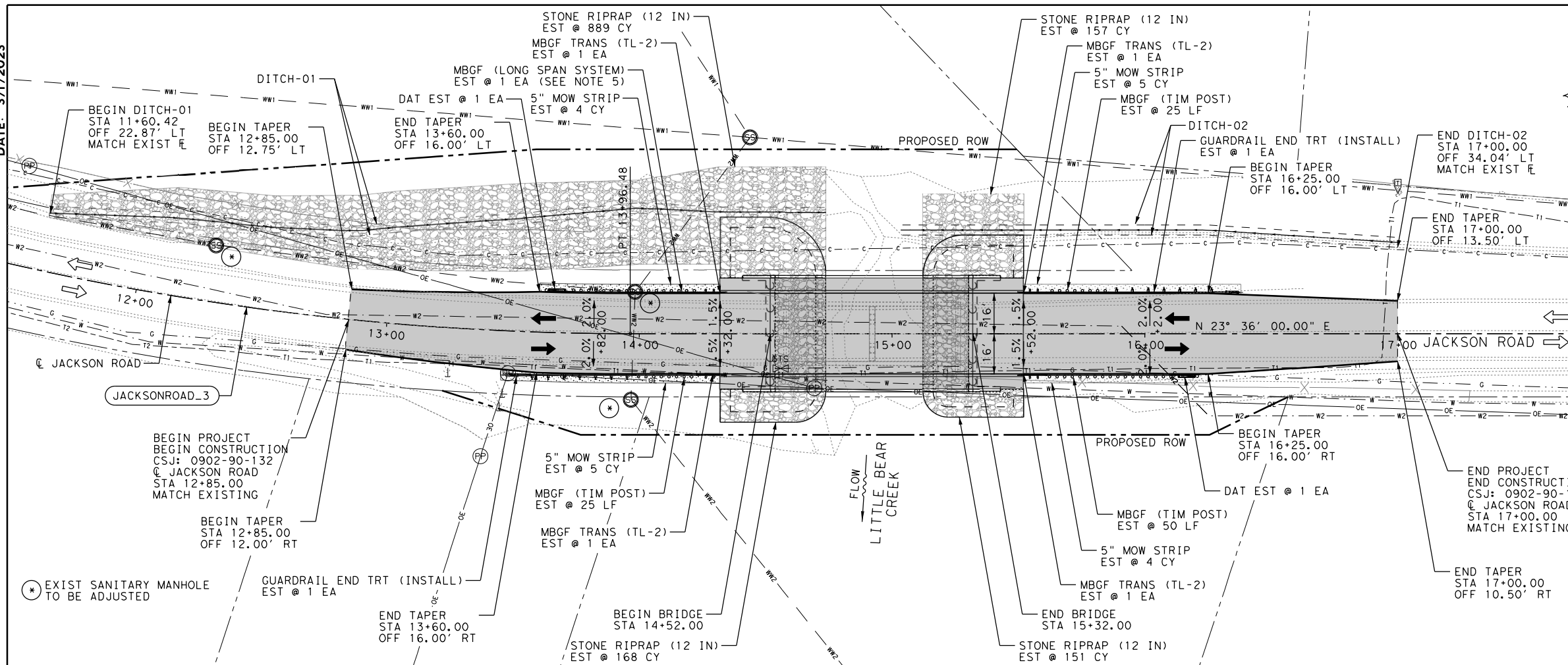
**JACKSON POOL  
ROADWAY  
REMOVAL PLANS**

SCALE: 1"=50' (H) SHEET 1 OF 1

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MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	28
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	90	132	
CHECK	PKC			

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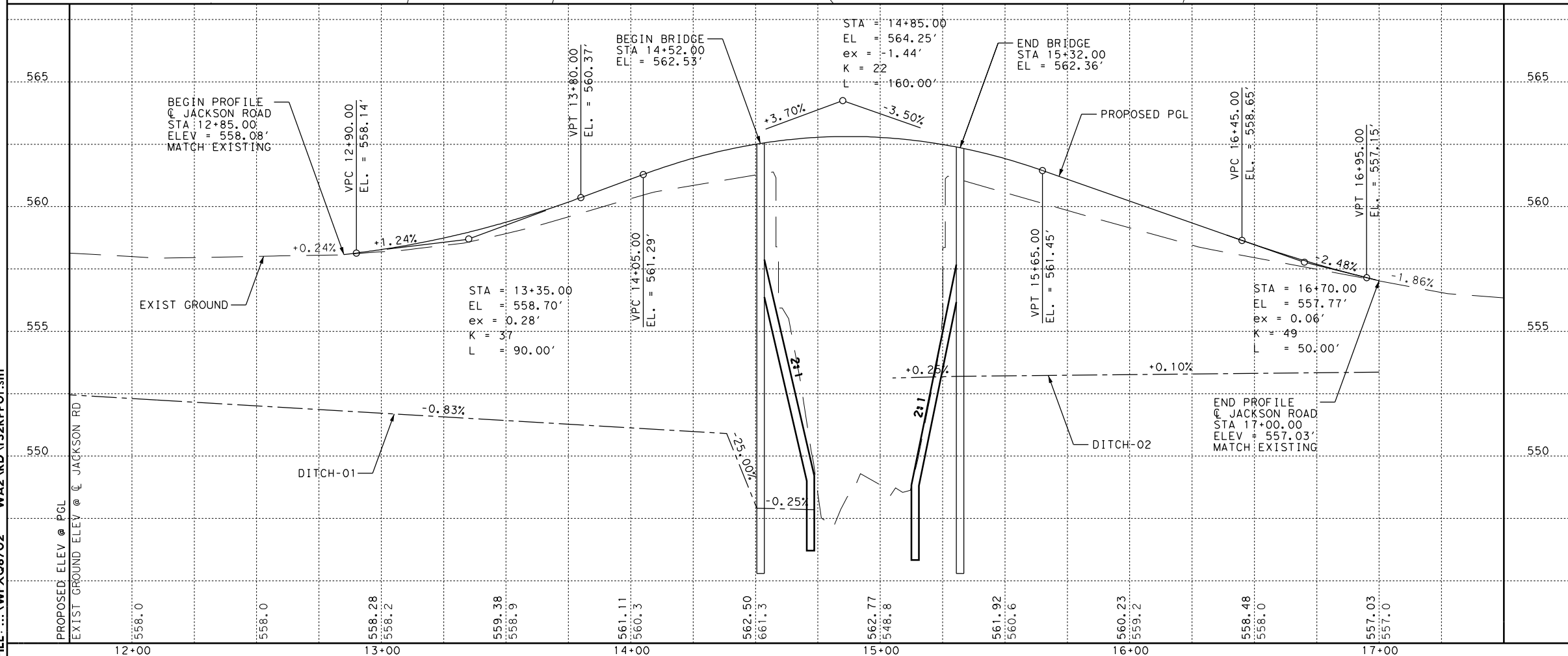
TIME: 8:28:43 AM  
DATE: 3/1/2023



**LEGEND**

- ➔ PROPOSED TRAFFIC LANE
- ➔ EXISTING TRAFFIC LANE
- STONE RIPRAP (12")
- CONC MOWSTRIP (5")
- PROPOSED PAVEMENT/BRIDGE
- (XXX-X) CURVE NUMBER
- ➔ PROPOSED DITCH

- NOTES:**
- SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR ADDITIONAL INFORMATION REGARDING HORIZONTAL ALIGNMENTS.
  - ALL DIMENSIONS TO EDGE OF PAVEMENT OR NOMINAL FACE OF CURB OR RAIL UNLESS NOTED OTHERWISE.
  - ALL STATIONS AND OFFSETS REFER TO  $\phi$  JACKSON ROAD UNLESS NOTED OTHERWISE.
  - REFER TO GRADING LAYOUT FOR RIPRAP LIMITS AND TYPE.
  - MBGF (LONG SPAN SYSTEM) TO SPAN WASTEWATER MANHOLE. FIELD-VERIFY LOCATION OF EXISTING WASTEWATER LINE AND USE CAUTION WHEN INSTALLING MBGF TO AVOID IMPACTING UTILITIES. INSTALL POSTS NO DEEPER THAN 40" PER STANDARDS.



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DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966

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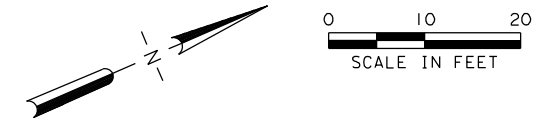
**JACKSON POOL**  
**ROADWAY**  
**PLAN AND PROFILE**

SCALE: 1"=50' (H) 1"=5' (V) SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	REL	STATE	DISTRICT	COUNTY
GRAPHICS	BHK	TEXAS	FTW	TARRANT
CHECK	PKC	CONTROL	SECTION	JOB
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29

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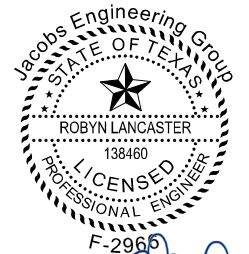


**LEGEND**

- 
- 

**NOTES:**

1. ALL DIMENSIONS TO EDGE OF PAVEMENT OR NOMINAL FACE OF CURB OR RAIL UNLESS NOTED OTHERWISE.
2. ALL STATIONS AND OFFSETS REFER TO  $\phi$  JACKSON ROAD UNLESS NOTED OTHERWISE.



*[Signature]*  
2/7/2023

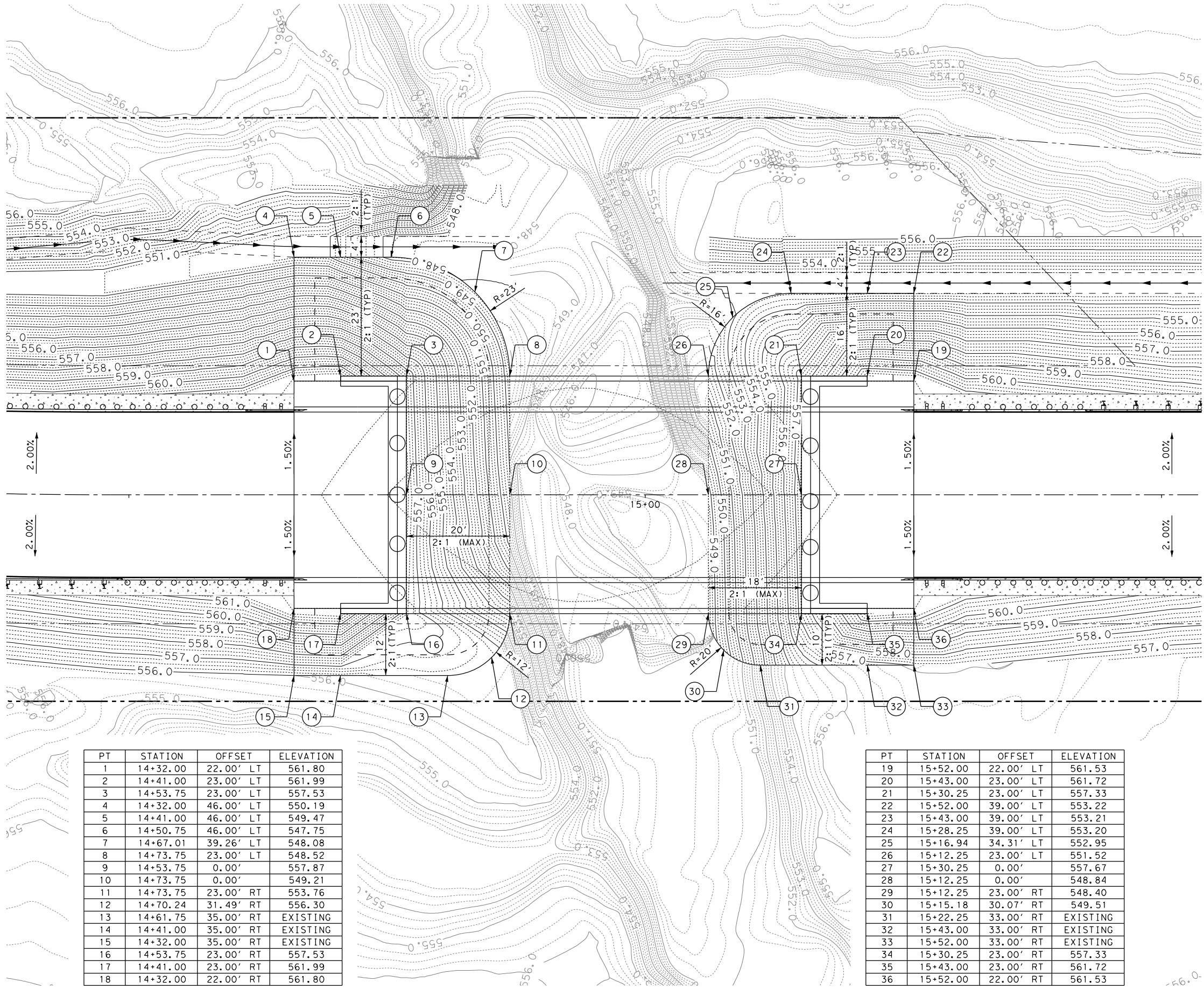
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Firm Registration: F-2966

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**JACKSON POOL**  
**ROADWAY**  
**GRADING LAYOUT**

SCALE: 1"=20' (H) SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
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GRAPHICS	BHK	TEXAS	FTW	TARRANT
CHECK	PKC	CONTROL	SECTION	JOB
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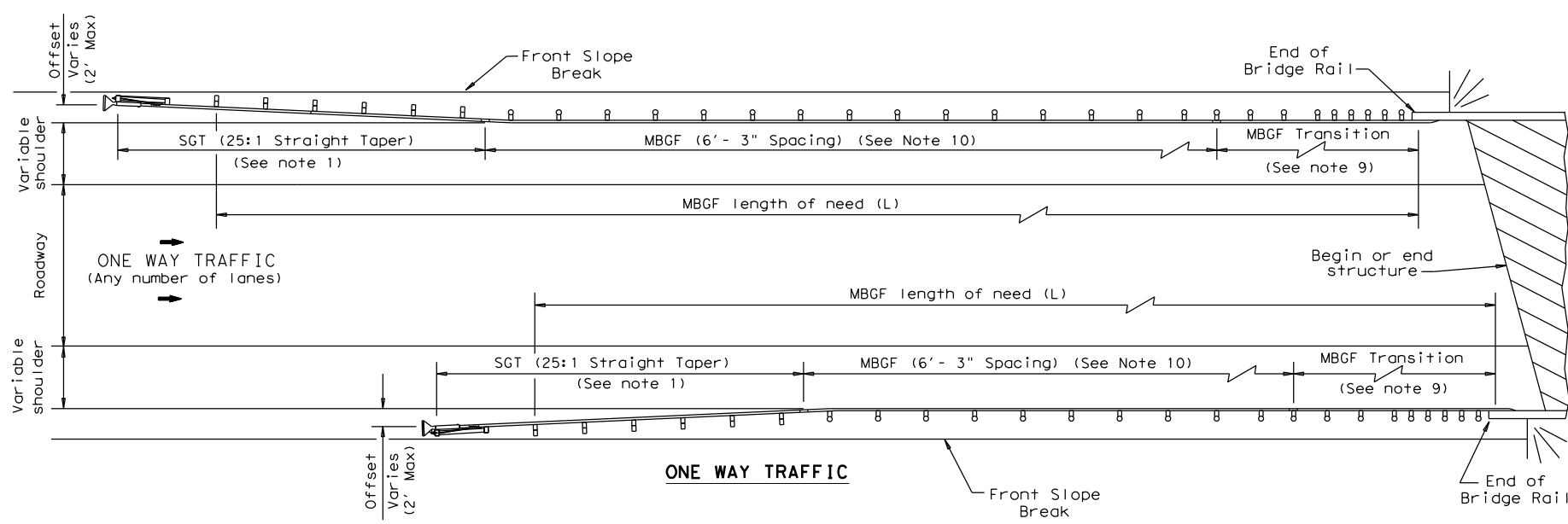
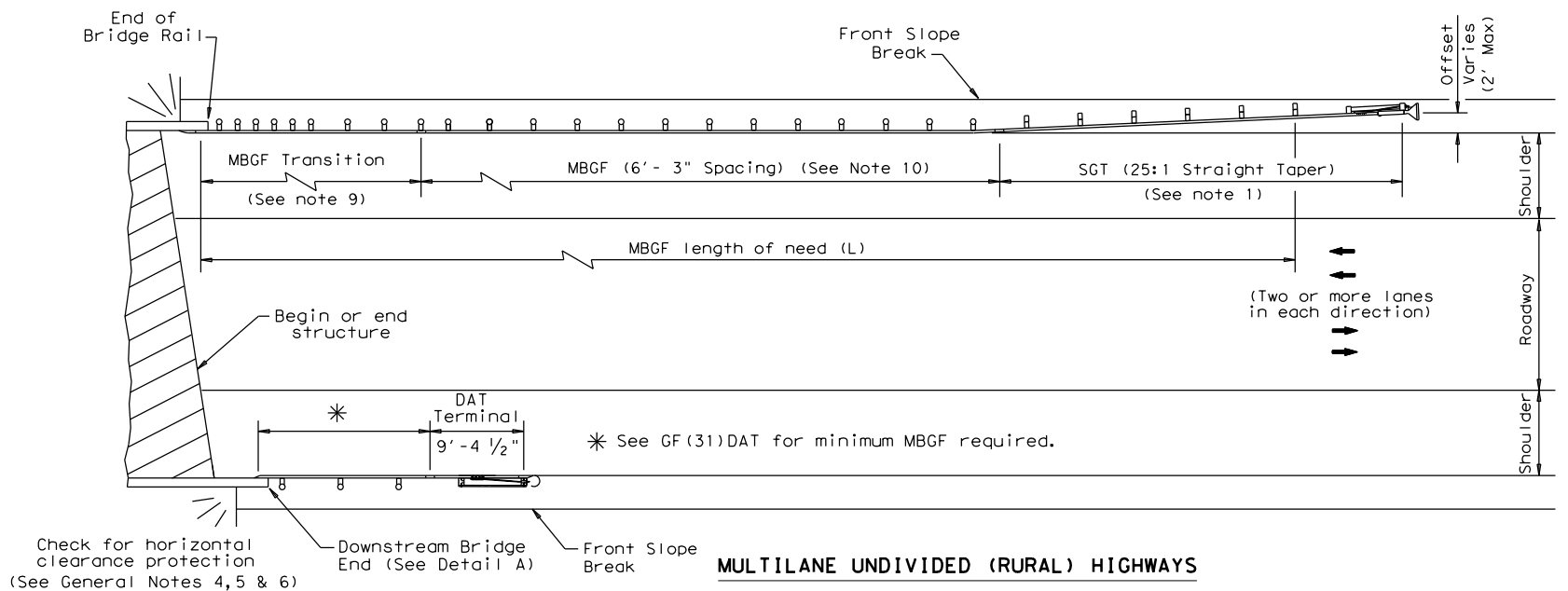
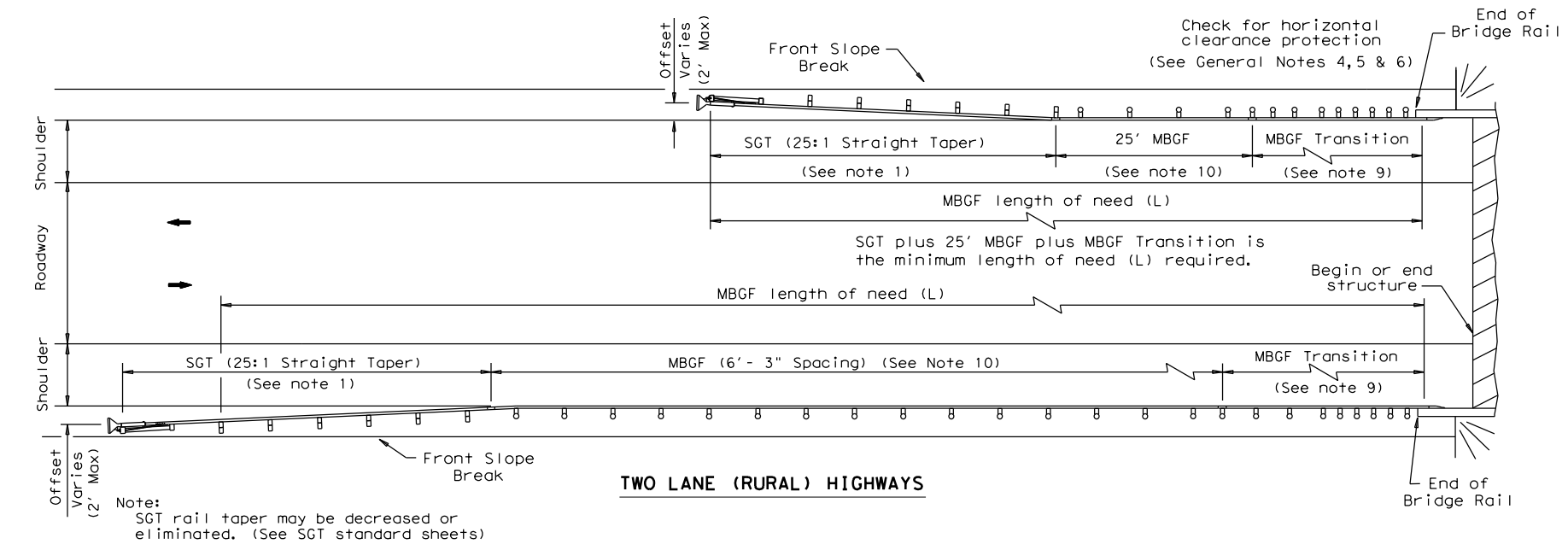


PT	STATION	OFFSET	ELEVATION
1	14+32.00	22.00' LT	561.80
2	14+41.00	23.00' LT	561.99
3	14+53.75	23.00' LT	557.53
4	14+32.00	46.00' LT	550.19
5	14+41.00	46.00' LT	549.47
6	14+50.75	46.00' LT	547.75
7	14+67.01	39.26' LT	548.08
8	14+73.75	23.00' LT	548.52
9	14+53.75	0.00'	557.87
10	14+73.75	0.00'	549.21
11	14+73.75	23.00' RT	553.76
12	14+70.24	31.49' RT	556.30
13	14+61.75	35.00' RT	EXISTING
14	14+41.00	35.00' RT	EXISTING
15	14+32.00	35.00' RT	EXISTING
16	14+53.75	23.00' RT	557.53
17	14+41.00	23.00' RT	561.99
18	14+32.00	22.00' RT	561.80

PT	STATION	OFFSET	ELEVATION
19	15+52.00	22.00' LT	561.53
20	15+43.00	23.00' LT	561.72
21	15+30.25	23.00' LT	557.33
22	15+52.00	39.00' LT	553.22
23	15+43.00	39.00' LT	553.21
24	15+28.25	39.00' LT	553.20
25	15+16.94	34.31' LT	552.95
26	15+12.25	23.00' LT	551.52
27	15+30.25	0.00'	557.67
28	15+12.25	0.00'	548.84
29	15+12.25	23.00' RT	548.40
30	15+15.18	30.07' RT	549.51
31	15+22.25	33.00' RT	EXISTING
32	15+43.00	33.00' RT	EXISTING
33	15+52.00	33.00' RT	EXISTING
34	15+30.25	23.00' RT	557.33
35	15+43.00	23.00' RT	561.72
36	15+52.00	22.00' RT	561.53

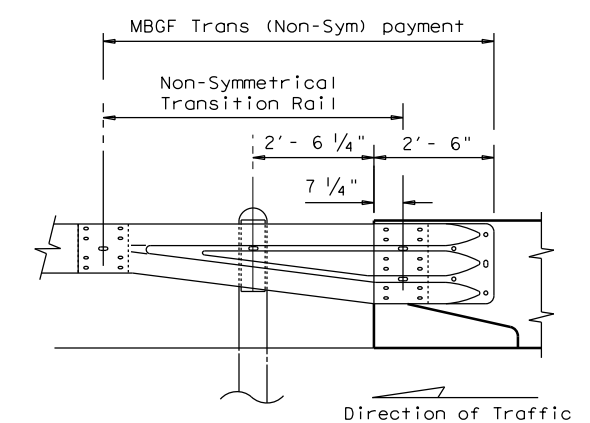
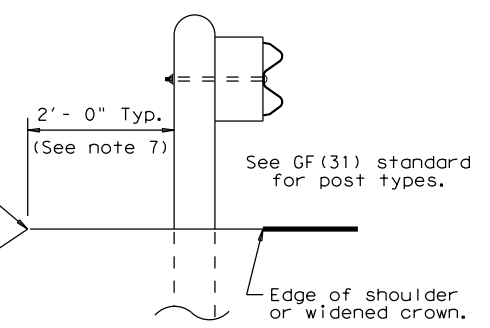
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DATE: 1/25/2023 5:27:37 PM  
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**GENERAL NOTES**

- For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
- Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
- Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
- MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
- Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
- Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
- The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'-0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
- For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
- Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
- A minimum 25' length of MBGF will be required.



Note: All rail elements shall be lapped in the direction of adjacent traffic.

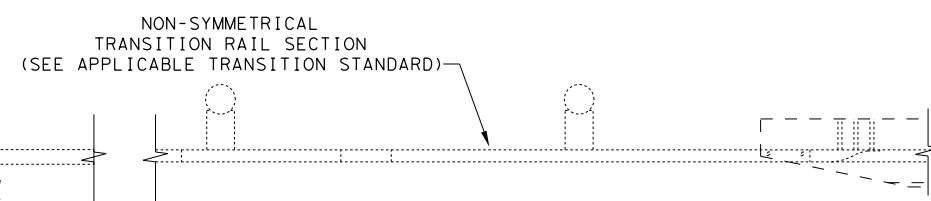
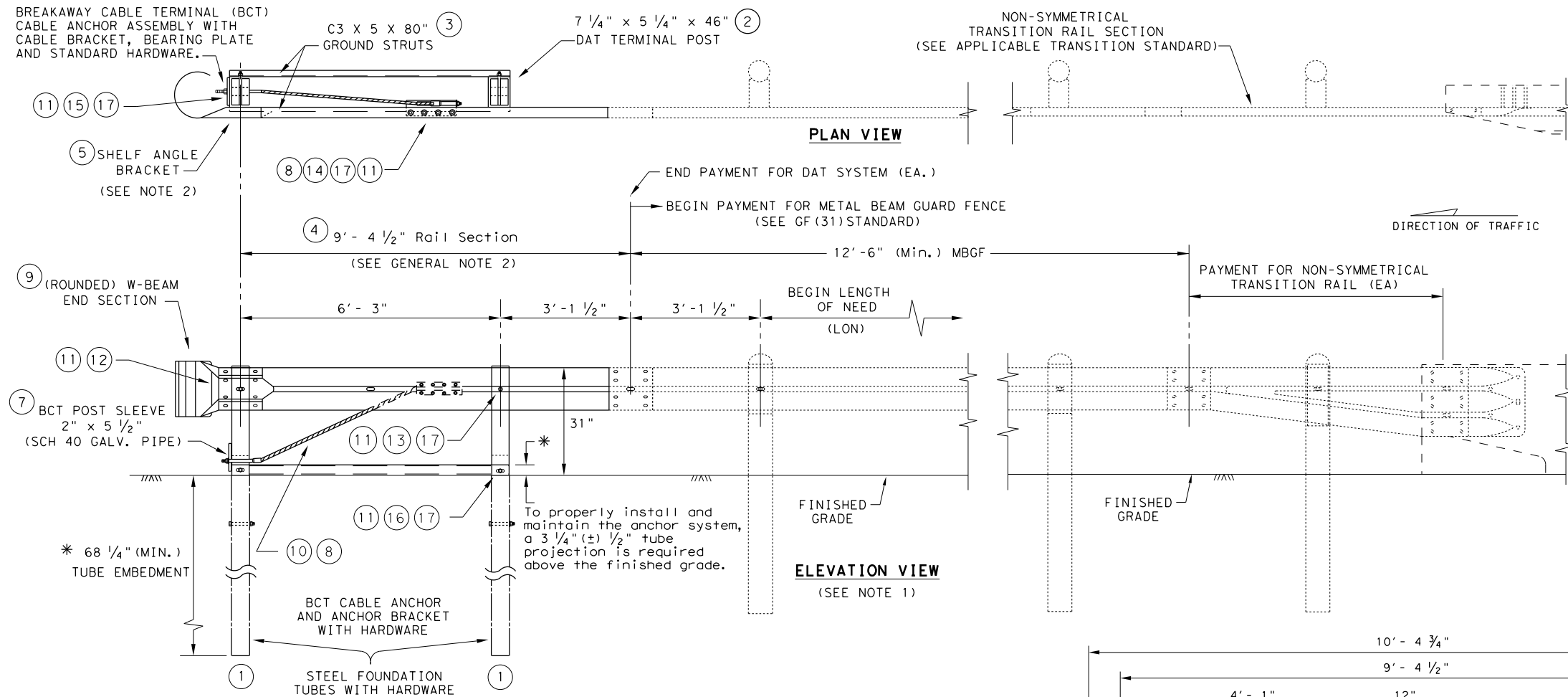
		<b>Design Division Standard</b>	
<b>BRIDGE END DETAILS</b> <b>(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)</b>			
<b>BED-14</b>			
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP
© TxDOT: December 2011	CONT	SECT	JOB
REVISIONS	0902	90	132
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY	SHEET NO.
	FTW	TARRANT	31





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DATE: 1/25/2023  
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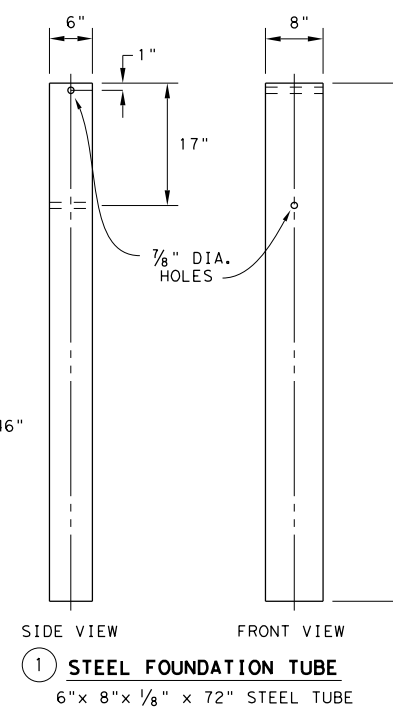
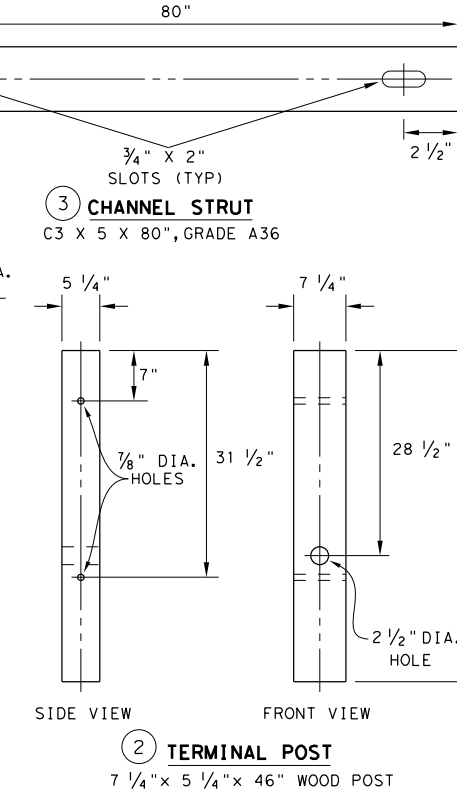
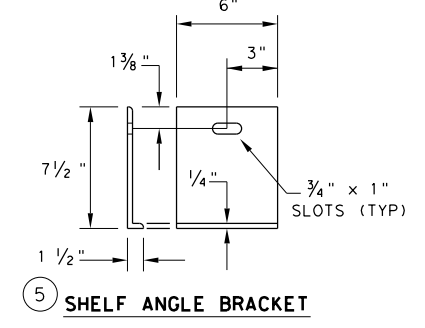
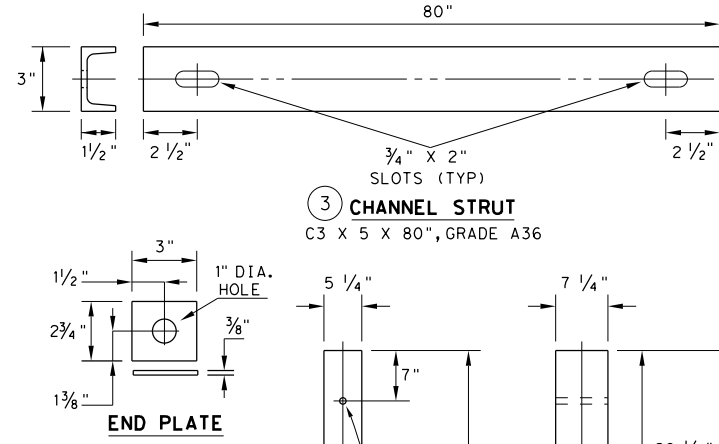
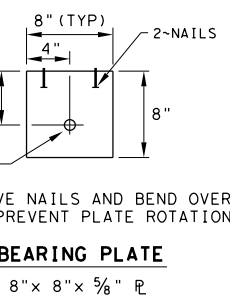
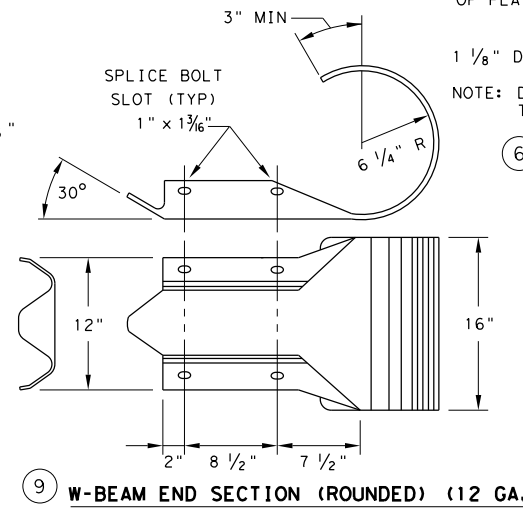
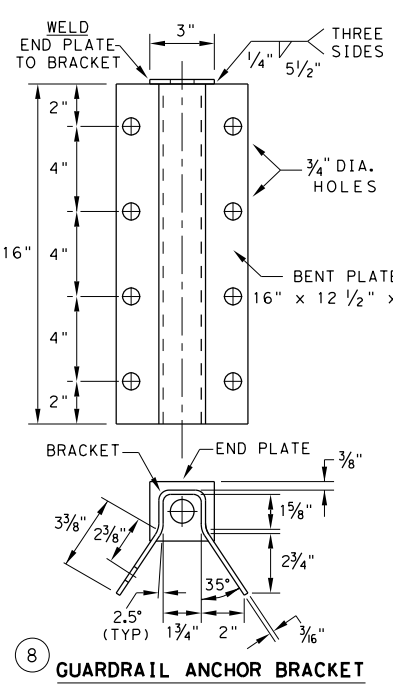
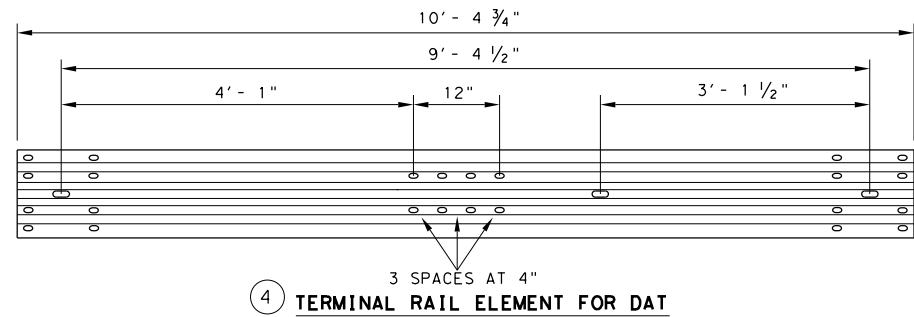
**GENERAL NOTES**

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.

**DOWNSTREAM ANCHOR TERMINAL (DAT)**

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



#	(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

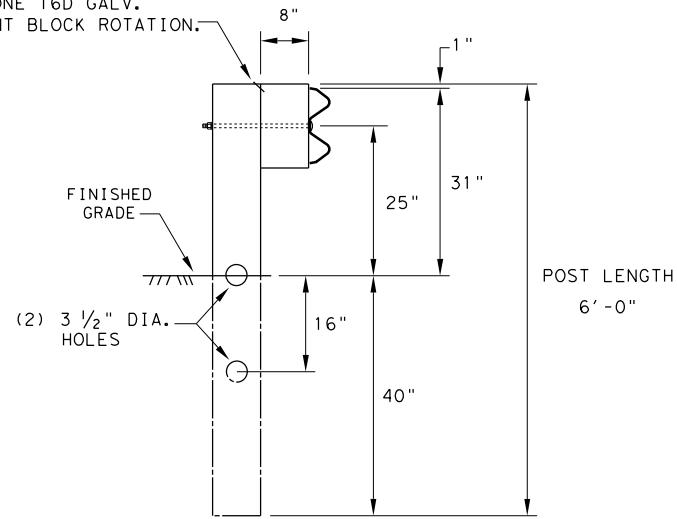
**METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL) TL-3 MASH COMPLIANT GF(31)DAT-19**

FILE: gf31dot19.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CGL/AG
© TXDOT: NOVEMBER 2019 REVISIONS	CONT: 0902	SECT: 90	JOB: 132	HIGHWAY: CS
	DIST: FTW	COUNTY: TARRANT	SHEET NO. 33	

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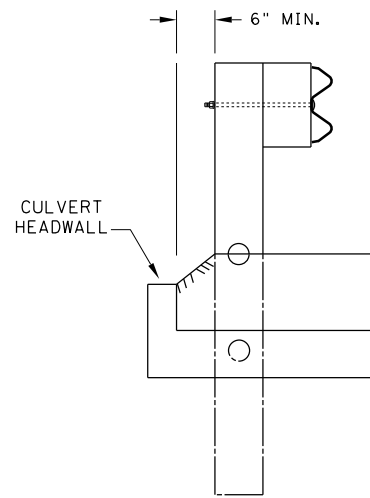
DATE: 1/25/2023  
 FILE: ...\\Jackson\_Rd\132gf311s19.dgn

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



**RECTANGULAR CRT POST  
(6" X 8" X 6' LONG)**

(6) CRT REQUIRED  
SEE ELEVATION DETAIL FOR LOCATIONS



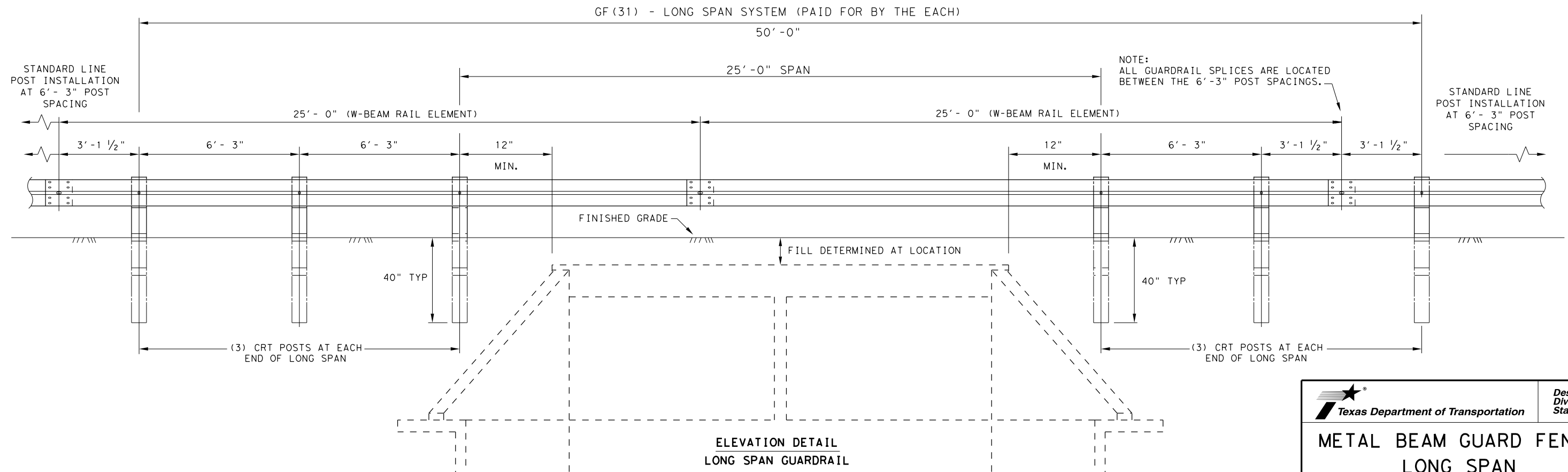
**LATERAL OFFSET BETWEEN THE  
GUARDRAIL AND THE CULVERT HEADWALL**

**GENERAL NOTES**

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'-6" OR 25'-0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'-1 1/2" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. 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 (FWC160) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC

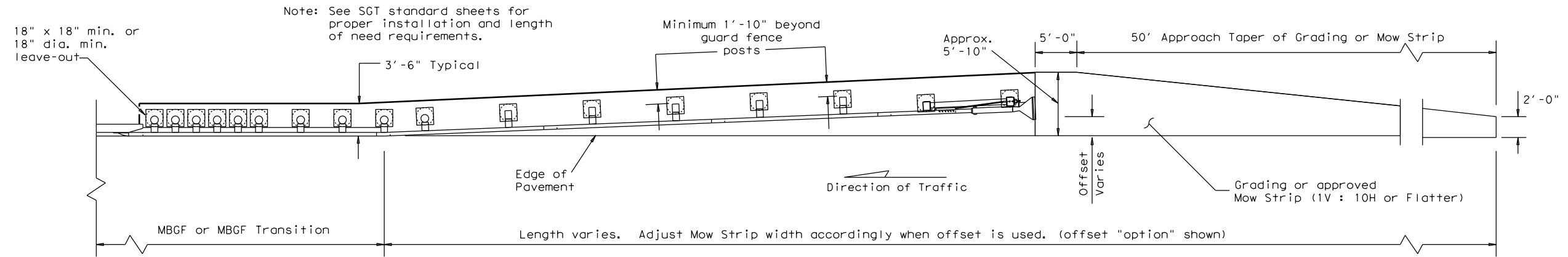


**ELEVATION DETAIL  
LONG SPAN GUARDRAIL**

				Design Division Standard
<b>METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT</b>				
<b>GF(31)LS-19</b>				
FILE: gf311s19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	<b>34</b>	

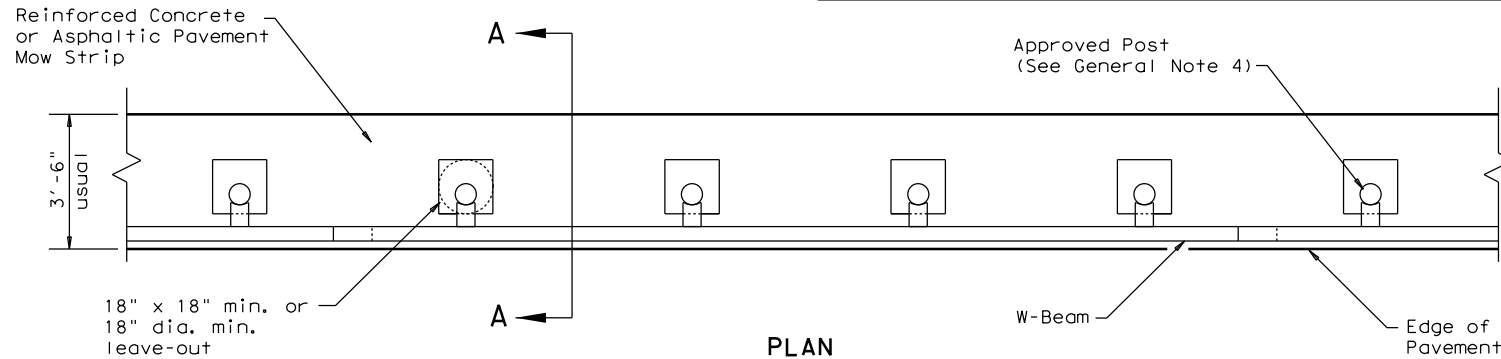
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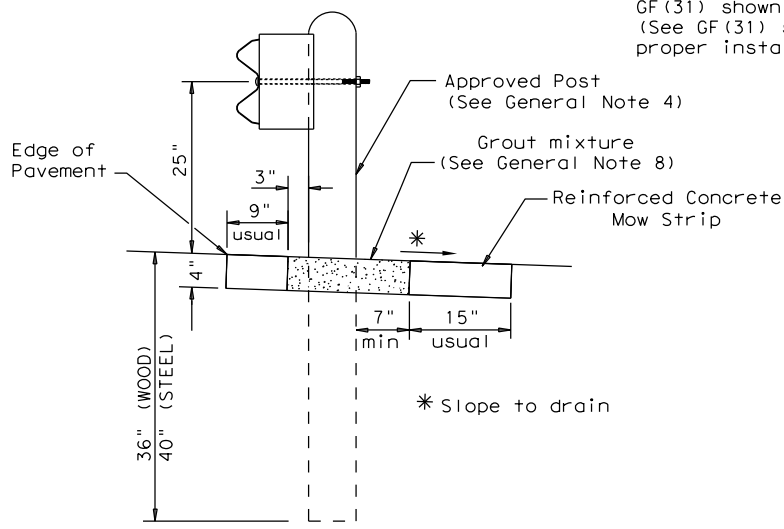
**GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS**

Note: Site Condition(s)  
Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.  
Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.



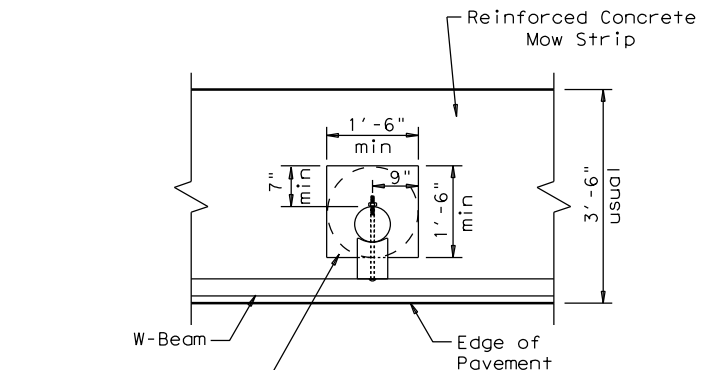
**PLAN**

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



**SECTION A-A**

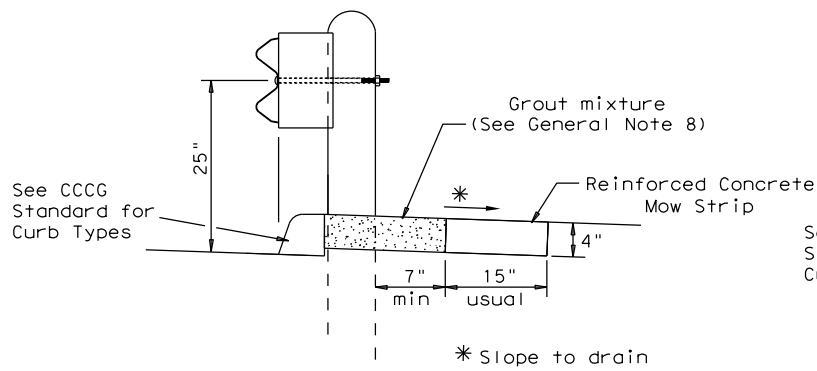
Typical



**MOW STRIP DETAIL**

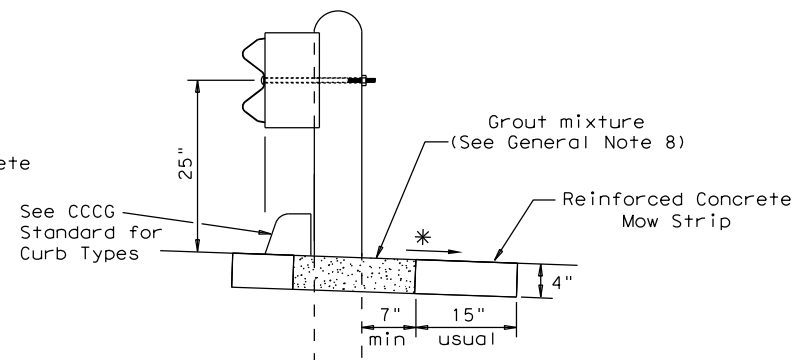
Reinforced Concrete Mow Strip with 18\"/>

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



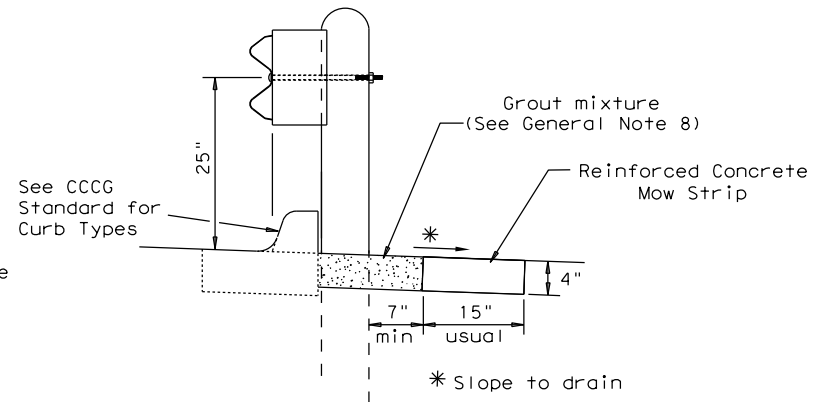
**CURB OPTION (1)**

This option will increase the post embedment throughout the system.



**CURB OPTION (2)**

Curb shown on top of mow strip

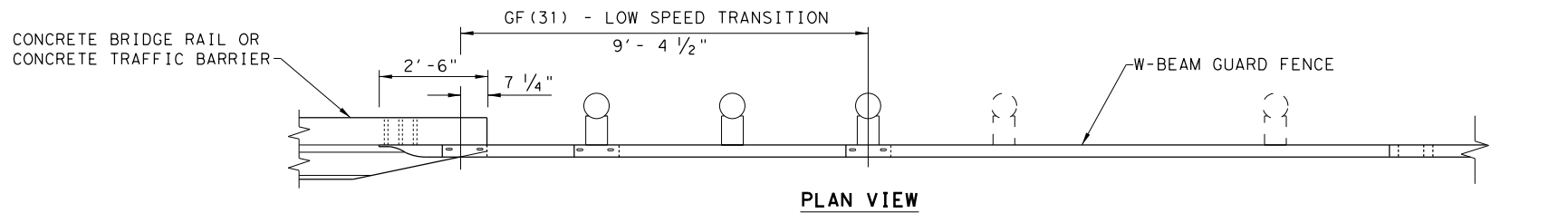


**CURB OPTION (3)**

				<b>Design Division Standard</b>
<b>METAL BEAM GUARD FENCE (MOW STRIP)</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)MS-19</b>				
FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	<b>35</b>	

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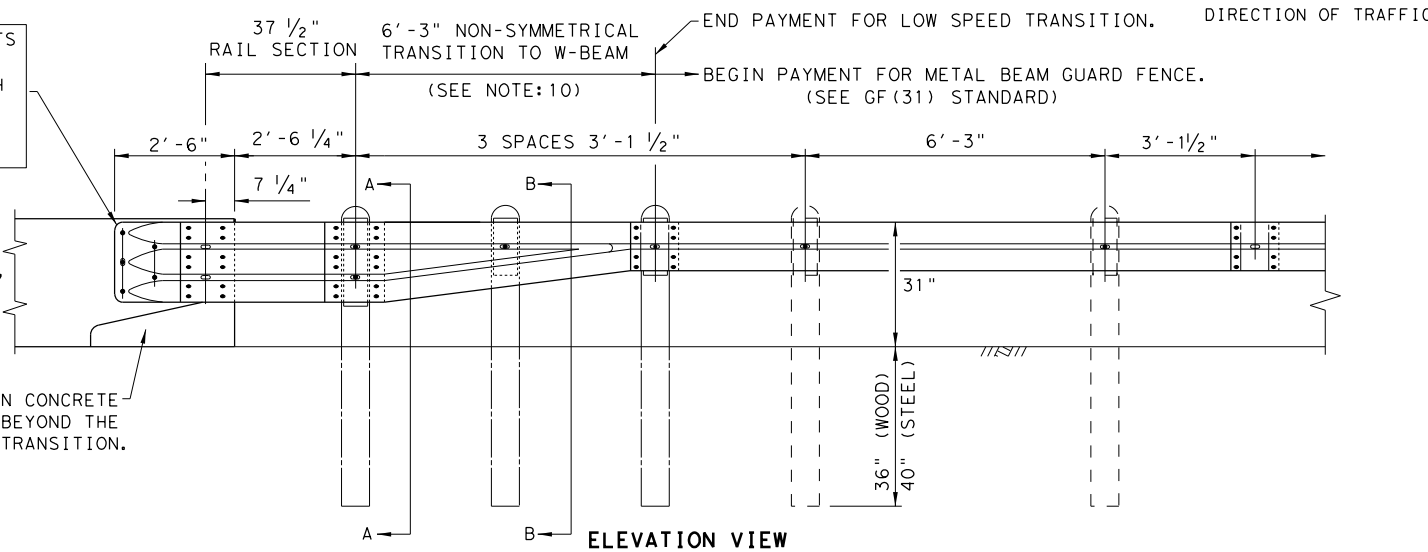


- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)

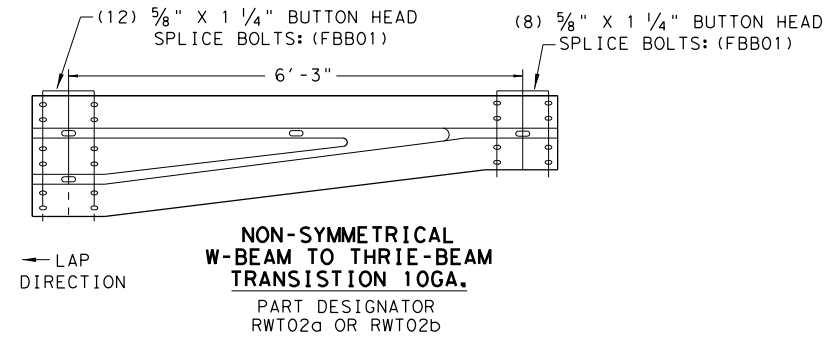
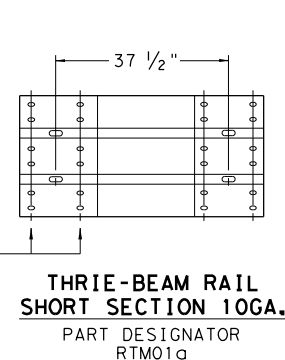
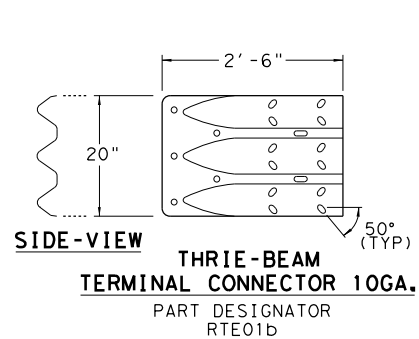
THRIE-BEAM CONNECTOR TO CONCRETE RAIL

NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.



- ### GENERAL NOTES
- THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31) STANDARD SHEET.
  - RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
  - FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
  - 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 (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
  - POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
  - CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
  - WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
  - 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 CAN FURNISH COMPOSITE MATERIAL BLOCKS.
  - REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
  - FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

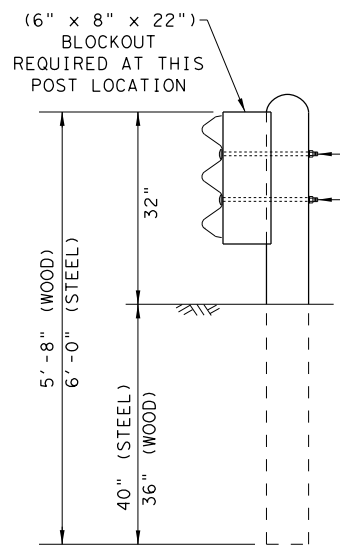


- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

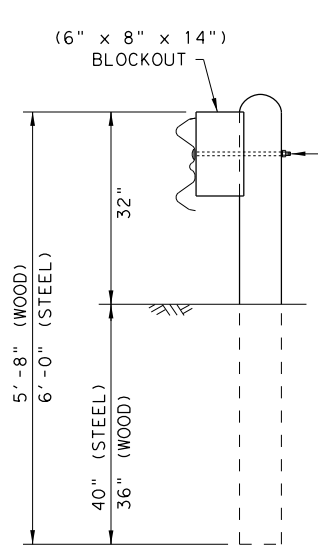
- (1) 5/8" BUTTON HEAD POST BOLT & NUT: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.  
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

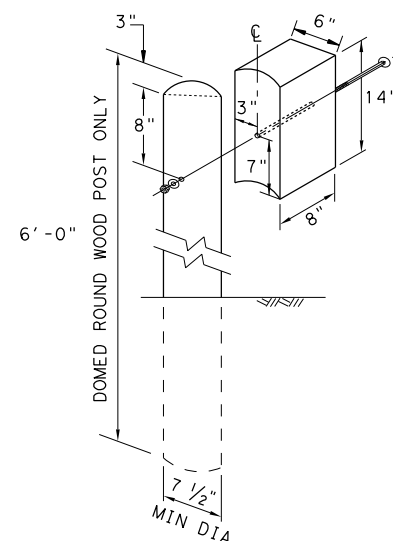


SECTION A-A

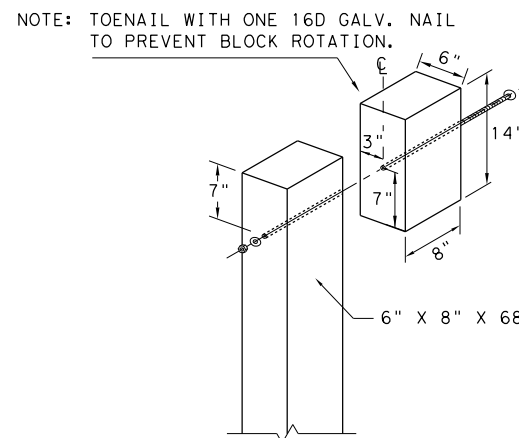


SECTION B-B

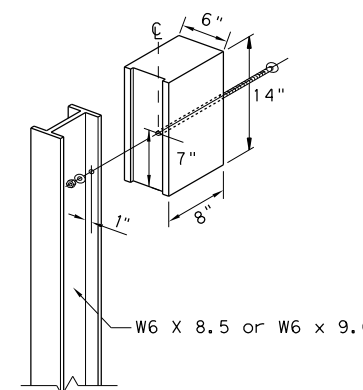
NOTE: \* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

**LOW-SPEED TRANSITION**

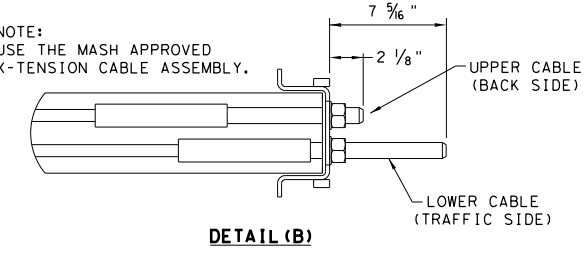
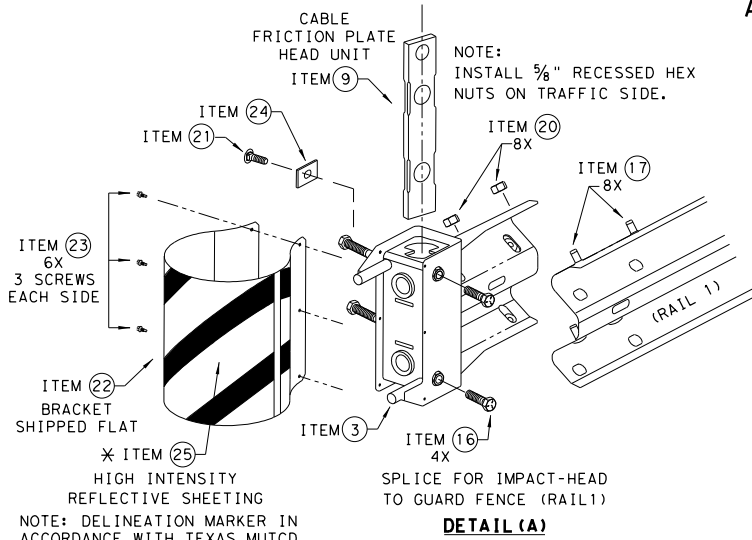
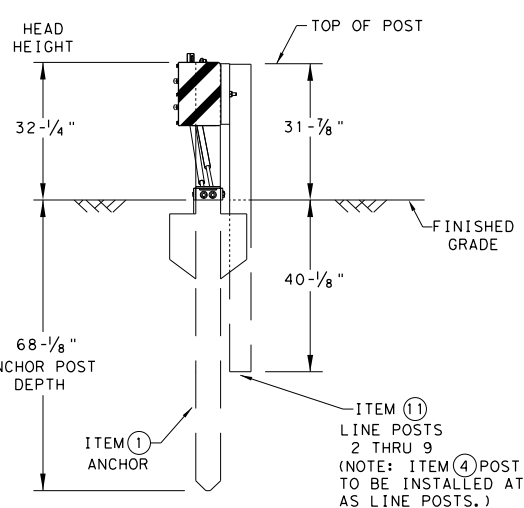
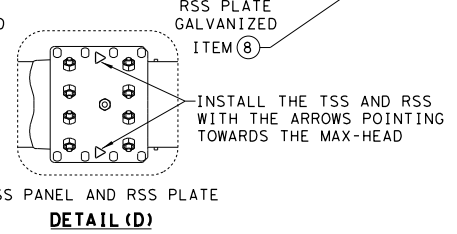
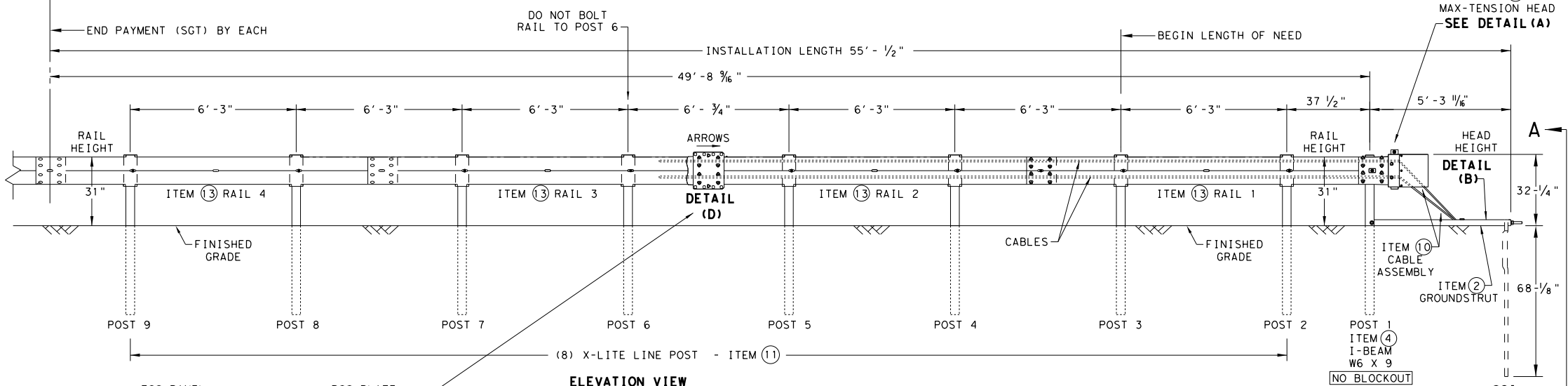
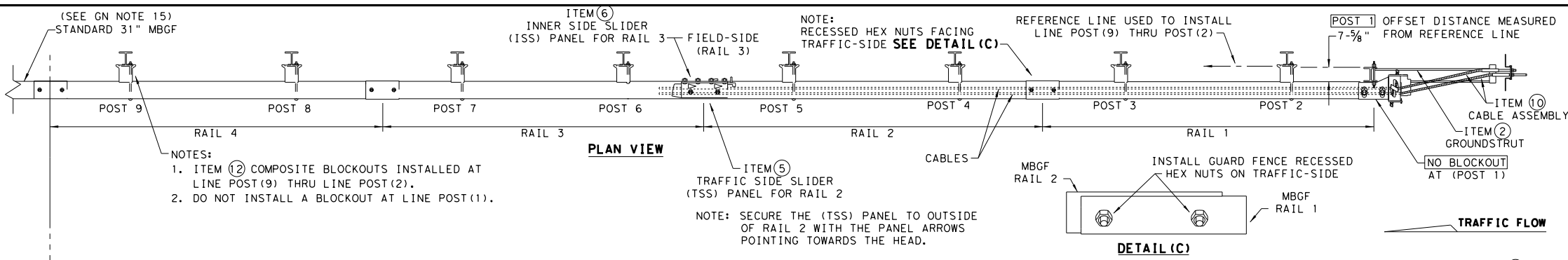
**METAL BEAM GUARD FENCE  
THRIE-BEAM TRANSITION  
TL-2 MASH COMPLIANT  
GF(31) TR TL2-19**

Texas Department of Transportation		Design Division Standard	
FILE: gf31tr+1219.dgn	DN: TxDOT	CK: KM	DW: VP
© TxDOT: NOVEMBER 2019	CONT: 0902	SECT: 90	JOB: 132
REVISIONS	DIST: FTW	COUNTY: TARRANT	SHEET NO.: 36



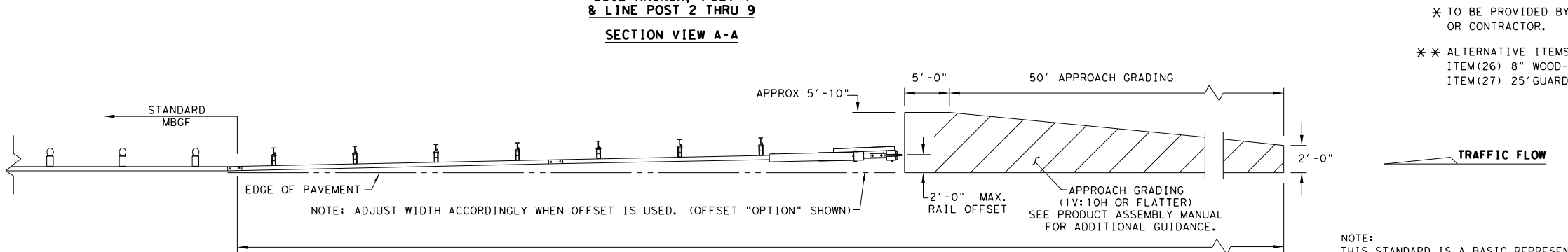
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DATE: 1/25/2023  
 FILE: ...Jackson\_Rd\132sgt11s31118.dgn



- 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



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

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

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

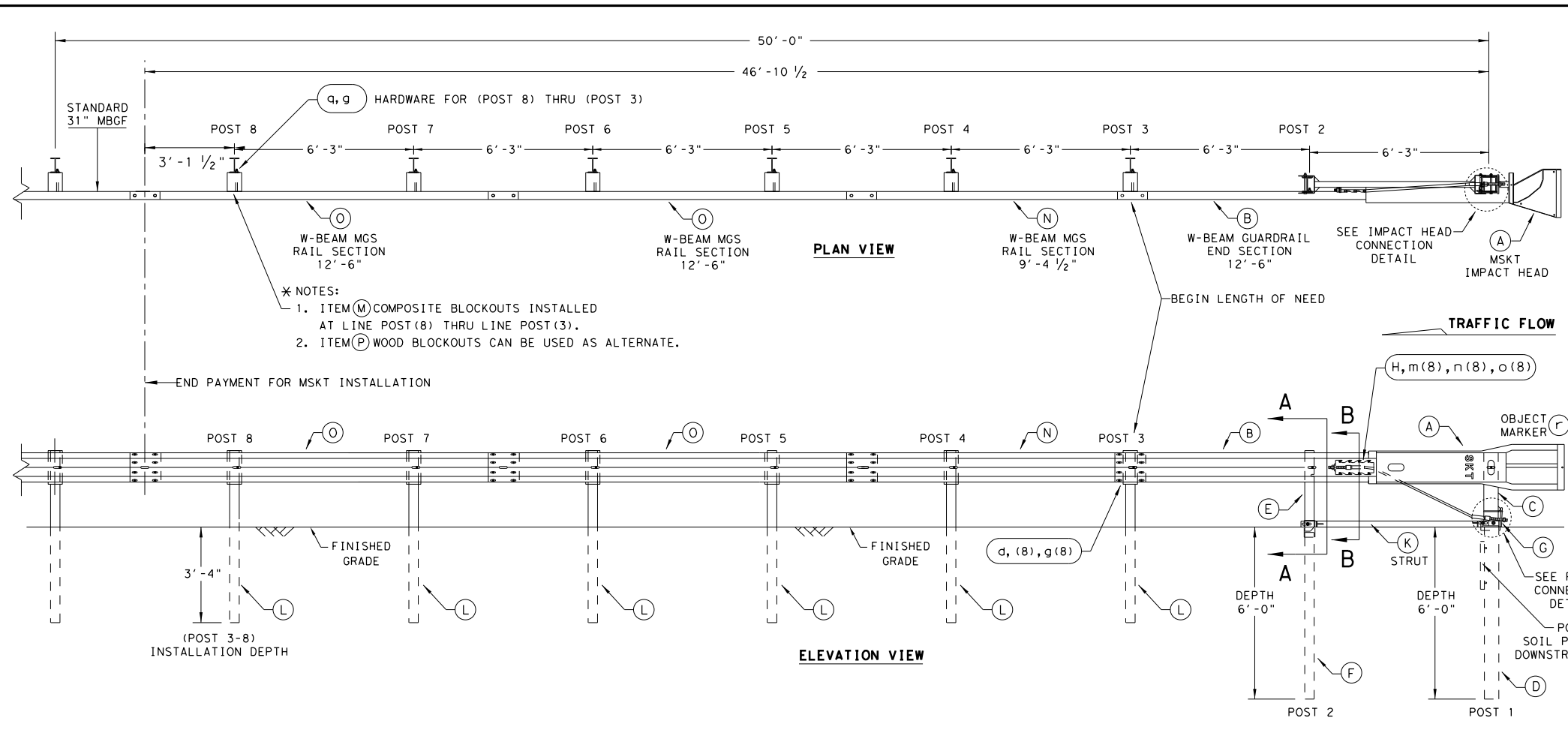
**Texas Department of Transportation**  
**Design Division Standard**

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

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© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	38	

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.

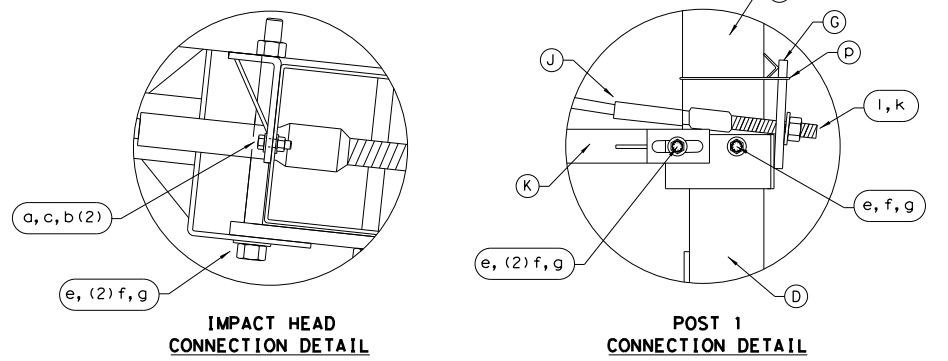
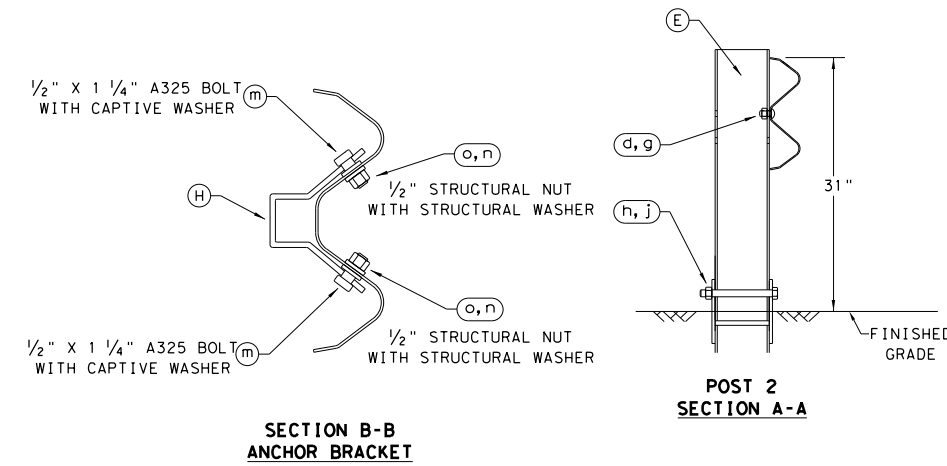
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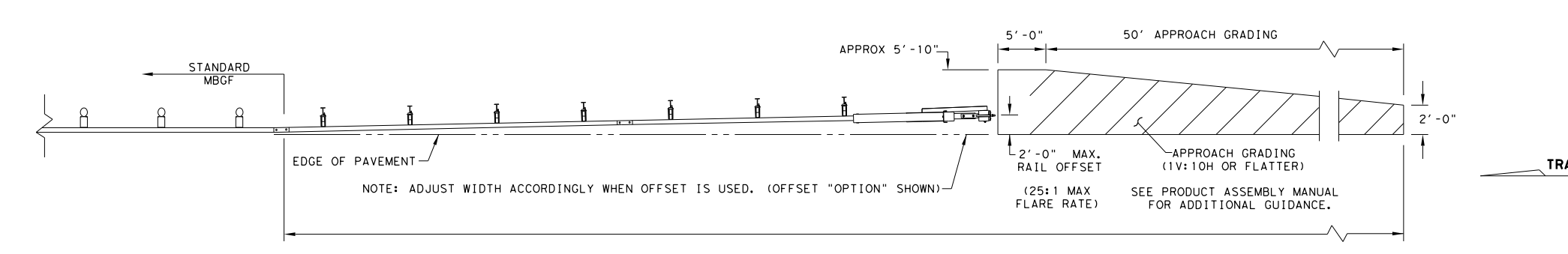
- NOTES:
- ITEM (M) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (8) THRU LINE POST (3).
  - ITEM (P) WOOD BLOCKOUTS CAN BE USED AS ALTERNATE.

- 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 MBSG STANDARD FOR INSTALLATION GUIDANCE.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBSG.
  - 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" MBSG PANELS, ONE 25'-0" MBSG 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 Go.	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

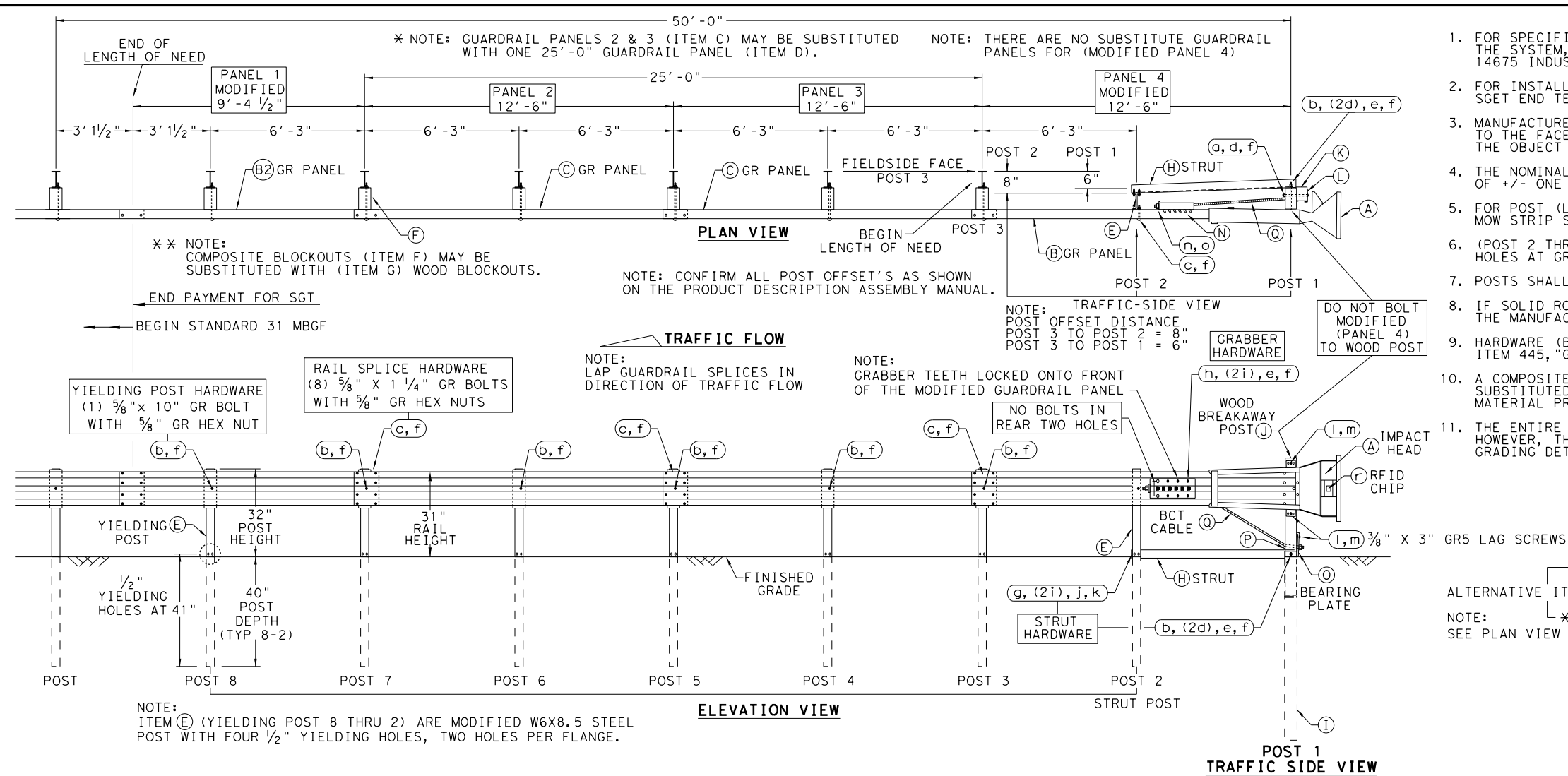
### SGT (12S) 31-18

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© TxDOT: APRIL 2018	CONT SECT	JOB	HIGHWAY	
REVISIONS	0902	90	132	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		<b>39</b>



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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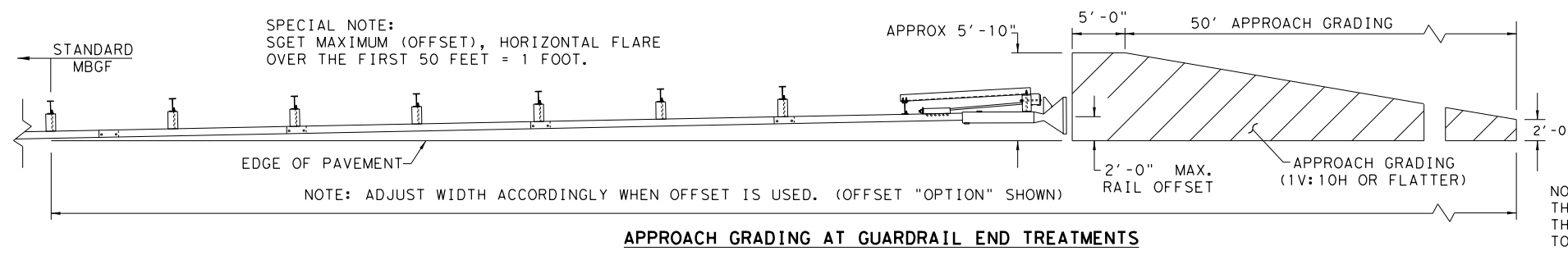
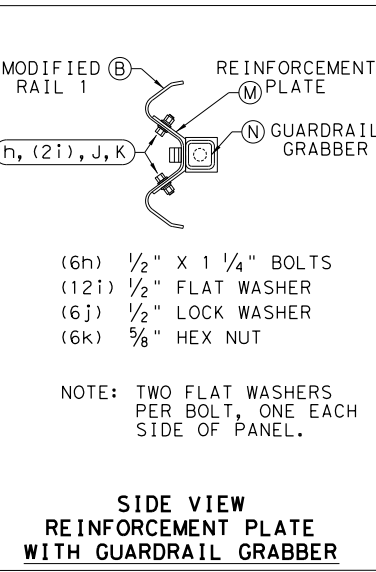
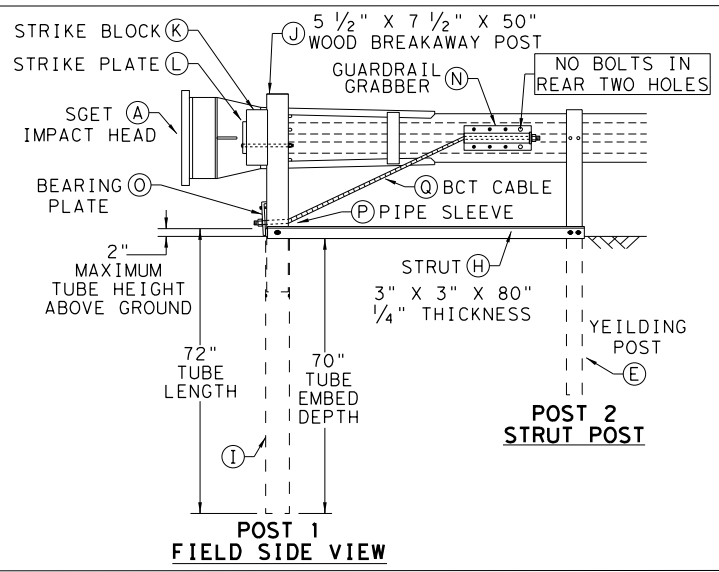
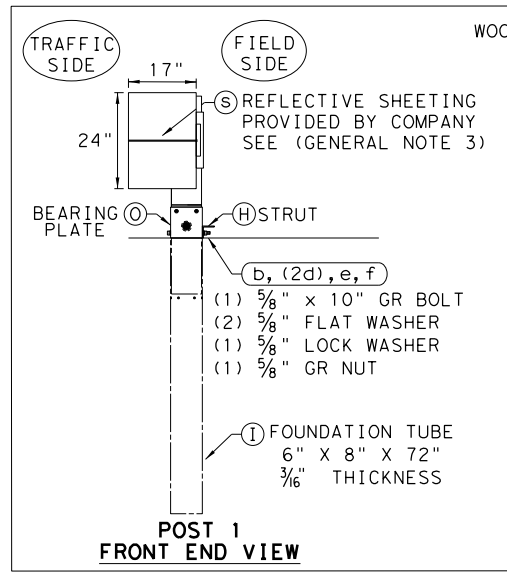
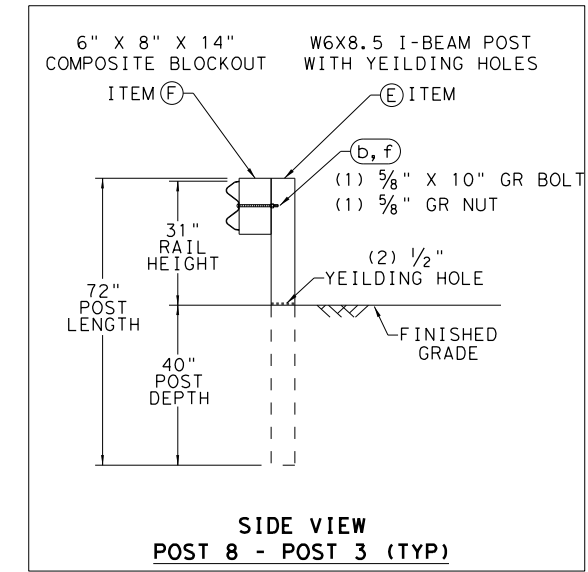


- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION 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"	CBO8
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	WSBK14
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"	GGR17
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 A563HDG	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: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

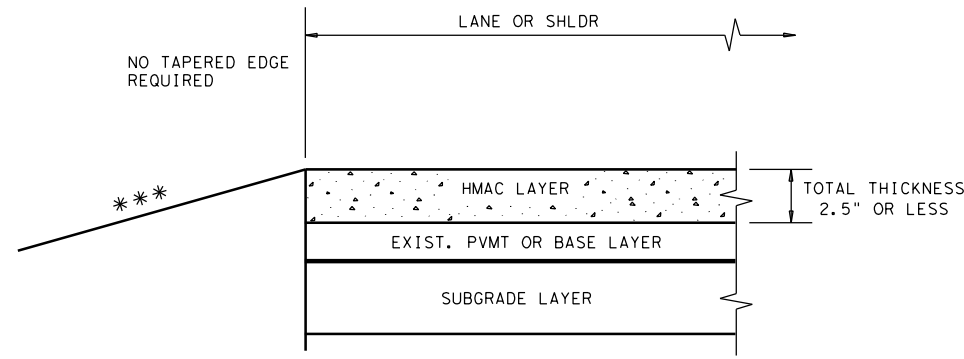
**Texas Department of Transportation**  
 Design Division Standard

**SPIG INDUSTRY, LLC**  
**SINGLE GUARDRAIL TERMINAL**  
**SGET - TL-3 - MASH**  
**SGT (15) 31-20**

FILE: sg+153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT: 0902	SECT: 90	JOB: 132	HIGHWAY: CS
REVISIONS	DIST: FTW	COUNTY: TARRANT	SHEET NO. 40	

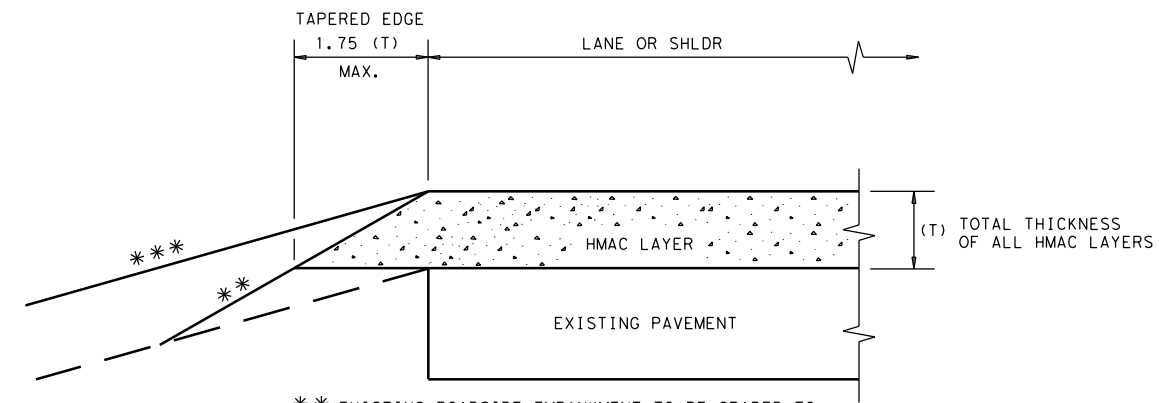
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\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

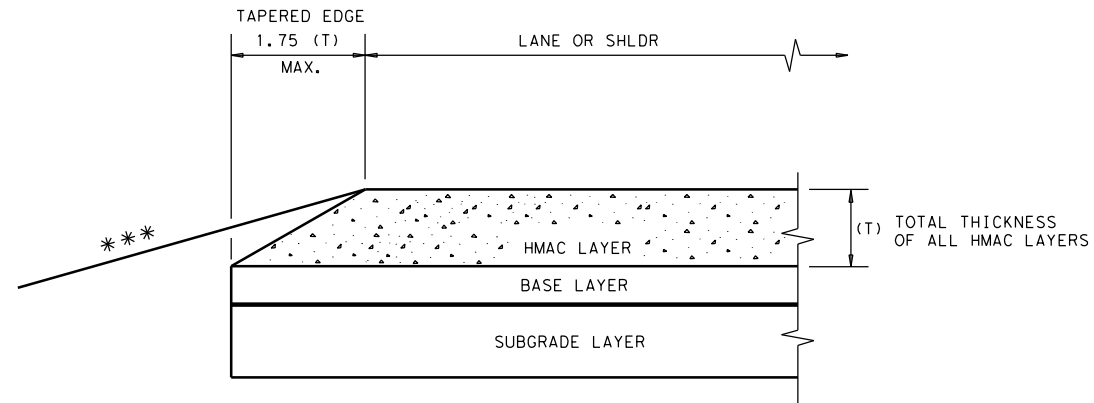
**CONDITION - 1**  
 THIN HMAC SURFACES OR HMAC OVERLAY  
 WITH THICKNESS OF 2.5" OR LESS



\*\* EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

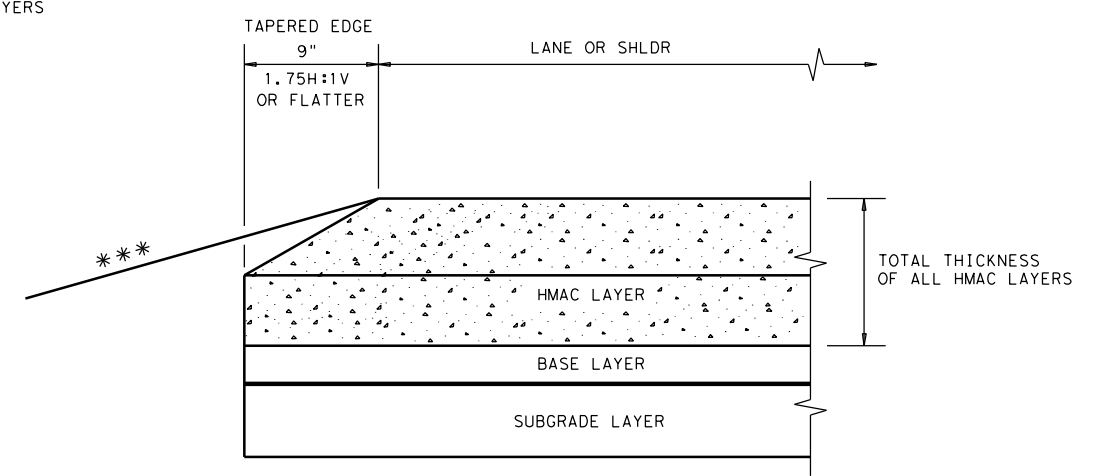
\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 2**  
 OVERLAY OF EXISTING PAVEMENT  
 HMAC THICKNESS 2.5" TO 5"



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 3**  
 NEW OR RECONSTRUCTED PAVEMENT  
 HMAC THICKNESS 2.5" TO 5"



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

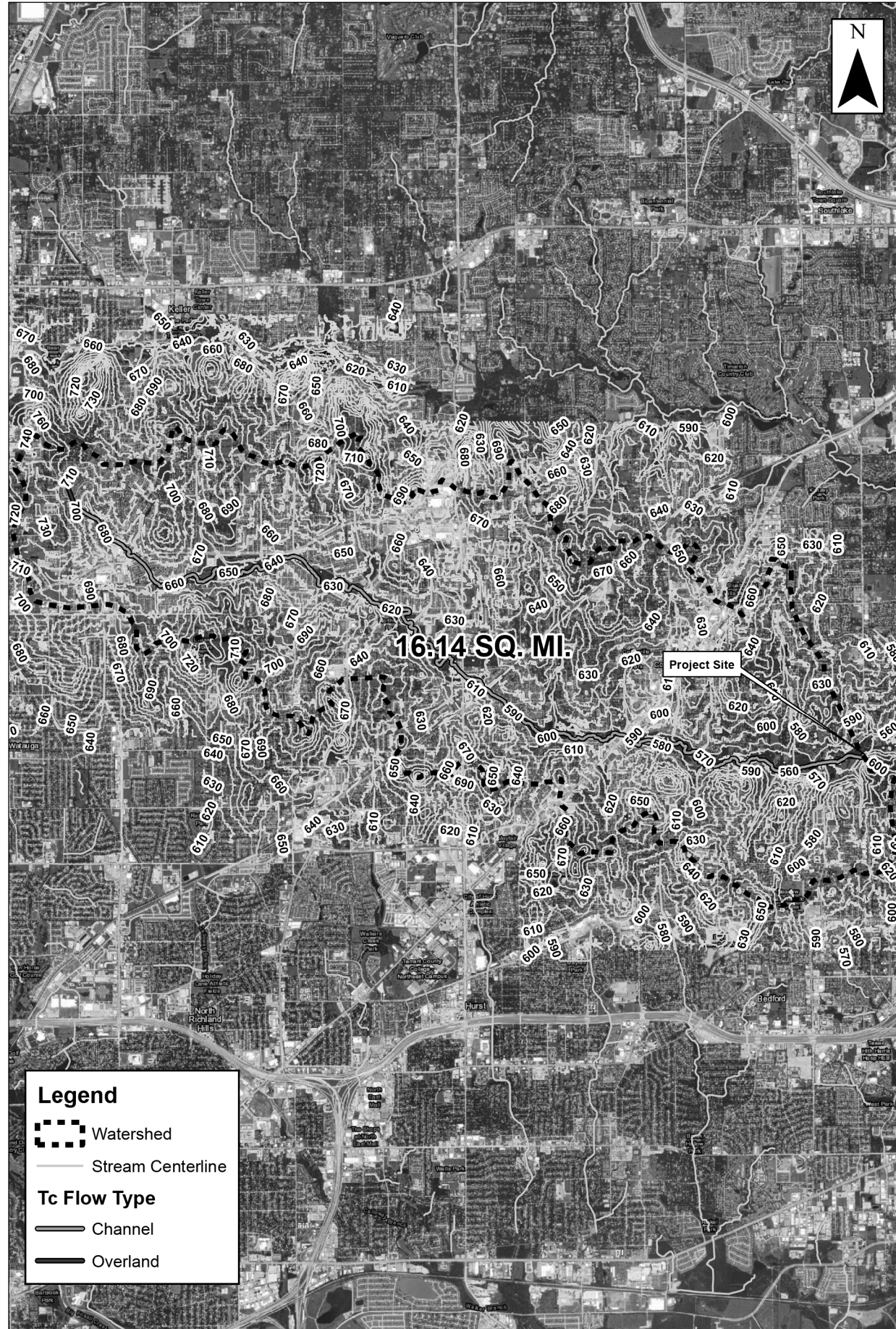
**CONDITION - 4**  
 NEW OR RECONSTRUCTED PAVEMENT  
 HMAC THICKNESS 5" OR GREATER

**GENERAL NOTES**

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

(NOT TO SCALE)

					<b>Design Division Standard</b>
<b>TAPERED EDGE DETAILS          HMAC PAVEMENT</b>					
<b>TE (HMAC) - 11</b>					
FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:	
© TxDOT January 2011	CON: 0902	SECT: 90	JOB: 132	HIGHWAY: CS	
REVISIONS					
	DIST: FTW	COUNTY: TARRANT	SHEET NO.:		
					<b>41</b>



**Legend**

- Watershed
- Stream Centerline

**Tc Flow Type**

- Channel
- Overland

**DRAINAGE AREA MAP**

**HYDROLOGIC COMPUTATIONS**

WATERSHED NAME	SOURCE	AREA (SQ MI)	TC (MIN)	LAG TIME (MIN)	CN	Q2	Q5	Q10	Q25	Q50	Q100	Q500
LITTLE BEAR CREEK (DA-01)	SCS 24-HR FLOWS	16.14	342	205	83	3643	5385	6757	8639	10100	11639	15589
	CURRENT FEMA EFFECTIVE FLOWS*	18.02	-	-	-	2736	4480	6400	8731	10400	12400	16700

\*2-, 5-, 25-YEAR INTERPOLATED

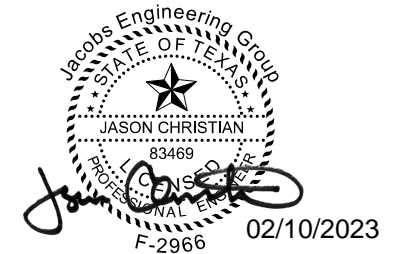
STORM FREQUENCY (YR)	2	5	10	25	50	100	500	
Pd (IN)	24 HOUR DURATION	3.52	4.78	5.75	7.07	8.10	9.18	11.92

**NOTES:**

- FEMA EFFECTIVE FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY, TEXAS USED IN THIS STUDY FOR THE 10-YR, 50-YR, 100-YR, & 500-YR FREQUENCY STORMS.
- 2-YR, 5-YR, & 25-YR FREQUENCY STORM EVENT FLOWS WERE INTERPOLATED FROM THE FIS FLOW DATA USING THE TRENDLINE METHOD. SEE THE HYDRAULIC REPORT FOR ADDITIONAL DETAIL.

**REFERENCES:**

- TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
- TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)



**Jacobs**  
1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966

**Texas Department of Transportation**  
© 2023

**JACKSON POOL**  
**BRIDGE HYDRAULIC DATA SHEET**

SCALE: N.T.S. SHEET 1 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
RS	TEXAS	FTW	TARRANT	42
CHECK	CONTROL	SECTION	JOB	
JC	0902	90	132	

TIME: 5:29:55 PM  
DATE: 1/25/2023

**NOTES:**

- 1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
- 2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.
- 3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0210K, 48439C0230L, AND 48439C0115K. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.
- 4) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
- 5) THE DOWNSTREAM BOUNDARY CONDITIONS ARE ESTABLISHED USING KNOWN WSEL'S FROM THE EXISTING MODEL PROVIDED BY FEMA.
- 6) FEMA EFFECTIVE FLOWS WERE UTILIZED FOR THE DESIGN ANALYSIS. PROPOSED BRIDGE WAS DESIGNED TO MATCH EXISTING FLOW CONDITIONS OR BETTER.

**NOTES CONTINUED:**

- 7) FEMA EFFECTIVE 100-YR FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY WERE USED IN THIS STUDY TO VERIFY THAT THE FEMA CRITERIA WAS MET.
- 8) REFER TO THE H&H REPORT "HYDRAULIC REPORT FOR LITTLE BEAR CREEK" FOR ADDITIONAL INFORMATION.
- 9) THE CITY OF COLLEYVILLE FPA (LARRY WRIGHT) WILL BE PROVIDED A COPY OF THE FINAL DRAINAGE REPORT.

**REFERENCES:**

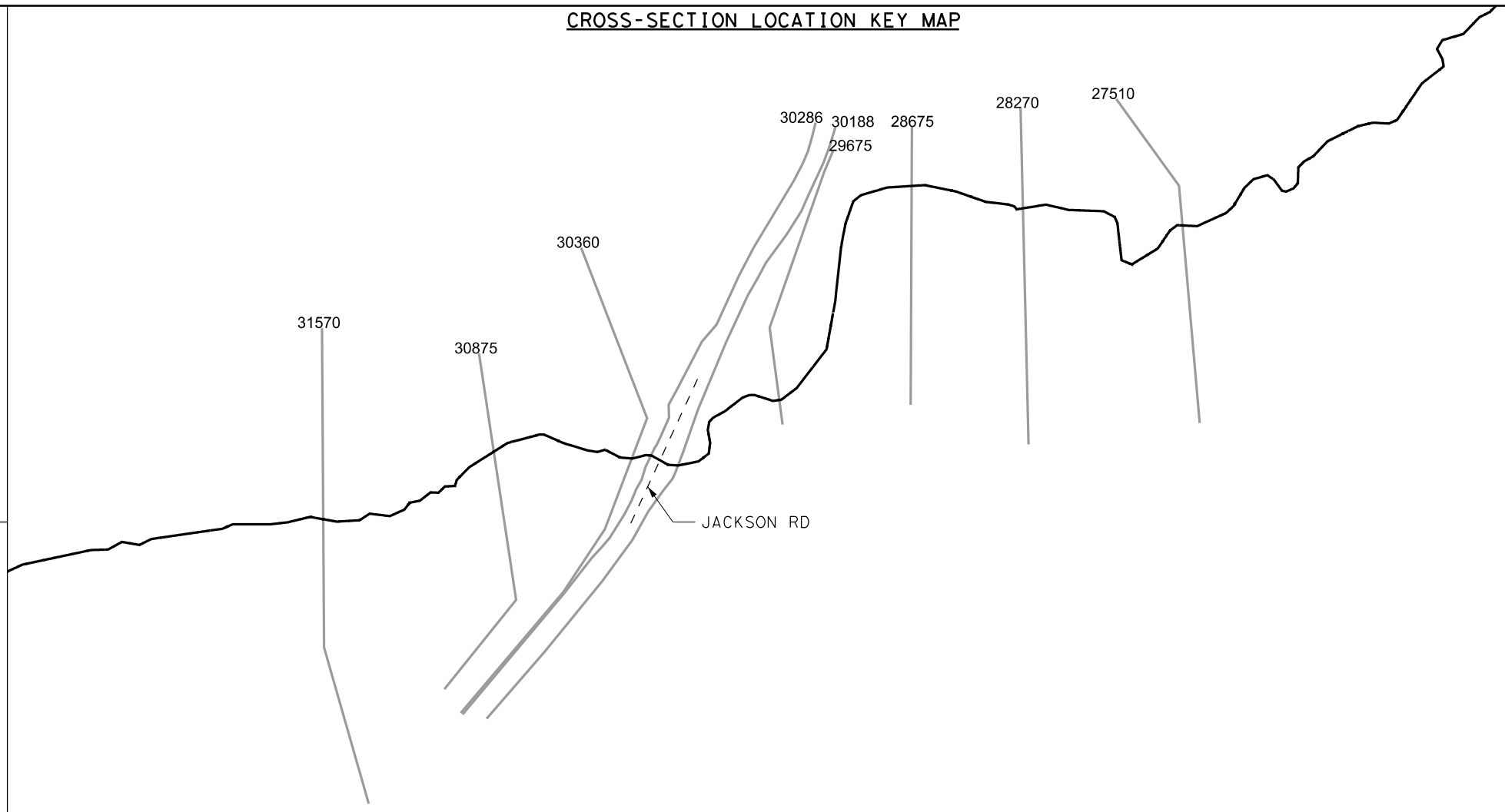
- 1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
- 2) TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)

**TIE-IN WSELS @ RS 27510**

STORM FREQUENCY (YR)	2	5	10	25	50	100	500
KNOWN D/S/ WSEL (FT) *	552.20	552.92	553.55	554.20	554.61	555.08	556.00

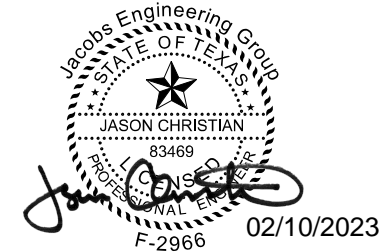
\*2-, 5-, 25-YEAR INTERPOLATED

**CROSS-SECTION LOCATION KEY MAP**



**HYDRAULIC COMPUTATIONS**

HEC-RAS RIVER STA	FLOWS (CFS)	DESIGN FREQUENCY 2-YR					CHECK FREQUENCY 100-YR					
		COMPUTED WATER SURFACE ELEVATION (FT)			VELOCITIES (FPS)		COMPUTED WATER SURFACE ELEVATION (FT)			VELOCITIES (FPS)		
		CORR EFF	PROP	RISE	CORR EFF	PROP	FLOWS (CFS)	CORR EFF	PROP	RISE	CORR EFF	PROP
31570	2736	560.76	560.76	0.00	3.96	3.95	12400	563.61	563.61	0.00	5.06	5.06
30875	2736	558.93	558.93	0.00	3.89	3.90	12400	561.43	561.43	0.00	6.48	6.48
30360	2736	557.23	557.24	0.01	5.54	5.48	12400	559.74	559.75	0.01	6.16	6.15
30286 ROW	2736	556.72	556.62	-0.10	6.13	6.43	12400	559.64	559.64	0.00	5.26	5.26
30240	Jackson Road Bridge											
30188 ROW	2736	556.56	556.56	0.00	2.72	2.71	12400	559.68	559.68	0.00	3.12	3.12
29675	2736	555.78	555.78	0.00	3.89	3.89	12400	558.92	558.92	0.00	5.09	5.09
28675	2736	553.47	553.47	0.00	5.09	5.09	12400	557.17	557.17	0.00	6.28	6.28
28270	2736	552.95	552.95	0.00	2.83	2.83	12400	556.33	556.33	0.00	5.13	5.13
27510	2736	552.20	552.20	0.00	3.33	3.33	12400	555.08	555.08	0.00	5.25	5.25



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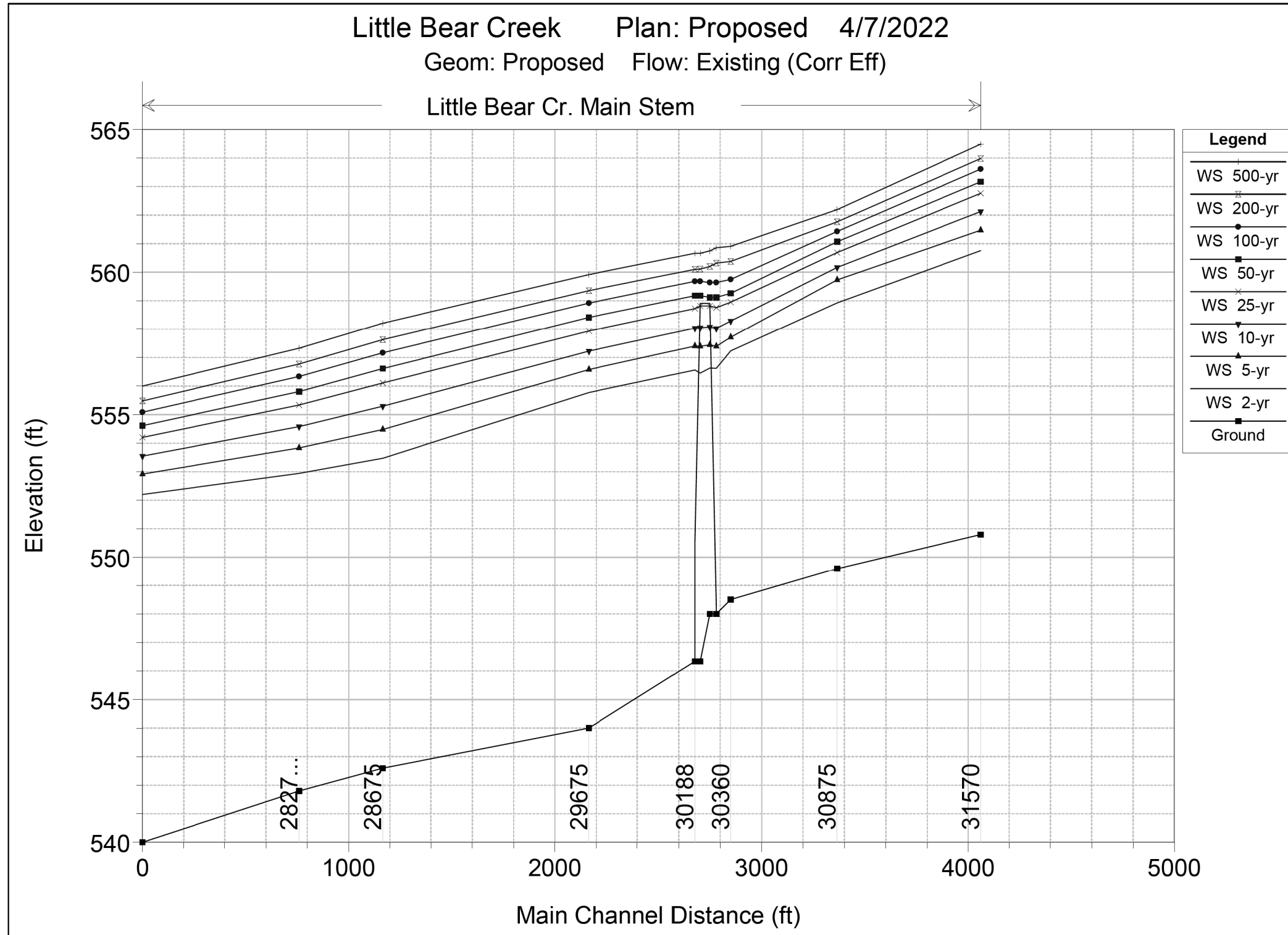


**JACKSON POOL**  
**BRIDGE HYDRAULIC DATA SHEET**

SCALE: N.T.S. SHEET 2 OF 7

DESIGN GD	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
CHECK JC	6	(See Title Sheet)		CS
GRAPHICS RS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK JC	TEXAS	FTW	TARRANT	43
	CONTROL	SECTION	JOB	
	0902	90	132	

PROPOSED DESIGN PROFILE LITTLE BEAR CREEK



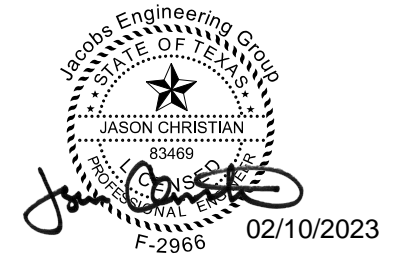
REFERENCES:

- 1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
- 2) TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)

NOTES:

- 1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
- 2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.
- 3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0210K, 48439C0230L, AND 48439C0115K. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.
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Legend	
WS 500-yr	+
WS 200-yr	x
WS 100-yr	●
WS 50-yr	■
WS 25-yr	x
WS 10-yr	▼
WS 5-yr	▲
WS 2-yr	■
Ground	■



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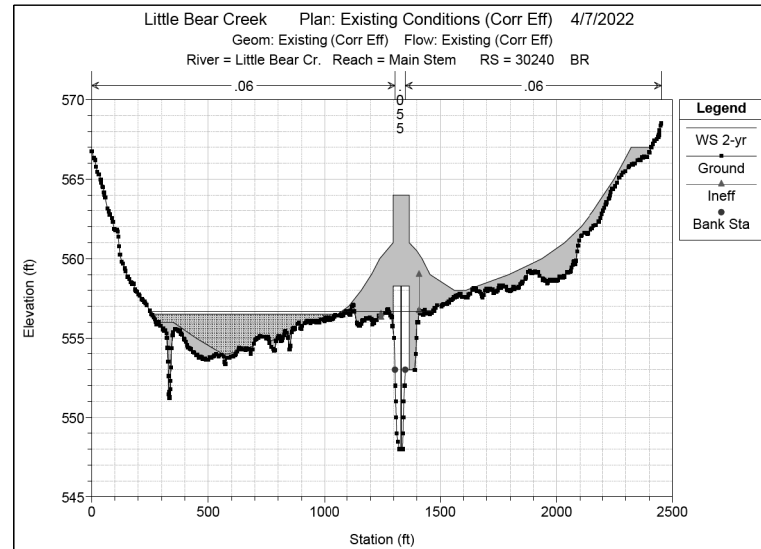
**JACKSON POOL**  
BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 3 OF 7

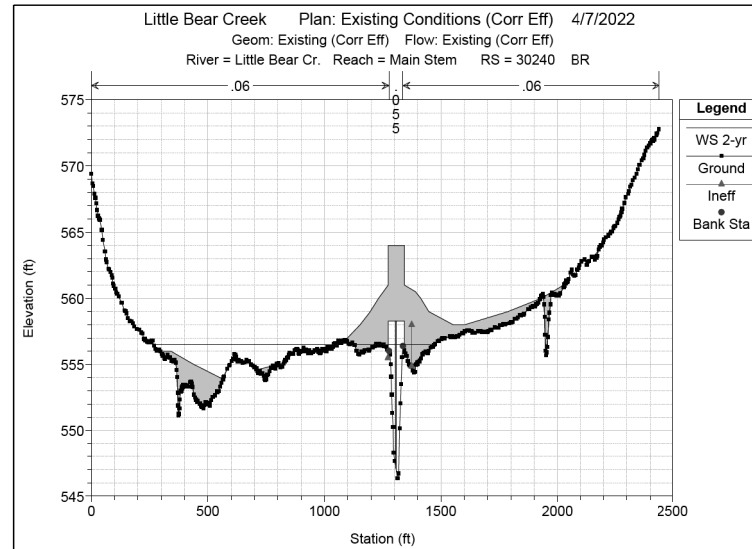
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CHECK JC	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS RS	TEXAS	FTW	TARRANT	44
CHECK JC	CONTROL	SECTION	JOB	
	0902	90	132	

**EXISTING DESIGN STREAM CROSS-SECTION LITTLE BEAR CREEK**

HEC-RAS SECTION STA 30240 BR UPSTREAM



HEC-RAS SECTION STA 30240 BR DOWNSTREAM



**REFERENCES:**

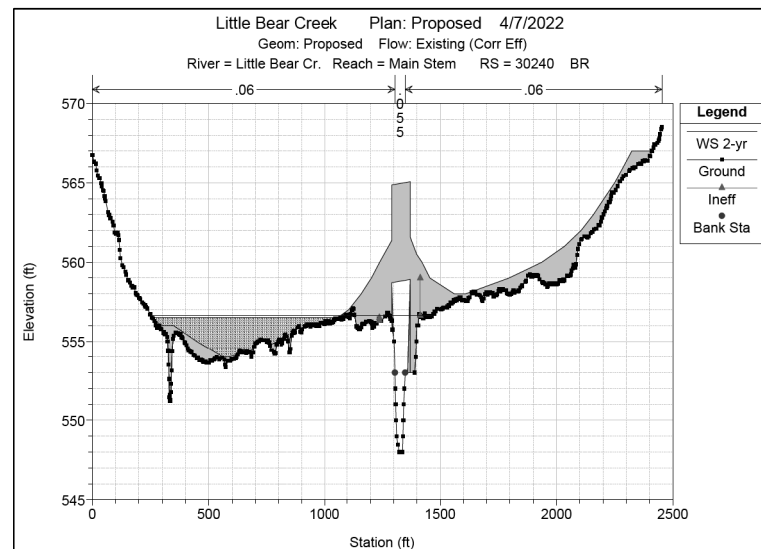
- 1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
- 2) TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)

**NOTES:**

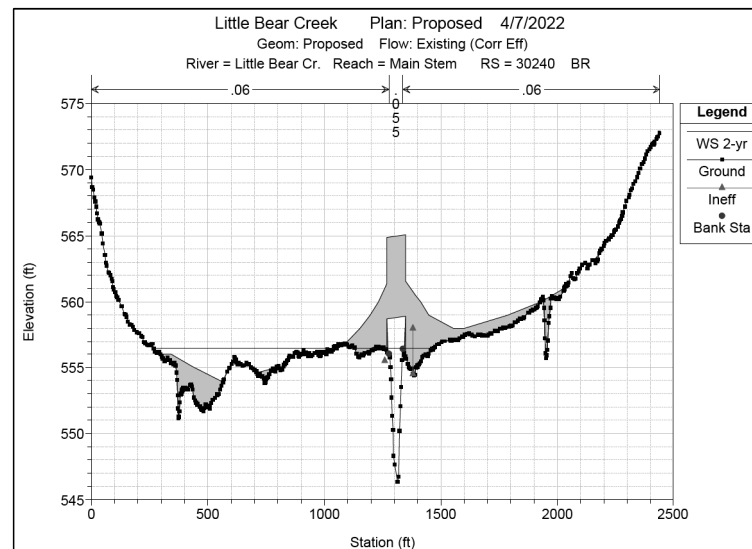
- 1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
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**PROPOSED DESIGN STREAM CROSS-SECTION LITTLE BEAR CREEK**

HEC-RAS SECTION STA 30240 BR UPSTREAM



HEC-RAS SECTION STA 30240 BR DOWNSTREAM



Jacobs Engineering Group  
STATE OF TEXAS  
JASON CHRISTIAN  
83469  
PROFESSIONAL ENGINEER  
F-2966  
02/10/2023

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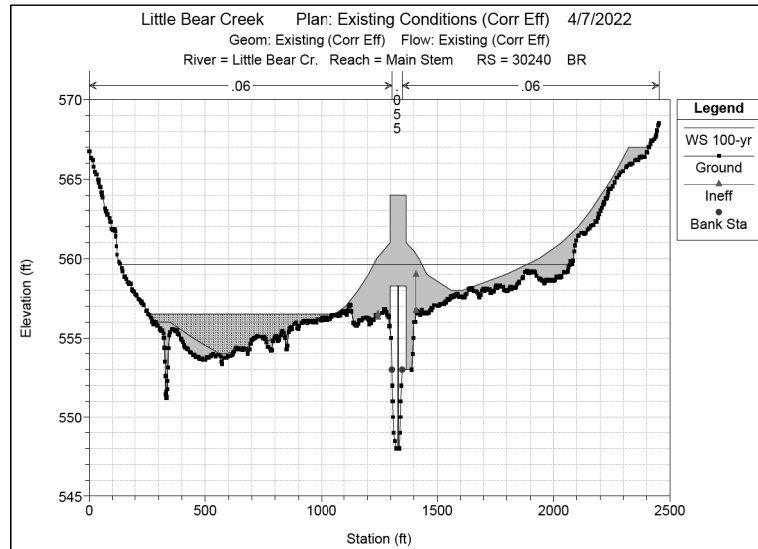
**JACKSON POOL**  
BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 4 OF 7

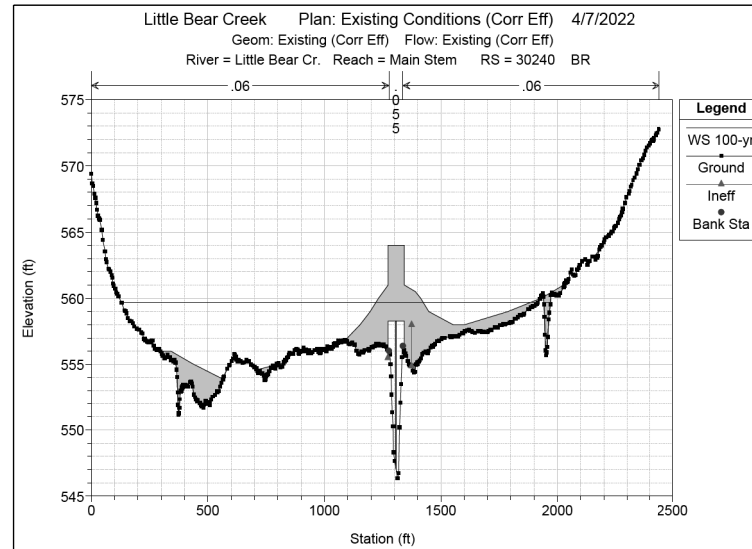
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CHECK JC	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS RS	TEXAS	FTW	TARRANT	45
CHECK JC	CONTROL	SECTION	JOB	
	0902	90	132	

**EXISTING CHECK STREAM CROSS-SECTION LITTLE BEAR CREEK**

HEC-RAS SECTION STA 30240 BR UPSTREAM



HEC-RAS SECTION STA 30240 BR DOWNSTREAM



**REFERENCES:**

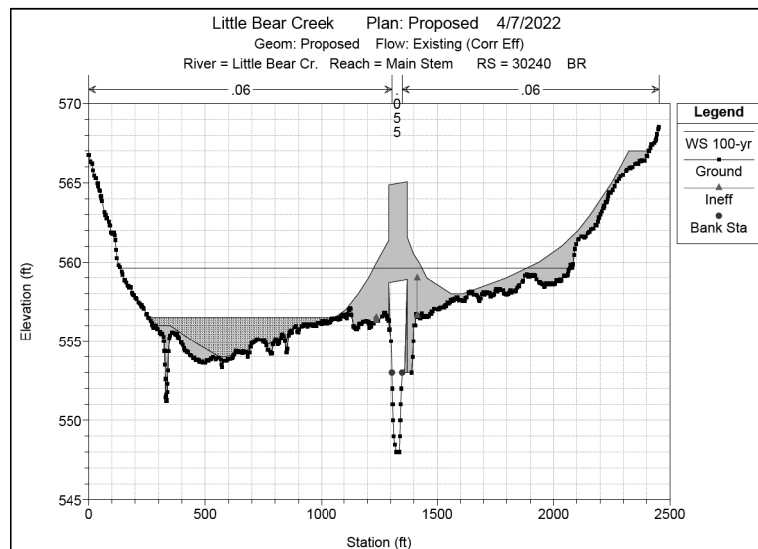
- 1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
- 2) TOPOGRAPHIC DATA SOURCES (TNRS & SURVEY SITE TOPO)

**NOTES:**

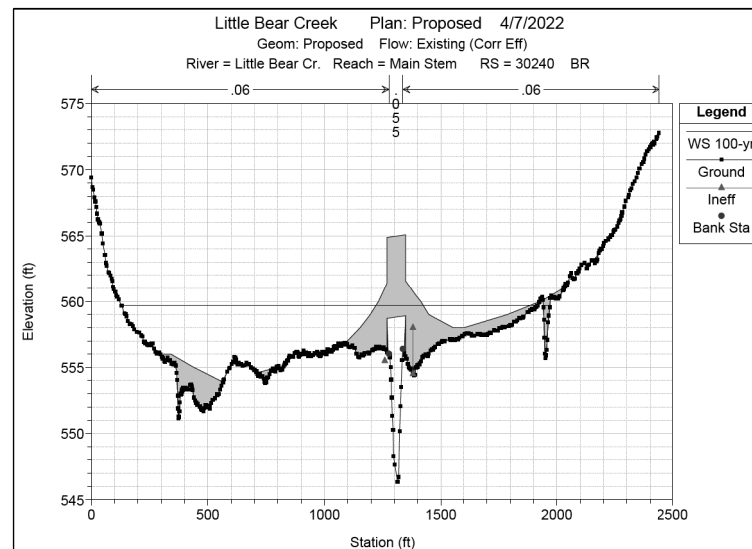
- 1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
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**PROPOSED CHECK STREAM CROSS-SECTION LITTLE BEAR CREEK**

HEC-RAS SECTION STA 30240 BR UPSTREAM



HEC-RAS SECTION STA 30240 BR DOWNSTREAM



Jacobs Engineering Group  
STATE OF TEXAS  
JASON CHRISTIAN  
83469  
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02/10/2023

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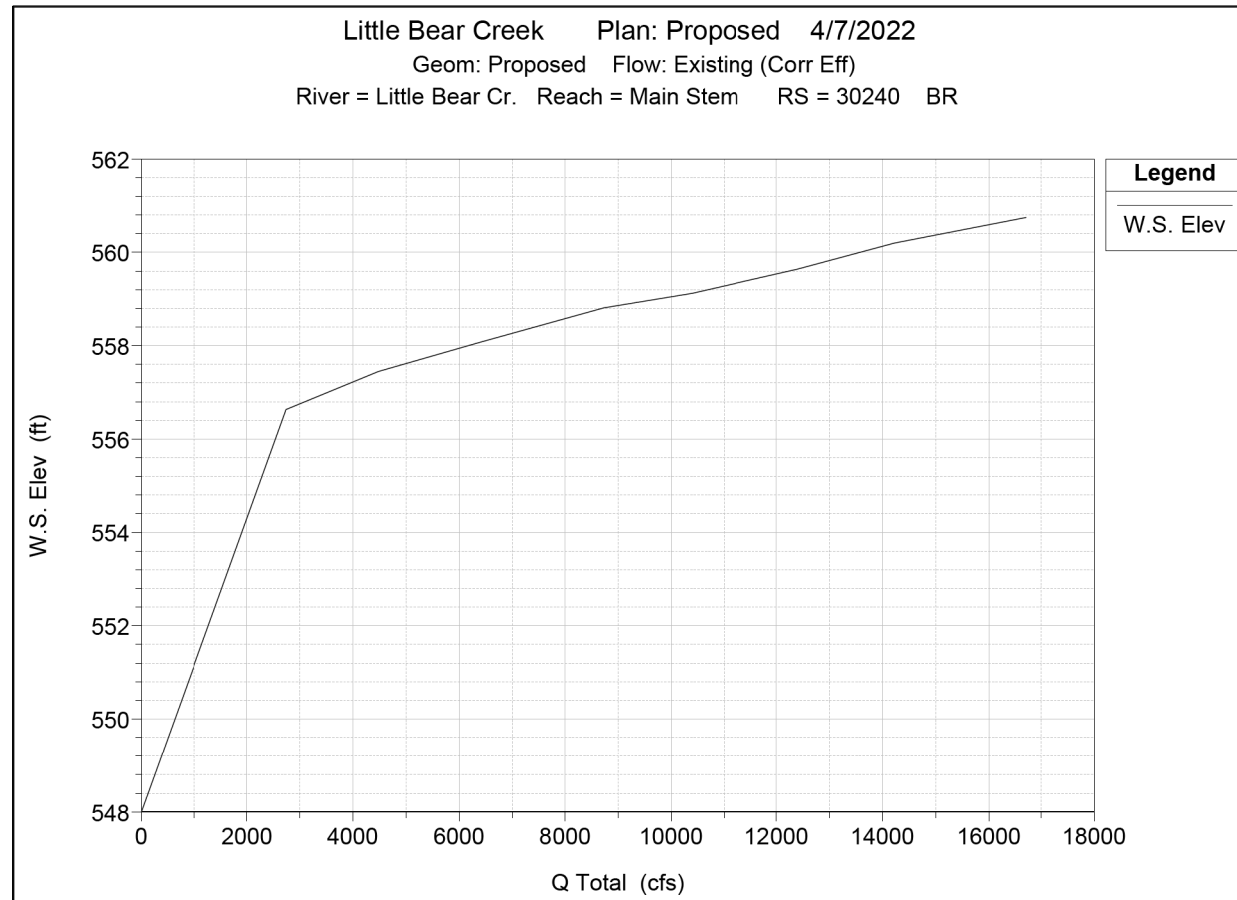
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**JACKSON POOL**  
BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 5 OF 7

DESIGN GD	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)		HIGHWAY NO. CS
CHECK JC	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS RS	TEXAS	FTW	TARRANT	46
CHECK JC	CONTROL	SECTION	JOB	
	0902	90	132	

**CONVEYANCE CURVE @ RS 30240**



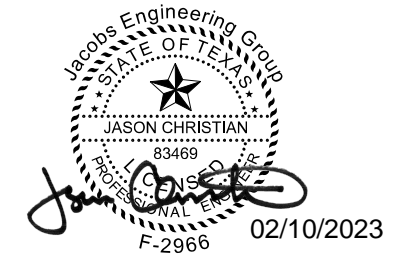
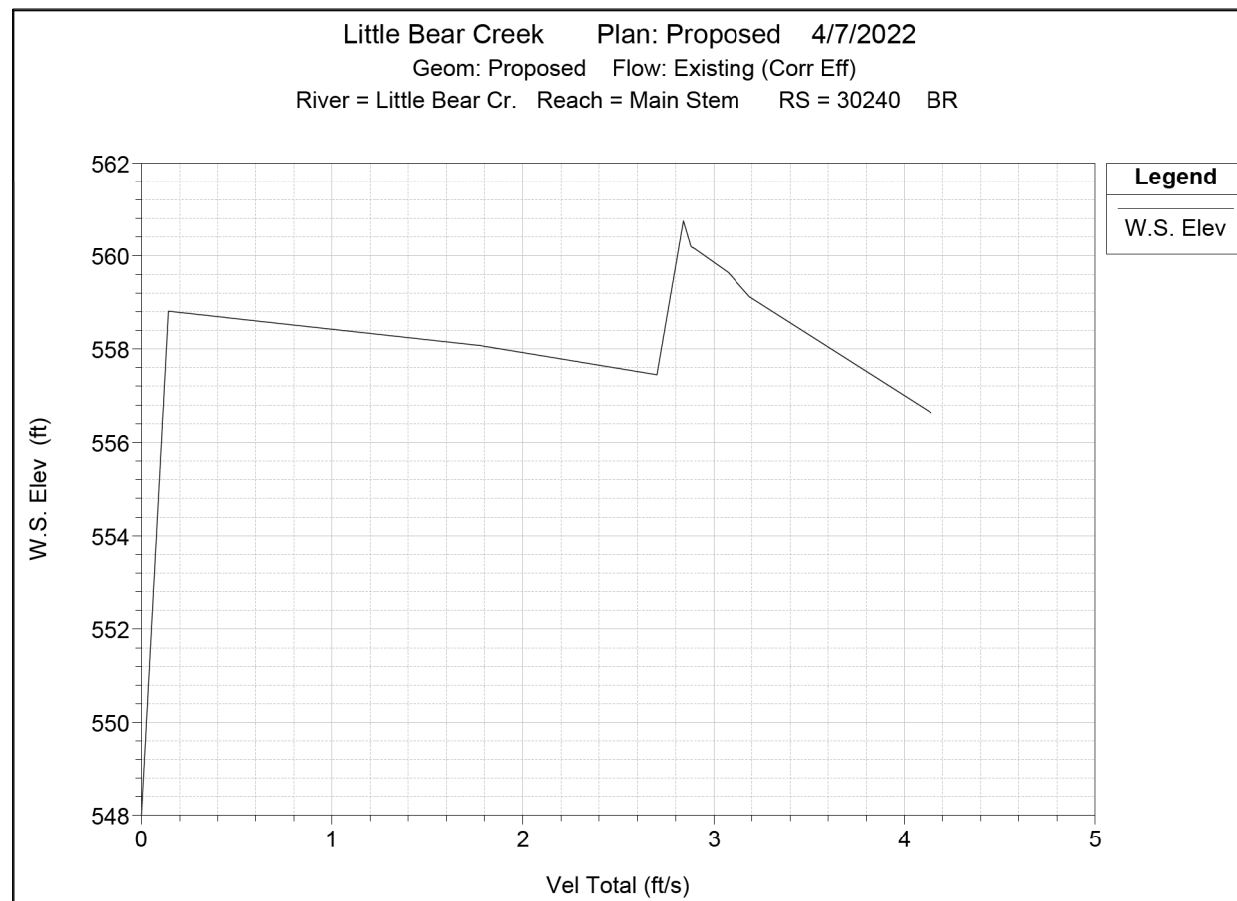
**REFERENCES:**

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- 2) TOPOGRAPHIC DATA SOURCES (TNRS & SURVEY SITE TOPO)

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**VELOCITY CURVE @ RS 30240**



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**JACKSON POOL**  
BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 6 OF 7

DESIGN GD	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)		HIGHWAY NO. CS
CHECK JC	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS RS	TEXAS	FTW	TARRANT	47
CHECK JC	CONTROL	SECTION	JOB	
	0902	90	132	



2-YR SCOUR DESIGN FLOOD FREQUENCY

JACKSON ROAD LITTLE BEAR CREEK					
2-YEAR SCOUR DESIGN FLOOD FREQUENCY					
Pier Shape	round	$k_{sh}$	N/A	$t_{e(P)}$ (hr)	101.9
$\alpha$ (degrees)	0	$k_{sp}$	N/A	$\tau_c$ (Pa)	5.61
a (m)	0	$k_w$	N/A	$\tau_{i(C)}$ (Pa)	327.0
a' (m)	0	$K_W$	1.00	$\tau_{i(P)}$ (Pa)	N/A
$A_1$ (m <sup>2</sup> )	115.1	$K_{SH}$	1.00	$v$ (m <sup>2</sup> /s)	0.000001
$B_1$ (m)	220	$K_{SP}$	1.00	$V_1$ (m/s)	0.67
$B_2$ (m)	21.7	$L_c$ (m)	28.65	$V_2$ (m/s)	1.26
$\gamma$ (kg/m <sup>3</sup> )	9810	$L_p$ (m)	14.02	$V_c$ (m/s)	1.01
g (m/s <sup>2</sup> )	9.81	n	0.05	$\dot{z}_{i(C)}$ (mm/hr)	24.66
$\theta$ (degrees)	27	$n_b$	0	$\dot{z}_{i(P)}$ (mm/hr)	N/A
$H_1$ (m)	0.52	$\rho$ (kg/m <sup>3</sup> )	1000	$Z_{max(C)}$ (m)	0.40
$H_2$ (m)	1.66	P (m)	220.9	$Z_c(\Delta t)$ (m)	0.39
$H_{2\Delta}$ (m)	1.66	$R_e$	0	$Z_{max(P)}$ (m)	0.00
$k_a$	N/A	$R_h$ (m)	1	$Z_p(\Delta t)$ (m)	0.00
$k_\theta$	1.15	S (m)	NA	$Z_c(\Delta t)$ (ft)	1.28
$k_{Lc}$	0.93	$\Delta t$ (yr)	100	$Z_p(\Delta t)$ (ft)	0.00
$k_r$	22.51	$t_{e(C)}$ (hr)	956.7	$Z_{tot}(\Delta t)$ (ft)	1.28

5-YR SCOUR DESIGN FLOOD FREQUENCY

JACKSON ROAD LITTLE BEAR CREEK					
5-YEAR SCOUR DESIGN FLOOD FREQUENCY					
Pier Shape	round	$k_{sh}$	N/A	$t_{e(P)}$ (hr)	47.8
$\alpha$ (degrees)	0	$k_{sp}$	N/A	$\tau_c$ (Pa)	5.61
a (m)	0	$k_w$	N/A	$\tau_{i(C)}$ (Pa)	368.3
a' (m)	0	$K_W$	1.00	$\tau_{i(P)}$ (Pa)	N/A
$A_1$ (m <sup>2</sup> )	170.5	$K_{SH}$	1.00	$v$ (m <sup>2</sup> /s)	0.000001
$B_1$ (m)	231.4	$K_{SP}$	1.00	$V_1$ (m/s)	0.67
$B_2$ (m)	21.7	$L_c$ (m)	28.65	$V_2$ (m/s)	0.82
$\gamma$ (kg/m <sup>3</sup> )	9810	$L_p$ (m)	14.02	$V_c$ (m/s)	1.01
g (m/s <sup>2</sup> )	9.81	n	0.054	$\dot{z}_{i(C)}$ (mm/hr)	27.82
$\theta$ (degrees)	27	$n_b$	0	$\dot{z}_{i(P)}$ (mm/hr)	N/A
$H_1$ (m)	0.74	$\rho$ (kg/m <sup>3</sup> )	1000	$Z_{max(C)}$ (m)	0.25
$H_2$ (m)	1.83	P (m)	232.3	$Z_c(\Delta t)$ (m)	0.25
$H_{2\Delta}$ (m)	1.83	$R_e$	0	$Z_{max(P)}$ (m)	0.00
$k_a$	N/A	$R_h$ (m)	1	$Z_p(\Delta t)$ (m)	0.00
$k_\theta$	1.15	S (m)	N/A	$Z_c(\Delta t)$ (ft)	0.81
$k_{Lc}$	0.92	$\Delta t$ (yr)	100	$Z_p(\Delta t)$ (ft)	0.00
$k_r$	24.53	$t_{e(C)}$ (hr)	438.2	$Z_{tot}(\Delta t)$ (ft)	0.81

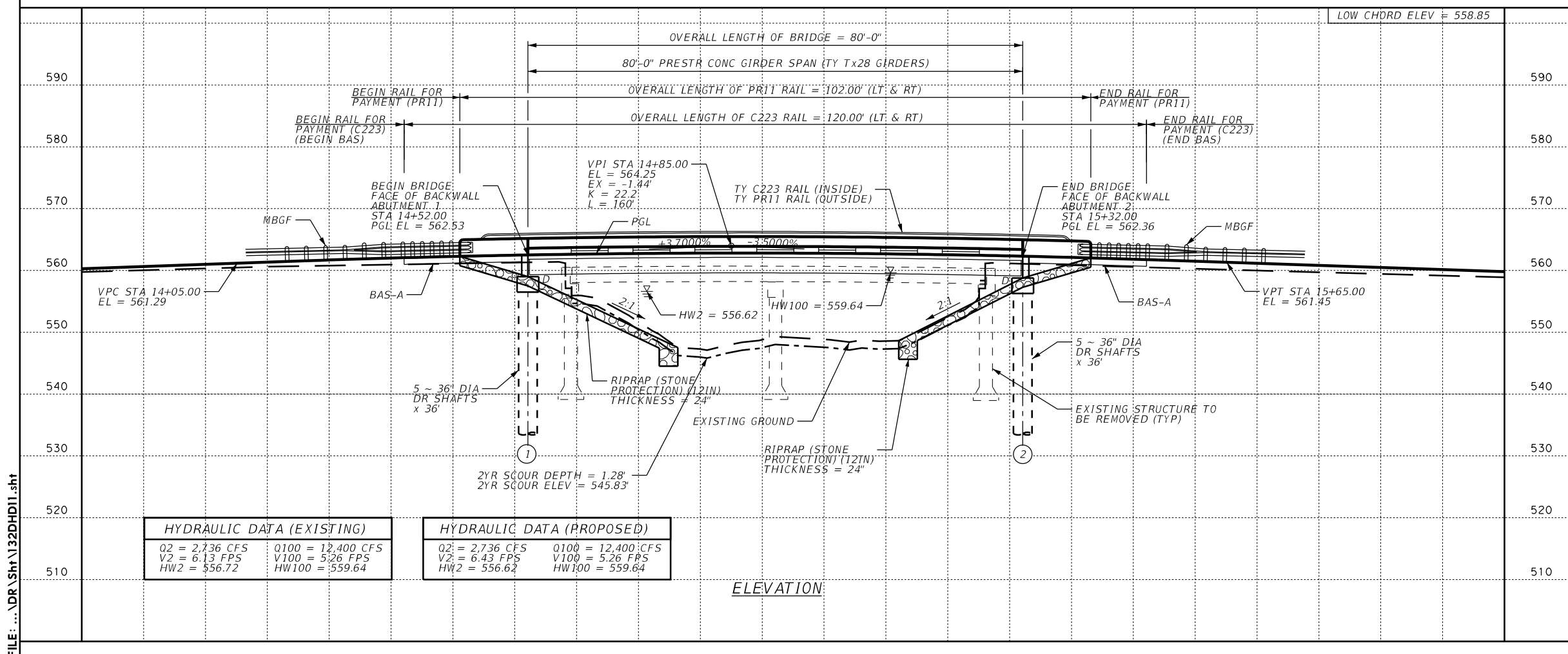
10-YR SCOUR DESIGN FLOOD FREQUENCY

JACKSON ROAD LITTLE BEAR CREEK					
10-YEAR SCOUR DESIGN FLOOD FREQUENCY					
Pier Shape	round	$k_{sh}$	N/A	$t_{e(P)}$ (hr)	21.2
$\alpha$ (degrees)	0	$k_{sp}$	N/A	$\tau_c$ (Pa)	5.61
a (m)	0	$k_w$	N/A	$\tau_{i(C)}$ (Pa)	599.0
a' (m)	0	$K_W$	1.00	$\tau_{i(P)}$ (Pa)	N/A
$A_1$ (m <sup>2</sup> )	201.8	$K_{SH}$	1.00	$v$ (m <sup>2</sup> /s)	0.000001
$B_1$ (m)	239.1	$K_{SP}$	1.00	$V_1$ (m/s)	0.9
$B_2$ (m)	23.5	$L_c$ (m)	25.91	$V_2$ (m/s)	0.54
$\gamma$ (kg/m <sup>3</sup> )	9810	$L_p$ (m)	14.02	$V_c$ (m/s)	1.01
g (m/s <sup>2</sup> )	9.81	n	0.055	$\dot{z}_{i(C)}$ (mm/hr)	45.47
$\theta$ (degrees)	27	$n_b$	0	$\dot{z}_{i(P)}$ (mm/hr)	N/A
$H_1$ (m)	0.9	$\rho$ (kg/m <sup>3</sup> )	1000	$Z_{max(C)}$ (m)	0.12
$H_2$ (m)	1.96	P (m)	240	$Z_c(\Delta t)$ (m)	0.12
$H_{2\Delta}$ (m)	1.96	$R_e$	0	$Z_{max(P)}$ (m)	0.00
$k_a$	N/A	$R_h$ (m)	1	$Z_p(\Delta t)$ (m)	0.00
$k_\theta$	1.15	S (m)	N/A	$Z_c(\Delta t)$ (ft)	0.39
$k_{Lc}$	0.90	$\Delta t$ (yr)	100	$Z_p(\Delta t)$ (ft)	0.00
$k_r$	22.65	$t_{e(C)}$ (hr)	163.5	$Z_{tot}(\Delta t)$ (ft)	0.39

25-YR SCOUR DESIGN FLOOD FREQUENCY

JACKSON ROAD LITTLE BEAR CREEK					
25-YEAR SCOUR DESIGN FLOOD FREQUENCY					
Pier Shape	round	$k_{sh}$	N/A	$t_{e(P)}$ (hr)	0.2
$\alpha$ (degrees)	0	$k_{sp}$	N/A	$\tau_c$ (Pa)	5.61
a (m)	0	$k_w$	N/A	$\tau_{i(C)}$ (Pa)	788.5
a' (m)	0	$K_W$	1.00	$\tau_{i(P)}$ (Pa)	N/A
$A_1$ (m <sup>2</sup> )	240.6	$K_{SH}$	1.00	$v$ (m <sup>2</sup> /s)	0.000001
$B_1$ (m)	250.8	$K_{SP}$	1.00	$V_1$ (m/s)	1.03
$B_2$ (m)	24.4	$L_c$ (m)	25.91	$V_2$ (m/s)	0.04
$\gamma$ (kg/m <sup>3</sup> )	9810	$L_p$ (m)	14.02	$V_c$ (m/s)	1.01
g (m/s <sup>2</sup> )	9.81	n	0.056	$\dot{z}_{i(C)}$ (mm/hr)	59.97
$\theta$ (degrees)	27	$n_b$	0	$\dot{z}_{i(P)}$ (mm/hr)	N/A
$H_1$ (m)	1.03	$\rho$ (kg/m <sup>3</sup> )	1000	$Z_{max(C)}$ (m)	0.00
$H_2$ (m)	1.99	P (m)	251.8	$Z_c(\Delta t)$ (m)	0.00
$H_{2\Delta}$ (m)	1.99	$R_e$	0	$Z_{max(P)}$ (m)	0.00
$k_a$	N/A	$R_h$ (m)	1	$Z_p(\Delta t)$ (m)	0.00
$k_\theta$	1.15	S (m)	N/A	$Z_c(\Delta t)$ (ft)	0.00
$k_{Lc}$	0.90	$\Delta t$ (yr)	100	$Z_p(\Delta t)$ (ft)	0.00
$k_r$	23.04	$t_{e(C)}$ (hr)	1.9	$Z_{tot}(\Delta t)$ (ft)	0.00

NOTES:  
1. HYDRAULIC DATA AND HEADWATER ELEVATIONS DETERMINED AT UPSTREAM BOUNDING CROSS SECTION 30286.



**Jacobs**  
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Firm Registration: F-2966

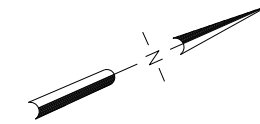
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**JACKSON POOL**  
BRIDGE HYDRAULIC DATA SHEET

SCALE: 1"=20' (H), 1"=20' (V) SHEET 7 OF 7

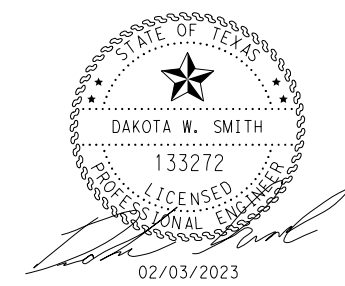
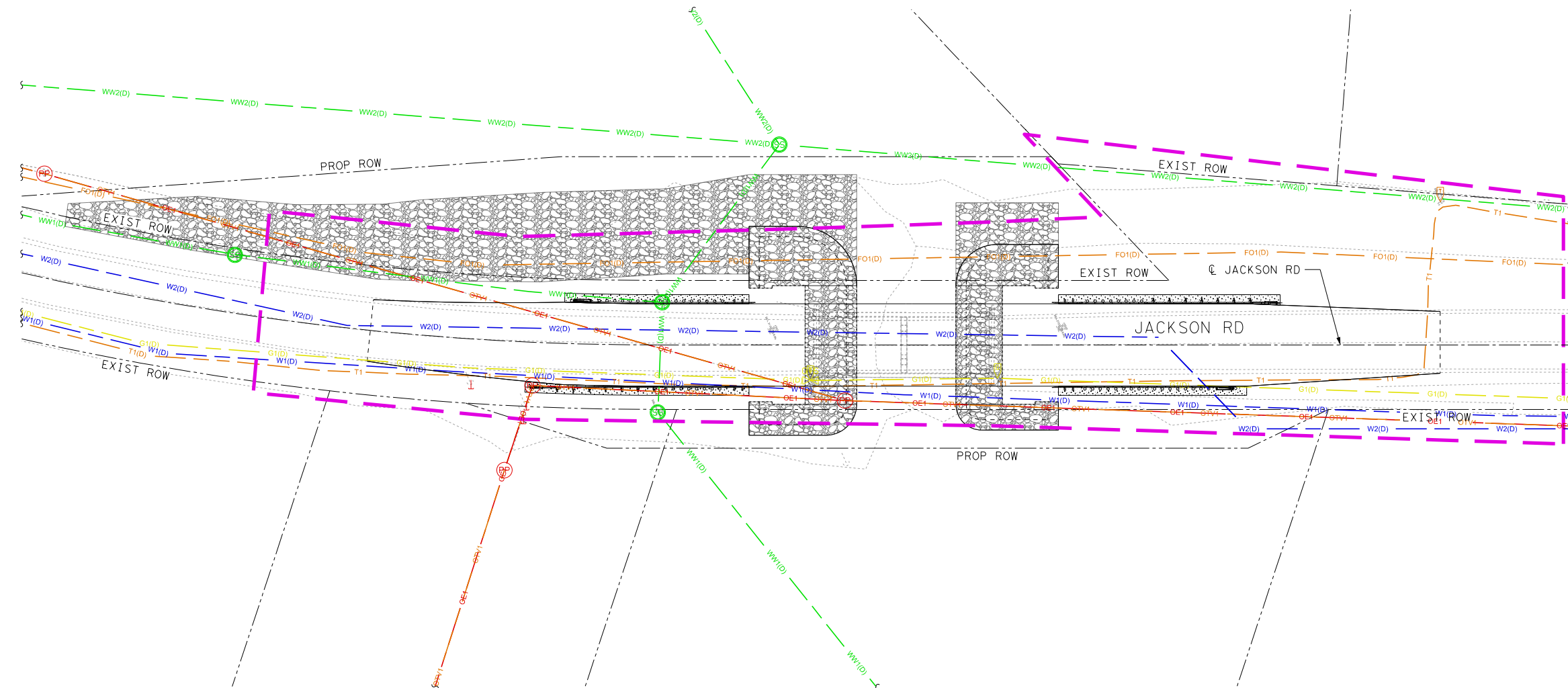
DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	JC	STATE	DISTRICT	COUNTY
GRAPHICS	RS	TEXAS	FTW	TARRANT
CHECK	JC	CONTROL	SECTION	JOB
		0902	90	132

**48**



LEGEND OF UTILITY TYPES

GENERAL	
UTILITY CONTINUES	—
UTILITY TERMINATES	—
QL-B SIGNAL LOST	—*
LIMITS OF INVESTIGATION	—
COMMUNICATIONS	
OH CATV - UNKNOWN	— OTV1
FIBER - FRONTIER (QL-D)	— FO1(D)
TELEPHONE - AT&T (QL-B)	— T1
TELEPHONE - AT&T (QL-D)	— T1(D)
ELECTRIC	
OH ELECTRIC - ONCOR	— OE1
GAS	
GAS - ATMOS (QL-D)	— G1(D)
SANITARY SEWER	
SANITARY SEWER - CITY OF COLLEYVILLE (QL-D)	— WW1(D)
SANITARY SEWER - TRA (QL-D)	— WW2(D)
WATER	
WATER - CITY OF COLLEYVILLE (QL-D)	— W1(D)
WATER - TRA (QL-D)	— W2(D)



**LAMB-STAR ENGINEERING, L.L.C.**  
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FRISCO, TEXAS 75034 (214)440-3600  
TEXAS REGISTERED ENGINEERING FIRM F-9073

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**JACKSON POOL**  
**EXISTING UTILITY LAYOUTS**

SCALE: 1"=50' (H)		SHEET 1 OF 1	
DESIGN <b>BWG</b>	FED. RD. DIV. NO. <b>6</b>	FEDERAL AID PROJECT NUMBER <b>(See Title Sheet)</b>	HIGHWAY NO. <b>CR</b>
CHECK <b>DWS</b>	STATE	DISTRICT	COUNTY
GRAPHICS <b>BWG</b>	<b>TEXAS</b>	<b>FW</b>	<b>TARRANT</b>
CHECK <b>DWS</b>	CONTROL	SECTION	JOB
	<b>0902</b>	<b>90</b>	<b>132, ETC.</b>
			<b>49</b>

UTILITY QUALITY LEVELS

(OBTAINED FROM ASCE PUBLICATION CI/ASCE STANDARD 38-02)

- UTILITY QUALITY LEVEL D (QL D): INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.
- UTILITY QUALITY LEVEL C (QL C): INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.
- UTILITY QUALITY LEVEL B (QL B): INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.
- UTILITY QUALITY LEVEL A (QL A): PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.

GENERAL NOTES

- THE UTILITIES DEPICTED WERE INVESTIGATED BY LAMB-STAR ENGINEERING, ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION WAS PROVIDED BY OTHERS AND LAMB-STAR ENGINEERING DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.
- EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 10/19/2021. LAMB-STAR ENGINEERING EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR SUE DATA PROVIDED BY OTHERS AND NEW UTILITY INSTALLATIONS OR MODIFICATIONS, AND ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.
- UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME SURVEYED. CALL TEXAS 811 FOR UTILITY LOCATIONS 48-HOURS PRIOR TO ANY WORK.
- UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL D INFORMATION IS SHOWN AS NOTED IN THE LEGEND.
- UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL C INFORMATION IS SHOWN AS NOTED IN THE LEGEND.
- UTILITY LINES WERE DESIGNATED WHERE POSSIBLE. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS DO NOT SHOW SERVICE LINE LOCATIONS. THEREFORE, NOT ALL SERVICE LINES MAY BE SHOWN.
- UTILITIES SHOWN OUTSIDE OF LIMITS OF INVESTIGATION ARE FOR REFERENCE ONLY. THESE UTILITIES ARE SHOWN FOR GENERAL INFORMATION USE DURING UTILITY COORDINATION, BUT THEY HAVE NOT BEEN VERIFIED AS BEING COMPLETE OR ACCURATE.

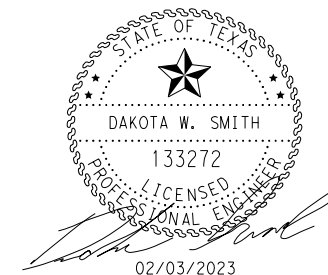
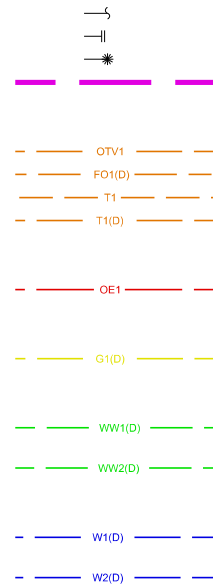
LEGEND OF UTILITY SYMBOLS

- COMMUNICATIONS  
UNDERGROUND TELEPHONE MARKER
- ELECTRIC  
GUY WIRE  
POWER POLE
- GAS  
TEST STATION  
UNDERGROUND GAS MARKER
- WASTEWATER  
WASTEWATER MANHOLE



LEGEND OF UTILITY TYPES

- GENERAL  
UTILITY CONTINUES  
UTILITY TERMINATES  
QL-B SIGNAL LOST  
LIMITS OF INVESTIGATION
- COMMUNICATIONS  
OH CATV - UNKNOWN  
FIBER - FRONTIER (QL-D)  
TELEPHONE - AT&T (QL-B)  
TELEPHONE - AT&T (QL-D)
- ELECTRIC  
OH ELECTRIC - ONCOR
- GAS  
GAS - ATMOS (QL-D)
- SANITARY SEWER  
SANITARY SEWER - CITY OF COLLEYVILLE (QL-D)  
SANITARY SEWER - TRA (QL-D)
- WATER  
WATER - CITY OF COLLEYVILLE (QL-D)  
WATER - TRA (QL-D)



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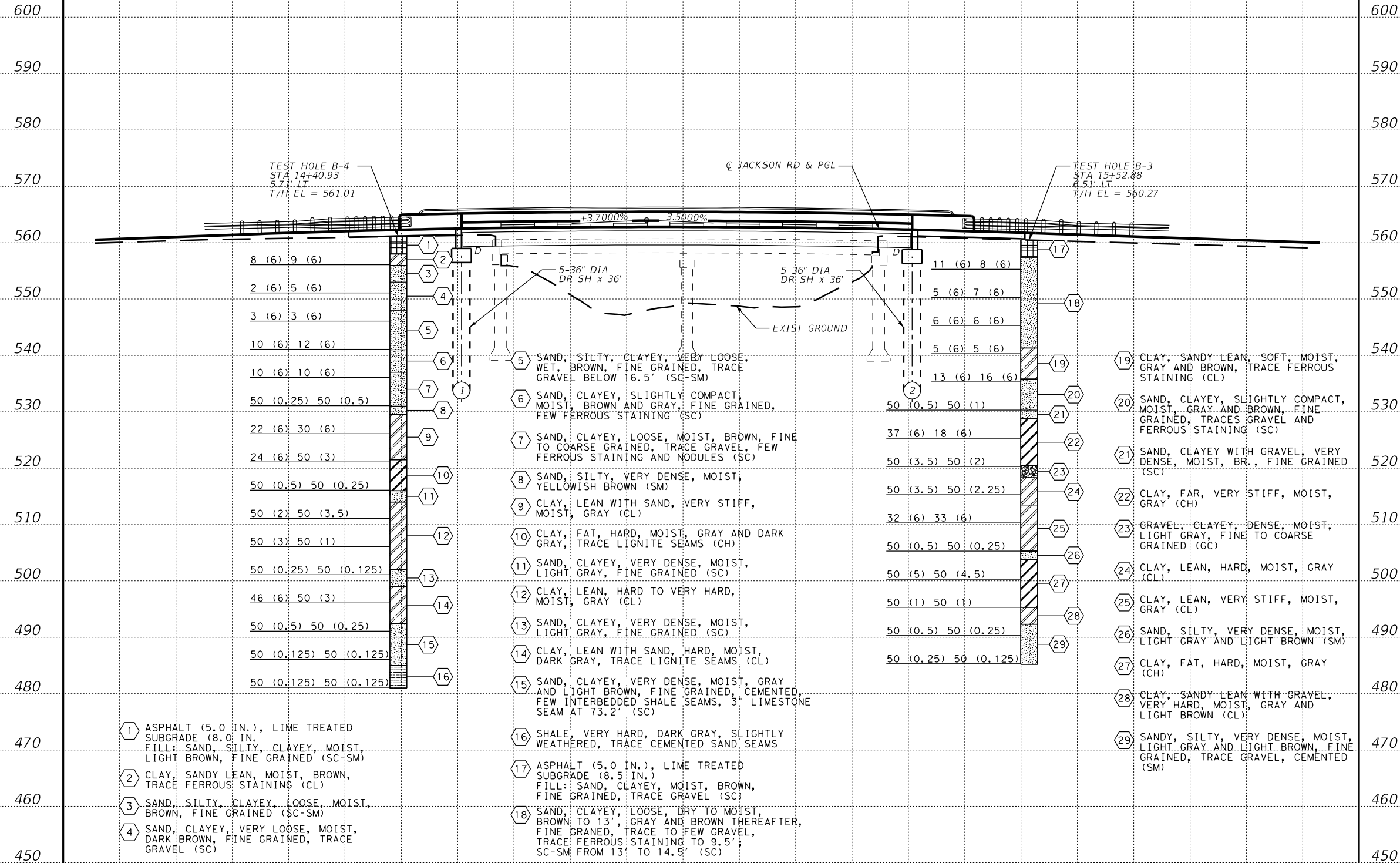
**JACKSON POOL**  
**EXISTING UTILITY**  
**LEGEND AND NOTES**

SCALE: 1"=50' (H) SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
<b>BWG</b>	<b>6</b>	<b>(See Title Sheet)</b>		<b>CR</b>
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
<b>DWS</b>	<b>TEXAS</b>	<b>FW</b>	<b>TARRANT</b>	<b>50</b>
GRAPHICS	CONTROL	SECTION	JOB	
<b>BWG</b>	<b>0902</b>	<b>90</b>	<b>132, ETC.</b>	



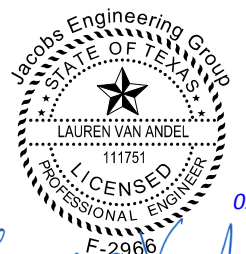
TIME: 5:42:13 PM  
DATE: 1/25/2023



- 1 ASPHALT (5.0 IN.), LIME TREATED SUBGRADE (8.0 IN.)  
FILL: SAND, SILTY, CLAYEY, MOIST, LIGHT BROWN, FINE GRAINED (SC-SM)
- 2 CLAY, SANDY LEAN, MOIST, BROWN, TRACE FERROUS STAINING (CL)
- 3 SAND, SILTY, CLAYEY, LOOSE, MOIST, BROWN, FINE GRAINED (SC-SM)
- 4 SAND, CLAYEY, VERY LOOSE, MOIST, DARK BROWN, FINE GRAINED, TRACE GRAVEL (SC)

- 16 SHALE, VERY HARD, DARK GRAY, SLIGHTLY WEATHERED, TRACE CEMENTED SAND SEAMS
- 17 ASPHALT (5.0 IN.), LIME TREATED SUBGRADE (8.5 IN.)  
FILL: SAND, CLAYEY, MOIST, BROWN, FINE GRAINED, TRACE GRAVEL (SC)
- 18 SAND, CLAYEY, LOOSE, DRY TO MOIST, BROWN TO 13', GRAY AND BROWN THEREAFTER, FINE GRAINED, TRACE TO FEW GRAVEL, TRACE FERROUS STAINING TO 9.5'; SC-SM FROM 13' TO 14.5' (SC)

- 19 CLAY, SANDY LEAN, SOFT, MOIST, GRAY AND BROWN, TRACE FERROUS STAINING (CL)
- 20 SAND, CLAYEY, SLIGHTLY COMPACT, MOIST, GRAY AND BROWN, FINE GRAINED, TRACES GRAVEL AND FERROUS STAINING (SC)
- 21 SAND, CLAYEY WITH GRAVEL, VERY DENSE, MOIST, BR., FINE GRAINED (SC)
- 22 CLAY, FAT, VERY STIFF, MOIST, GRAY (CH)
- 23 GRAVEL, CLAYEY, DENSE, MOIST, LIGHT GRAY, FINE TO COARSE GRAINED (GC)
- 24 CLAY, LEAN, HARD, MOIST, GRAY (CL)
- 25 CLAY, LEAN, VERY STIFF, MOIST, GRAY (CL)
- 26 SAND, SILTY, VERY DENSE, MOIST, LIGHT GRAY AND LIGHT BROWN (SM)
- 27 CLAY, FAT, HARD, MOIST, GRAY (CH)
- 28 CLAY, SANDY LEAN WITH GRAVEL, VERY HARD, MOIST, GRAY AND LIGHT BROWN (CL)
- 29 SANDY, SILTY, VERY DENSE, MOIST, LIGHT GRAY AND LIGHT BROWN, FINE GRAINED, TRACE GRAVEL, CEMENTED (SM)



02/08/2023  
*Lauren Van Anandel*

HL93 LOADING

**Jacobs**  
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**BORINGS**  
JACKSON RD AT LITTLE BEAR CREEK

SCALE: 1"=20' SHEET 10F 1

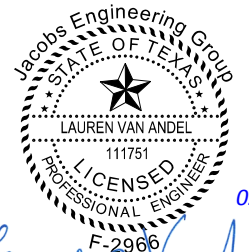
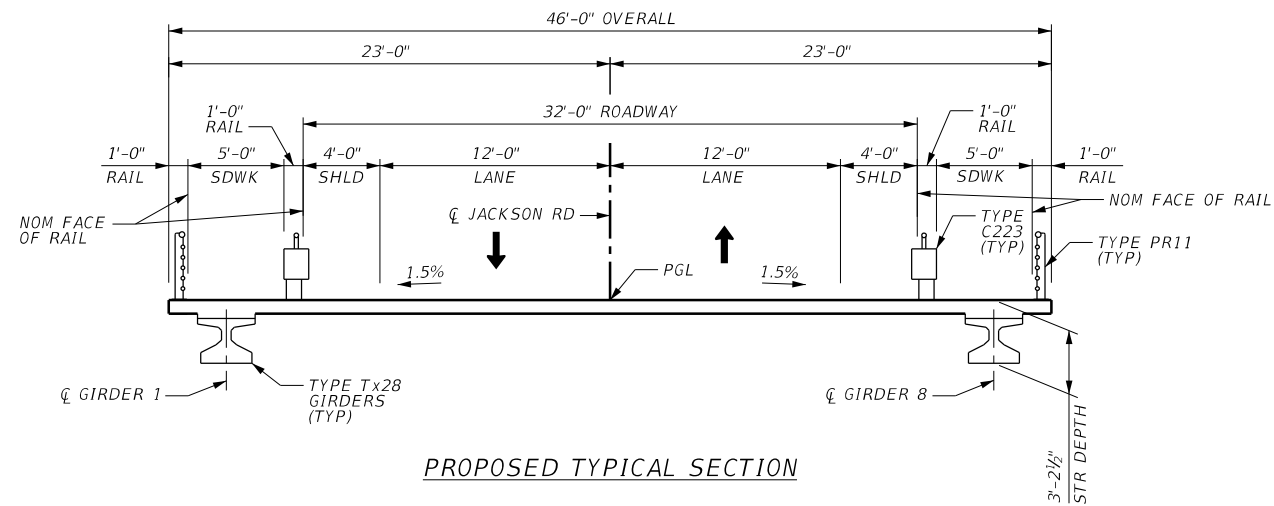
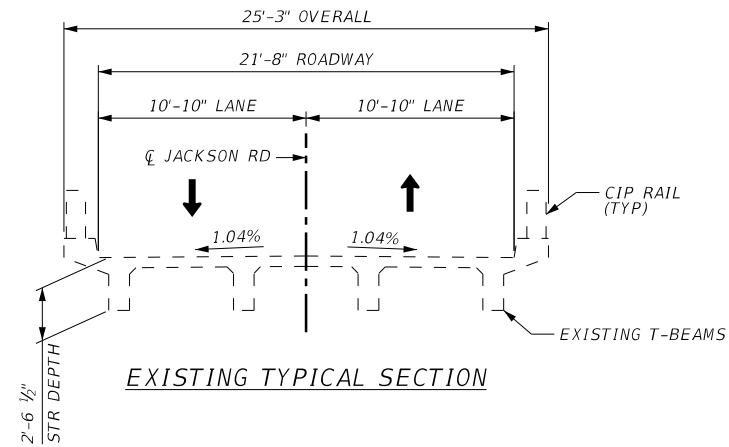
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CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	52
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	

FILE: ... \132B001.sht

14+00

15+00

16+00



02/08/2023

*Lauren VanAnandel*

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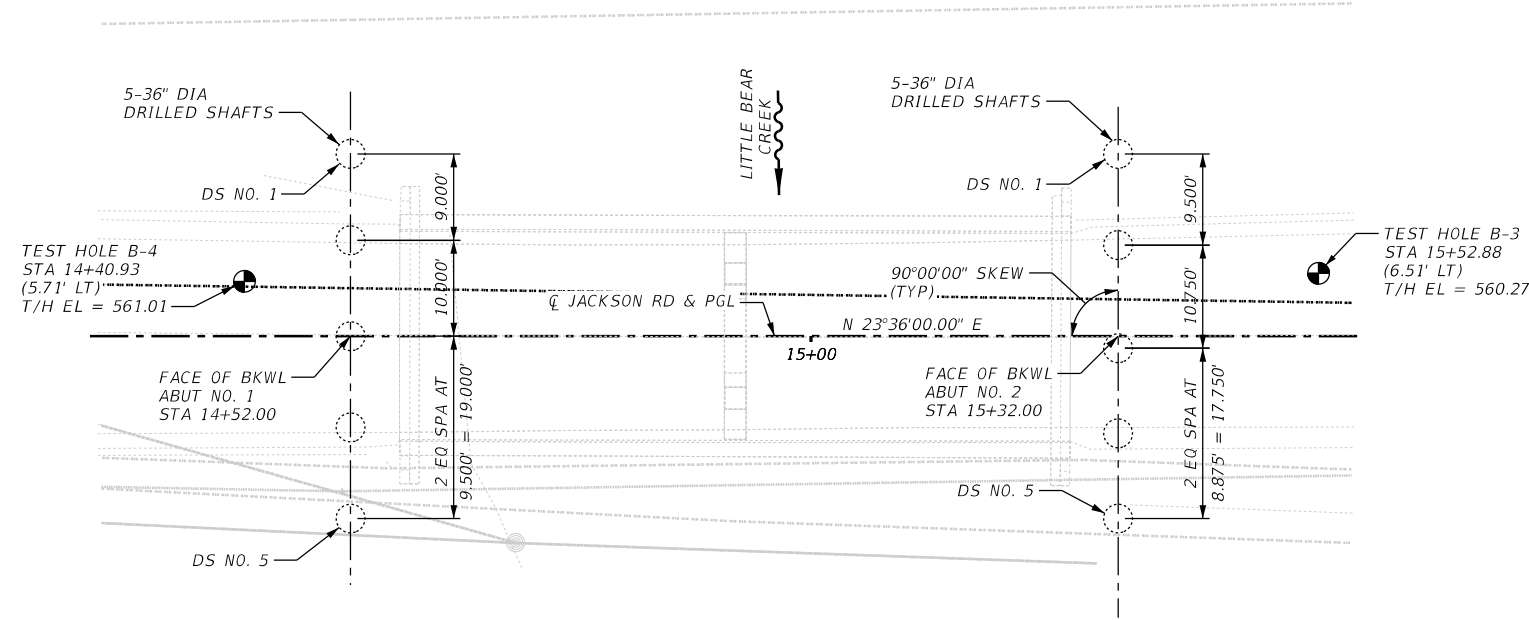
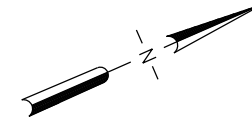
TYPICAL TRANSVERSE SECTIONS

JACKSON RD AT LITTLE BEAR CREEK

SCALE: N.T.S.

SHEET 10F 1

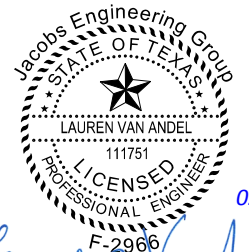
DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	53
GRAPHICS	CONTROL	SECTION	JOB	
VH	0902	90	132	
CHECK				
LVA				



FOUNDATION LAYOUT

NOTES:

1. SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS.
2. SEE BRIDGE BORING LOG SHEETS FOR TEST HOLE INFORMATION.
3. CONTRACTOR TO FIELD VERIFY LOCATION AND STATUS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO CONSTRUCTION.
4. THE CENTERLINE OF ALL BENTS AND ABUTMENTS ARE ON THE BEARING S 66°24'00.00" E.
5. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS NOT SHOWN.



02/08/2023

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FOUNDATION LAYOUT

JACKSON RD AT LITTLE BEAR CREEK

SCALE: N.T.S.

SHEET 10F 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	54
GRAPHICS	CONTROL	SECTION	JOB	
VH	0902	90	132	
CHECK				
LVA				

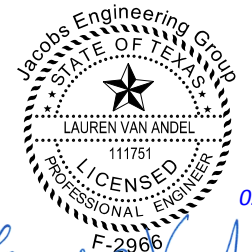
SUMMARY OF ESTIMATED QUANTITIES

ITEM  DESCRIPTION	400	416	420	422		425	442	450		454	496
	6005	6004	6014	6002	6016	6035	6007	6033	6103	6020	6009
	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT) (HPC) ①	REINF CONC SLAB (HPC)	APPROACH SLAB (HPC)	PRESTR CONC GIRDER (TX28)	STR STL (MISC NON-BRIDGE)	RAIL (TY C223) (HPC)	RAIL (TY PR11)	SEALED EXPANSION JOINT (4 IN) (SEJ-B)	REMOV STR (BRIDGE 0- 99 FT LENGTH)
	CY	LF	CY	SF	CY	LF	LB	LF	LF	LF	EA
2 ~ ABUTMENTS	177	360	55.2		70.6						
1 ~ 80.00' PRESTR CONC GIRDER UNIT				3,680		636.00	271.00	240.0	204.0	67	
BRIDGE TOTAL	177	360	55.2	3,680	70.6	636.00	271.00	240.0	204.0	67	1

① QUANTITIES INCLUDE SHEAR KEY.

BEARING SEAT ELEVATIONS

ABUT 1 (FWD)	GIRDER 1 558.808	GIRDER 2 558.894	GIRDER 3 558.981	GIRDER 4 559.067	GIRDER 5 559.067	GIRDER 6 558.981	GIRDER 7 558.894	GIRDER 8 558.808
ABUT 2 (BK)	GIRDER 1 558.639	GIRDER 2 558.725	GIRDER 3 558.812	GIRDER 4 558.898	GIRDER 5 558.898	GIRDER 6 558.812	GIRDER 7 558.725	GIRDER 8 558.639



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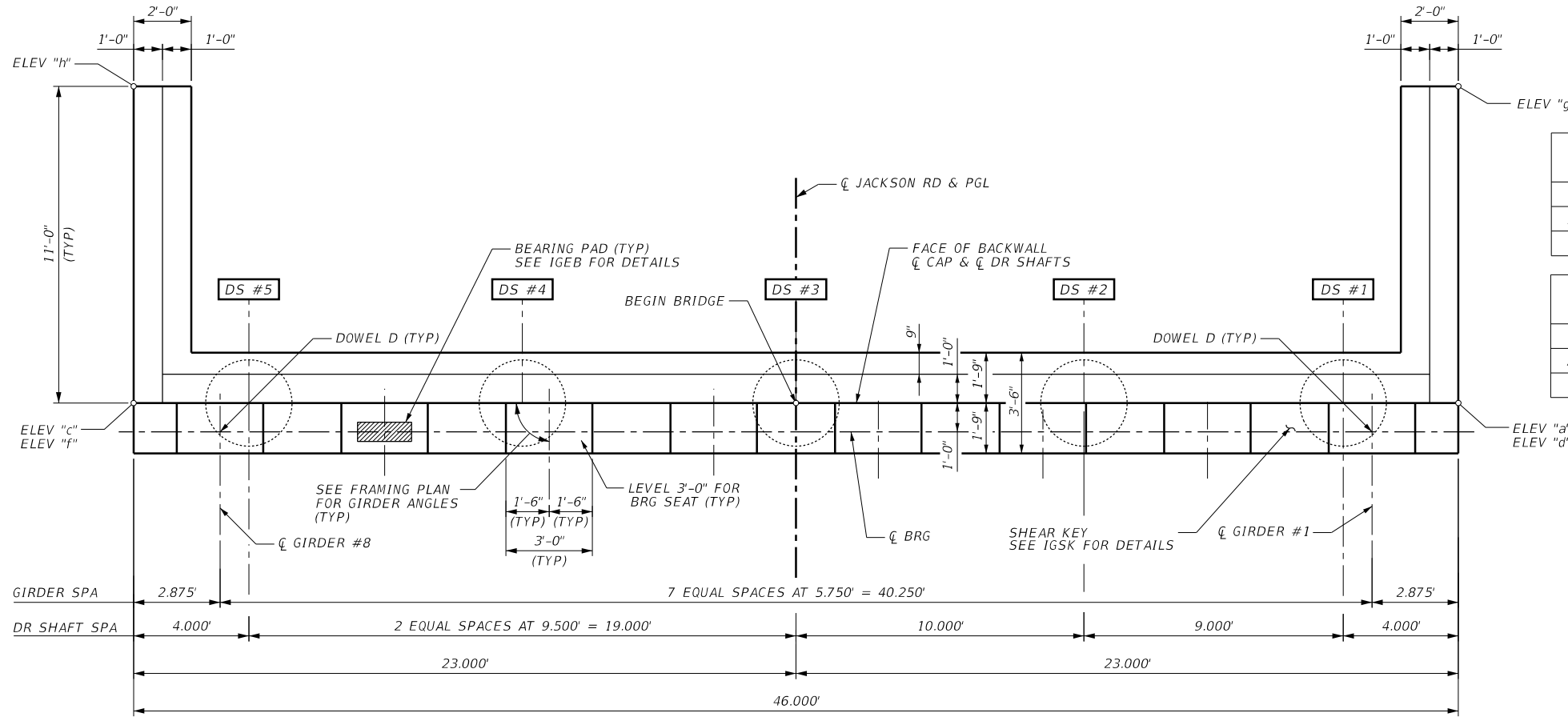
ESTIMATED QUANTITIES &  
BEARING SEAT ELEVATIONS  
JACKSON RD AT LITTLE BEAR CREEK

SCALE: N.T.S.

SHEET 1 OF 1

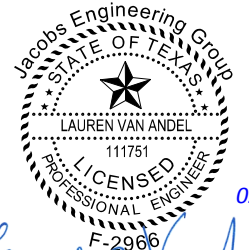
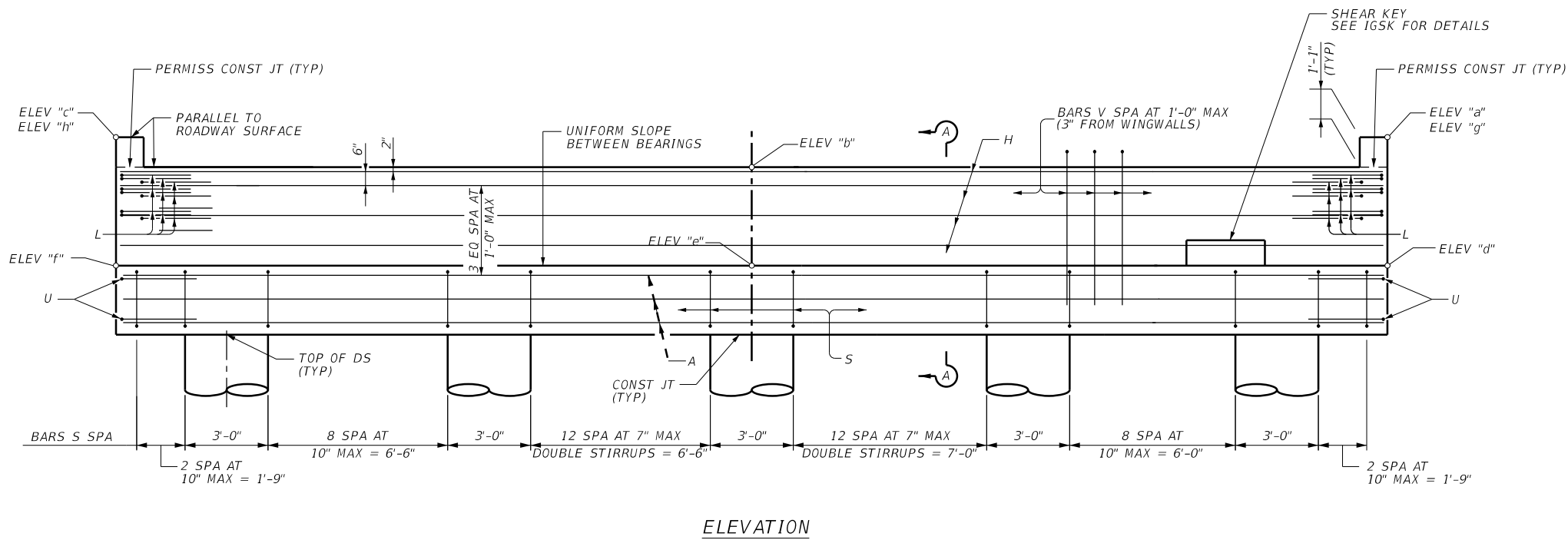
DESIGN BB	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)		HIGHWAY NO. CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	55
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	





TOP OF SHAFT ELEVATIONS					
	1	2	3	4	5
ABUT 1	556.200'	556.335'	556.485'	556.342'	556.200'

CONTROL ELEVATIONS								
	"a"	"b"	"c"	"d"	"e"	"f"	"g"	"h"
ABUT 1	562.185'	561.447'	562.185'	558.640'	558.985'	558.640'	561.985'	561.985'



02/08/2023

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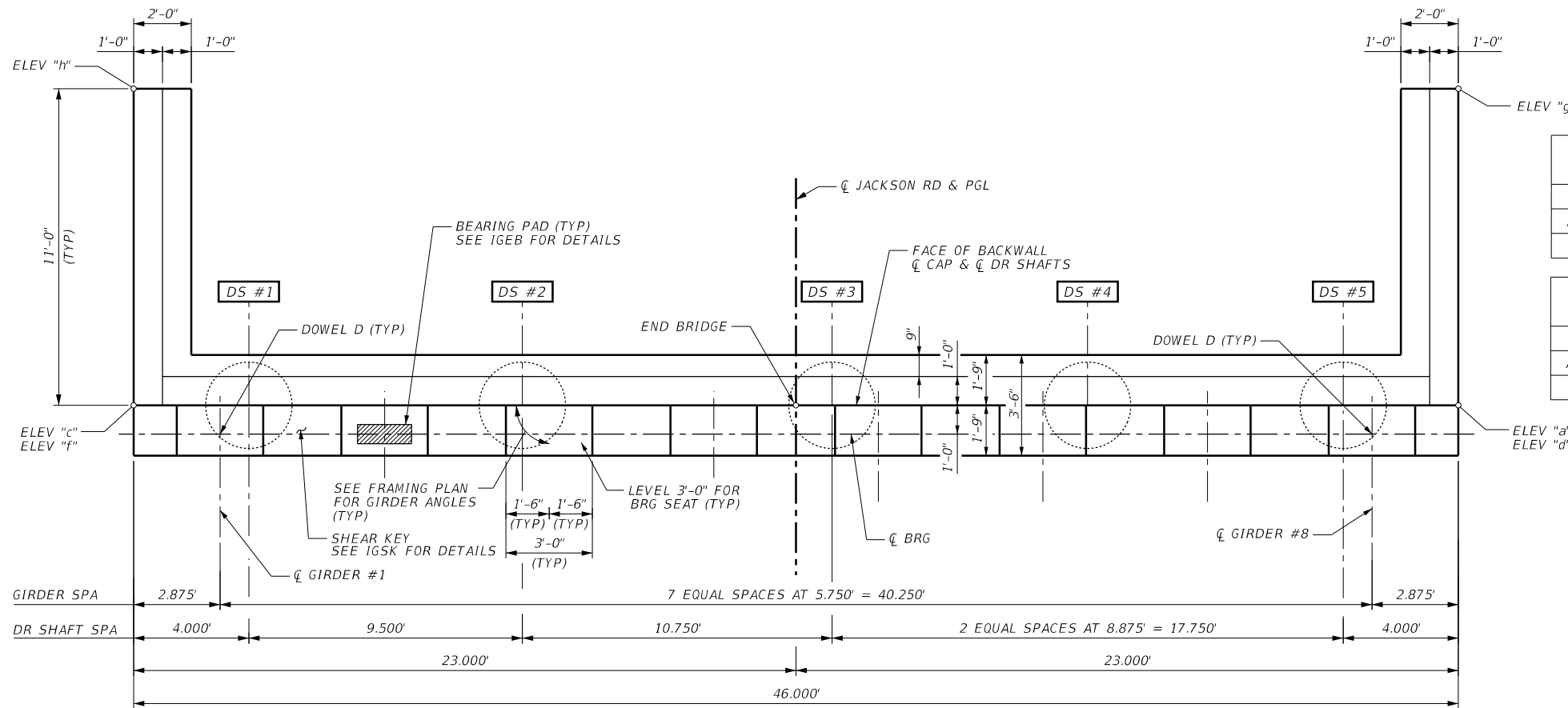
**ABUTMENT 1**

JACKSON RD AT LITTLE BEAR CREEK

SCALE: N.T.S.

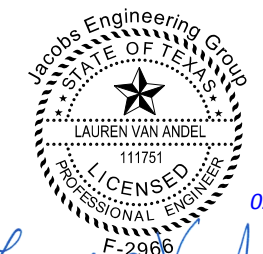
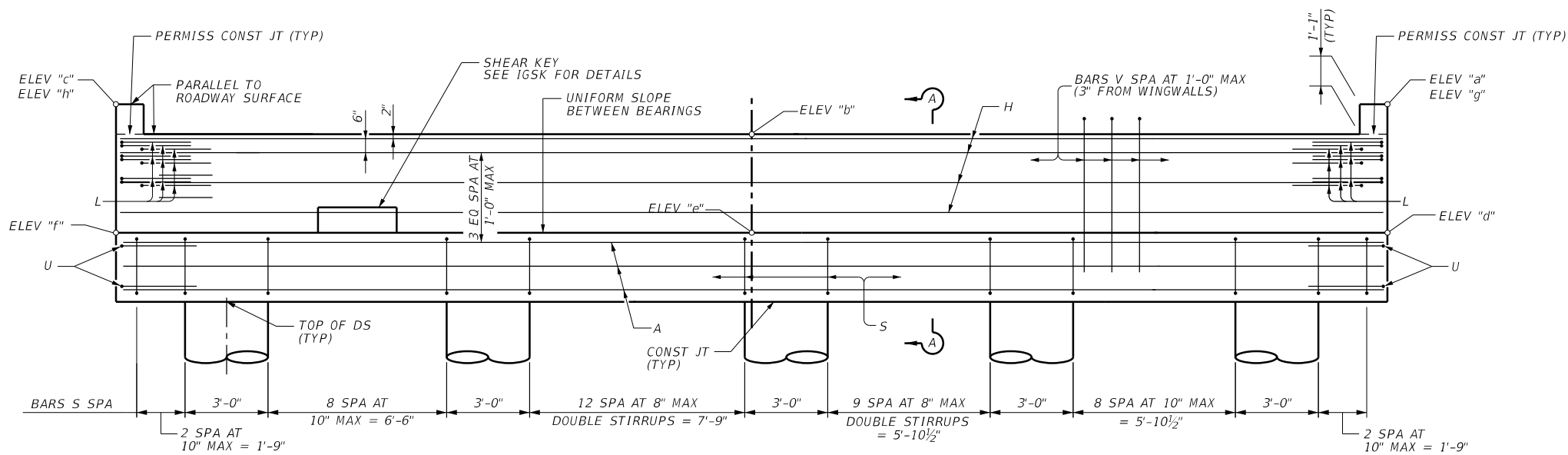
SHEET 10F 3

DESIGN BB	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)		HIGHWAY NO. CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	56
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	



TOP OF SHAFT ELEVATIONS					
	1	2	3	4	5
ABUT 2	556.031'	556.173'	556.297'	556.164'	556.031'

CONTROL ELEVATIONS								
	"a"	"b"	"c"	"d"	"e"	"f"	"g"	"h"
ABUT 2	562.015'	561.277'	562.015'	558.471'	558.816'	558.471'	561.766'	561.766'



02/08/2023

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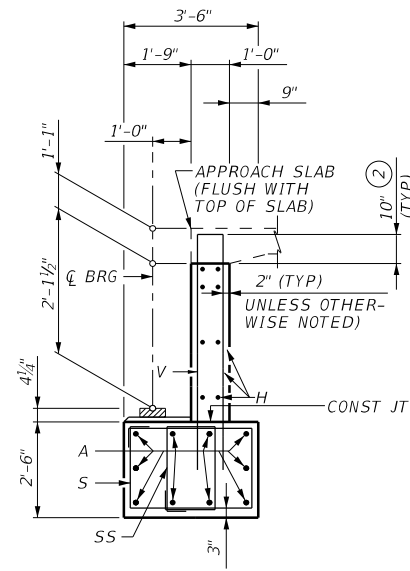
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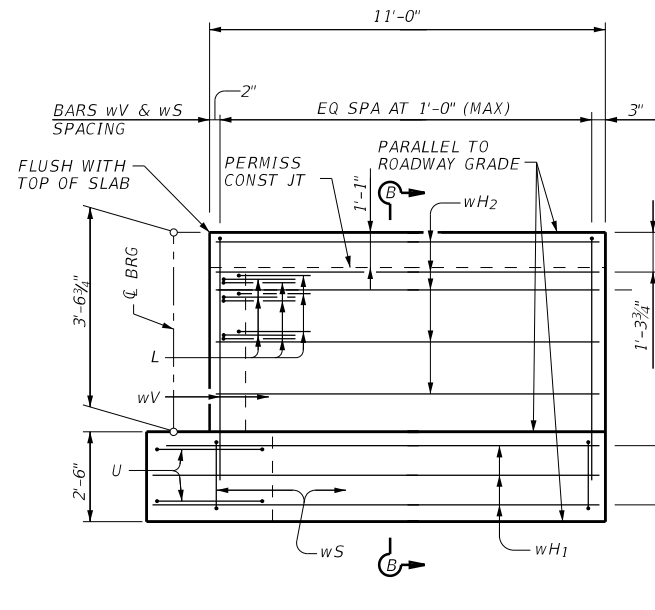
**ABUTMENT 2**

JACKSON RD AT LITTLE BEAR CREEK

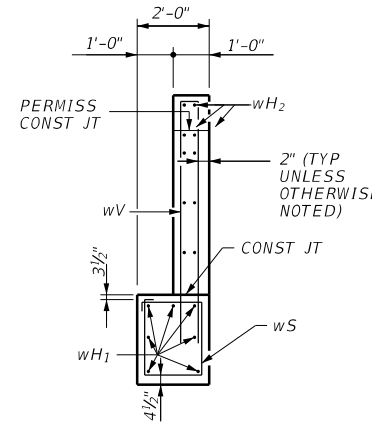
DESIGN BB	FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NUMBER (See Title Sheet)		HIGHWAY NO. CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	57
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	



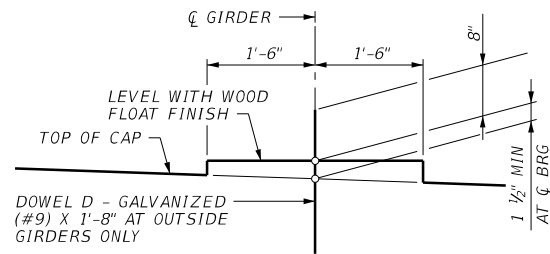
SECTION A-A



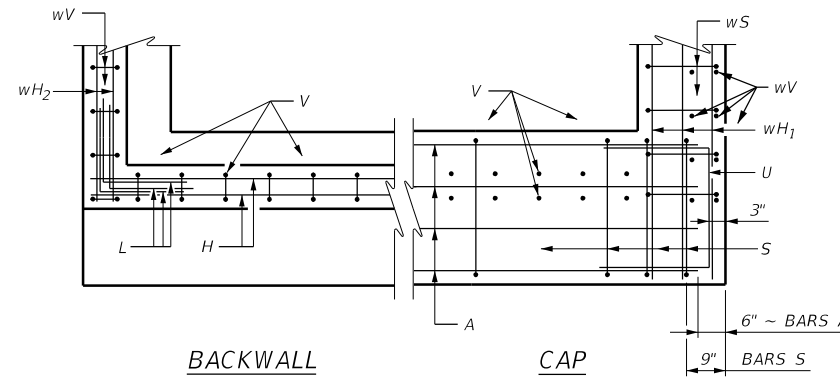
WINGWALL ELEVATION



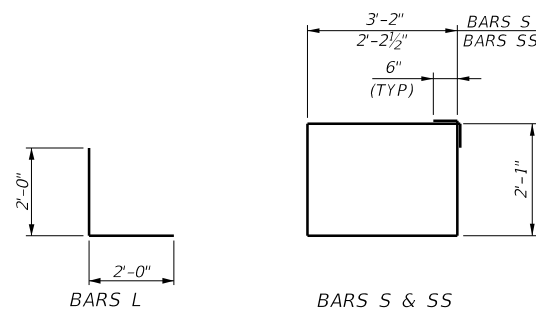
SECTION B-B



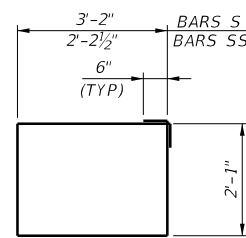
BEARING SEAT DETAIL  
(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD)



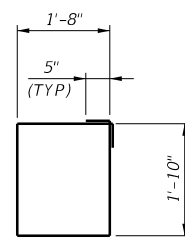
BACKWALL  
CAP  
CORNER DETAILS



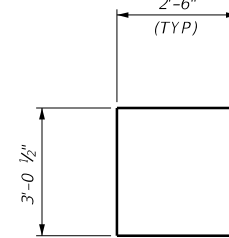
BARS L



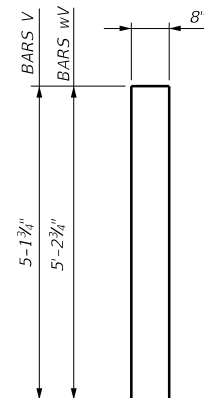
BARS S & SS



BARS wS



BARS U



BARS V & wV

TABLE OF ESTIMATED QUANTITIES ABUTMENT 1

BAR	NO.	SIZE	LENGTH	WEIGHT	
A	10	#11	45'-8"	2,426	
D	2	#9	1'-8"	11	
H	8	#6	45'-8"	549	
L	18	#6	4'-0"	108	
S	50	#5	11'-6"	600	
SS	26	#5	9'-7"	260	
U	4	#6	8'-1"	48	
V	45	#5	11'-0"	514	
wH1	14	#6	12'-5"	261	
wH2	20	#6	10'-8"	320	
wS	24	#4	7'-10"	126	
wV	24	#5	11'-2"	279	
REINFORCING STEEL (1)				LB	5,502
CLASS "C" CONC (ABUT) (HPC) (3)				CY	27.6

TABLE OF ESTIMATED QUANTITIES ABUTMENT 2

BAR	NO.	SIZE	LENGTH	WEIGHT	
A	10	#11	45'-8"	2,426	
D	2	#9	1'-8"	11	
H	8	#6	45'-8"	549	
L	18	#6	4'-0"	108	
S	47	#5	11'-6"	564	
SS	23	#5	9'-7"	230	
U	4	#6	8'-1"	48	
V	45	#5	11'-0"	514	
wH1	14	#6	12'-5"	261	
wH2	20	#6	10'-8"	320	
wS	24	#4	7'-10"	126	
wV	24	#5	11'-2"	279	
REINFORCING STEEL (1)				LB	5,436
CLASS "C" CONC (ABUT) (HPC) (3)				CY	27.6

- (1) FOR CONTRACTOR'S INFORMATION ONLY.
- (2) INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.
- (3) SHEAR KEY QUANTITY IS INCLUDED.

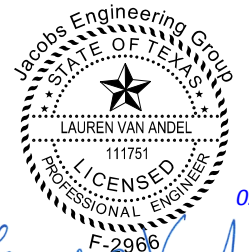
GENERAL NOTES:

- DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, (2020), AS MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL (NOV 2021) AND BRIDGE DETAILING GUIDE (APR 2022).
- ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROSS SLOPE AND/OR SUPERELEVATIONS.
- SEE BRIDGE LAYOUT FOR DRILLED SHAFT SIZES AND LENGTHS.
- CALCULATED FOUNDATION SERVICE LOADS: 128 TONS/SHAFT.
- SEE IGEB STANDARD FOR BEARING PAD DETAILS.
- GIRDER & DRILLED SHAFT SPACINGS ARE MEASURED ALONG  $\phi$  ABUT.
- SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR 36" DIA. DRILLED SHAFT DETAILS AND NOTES.
- SEE STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS AND NOTES.
- SEE PR11 & C223 RAILS DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
- SEE IGSK STANDARD FOR SHEAR KEY DETAILS.
- INTENTIONALLY ROUGHEN CONSTRUCTION JOINTS PER TXDOT STANDARD SPECIFICATIONS ITEM 420.4.7.7.

MATERIAL NOTES:

CONCRETE STRENGTH SHALL BE CLASS "C" CONC (ABUT) (HPC),  $f'_c = 3,600$  PSI.  
ALL REINFORCING STEEL SHALL BE GRADE 60.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS OTHERWISE NOTED. REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BAR.



02/08/2023

Lauren Van Andel

HL93 LOADING

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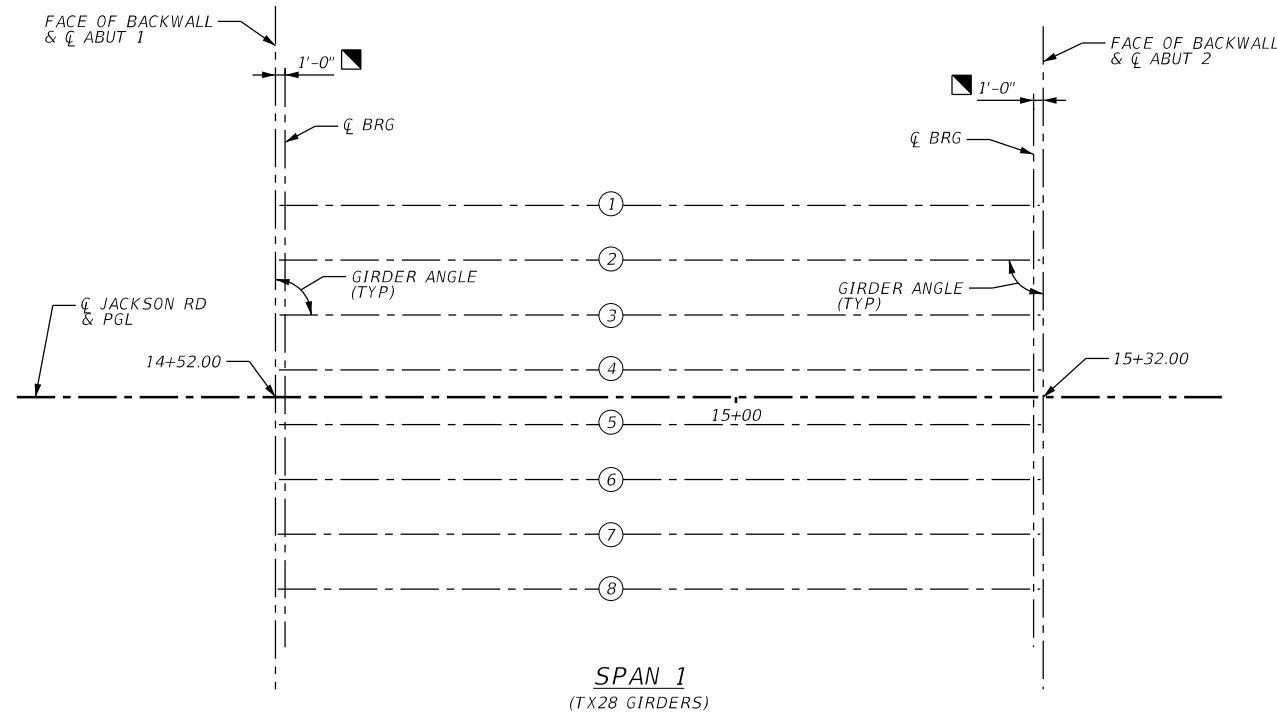
ABUTMENT DETAILS

JACKSON RD AT LITTLE BEAR CREEK

SCALE: N.T.S.

SHEET 3 OF 3

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER			HIGHWAY NO.
BB	6	(See Title Sheet)			CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.	
LVA	TEXAS	FTW	TARRANT	58	
GRAPHICS	CONTROL	SECTION	JOB		
VT	0902	90	132		
CHECK	LVA	0902	90	132	



MEASURED PERPENDICULAR TO FRONT FACE OF ABUTMENT BACKWALL.  
 GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

**BENT REPORT**

ABUT NO. 1 (S 66° 24' 00.00" E)  
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 20.125 L

SPAN 1 GIRDER	D	GIRDER SPAC. GIRDER ANGLE	
		M	S
1	0.000	90	0
2	5.750	90	0
3	5.750	90	0
4	5.750	90	0
5	5.750	90	0
6	5.750	90	0
7	5.750	90	0
8	5.750	90	0
TOTAL	40.250		

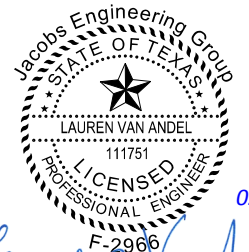
**GIRDER REPORT**

GIRDER REPORT, SPAN 1

GIRDER	HORIZONTAL DISTANCE		TRUE DISTANCE	GIRDER SLOPE
	C-C BENT	C-C BRG.		
1	80.000	78.000	79.50	-0.0022
2	80.000	78.000	79.50	-0.0022
3	80.000	78.000	79.50	-0.0022
4	80.000	78.000	79.50	-0.0022
5	80.000	78.000	79.50	-0.0022
6	80.000	78.000	79.50	-0.0022
7	80.000	78.000	79.50	-0.0022
8	80.000	78.000	79.50	-0.0022

ABUT NO. 2 (S 66° 24' 00.00" E)  
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 20.125 L

SPAN 1 GIRDER	D	GIRDER SPAC. GIRDER ANGLE	
		M	S
1	0.000	90	0
2	5.750	90	0
3	5.750	90	0
4	5.750	90	0
5	5.750	90	0
6	5.750	90	0
7	5.750	90	0
8	5.750	90	0
TOTAL	40.250		



02/08/2023

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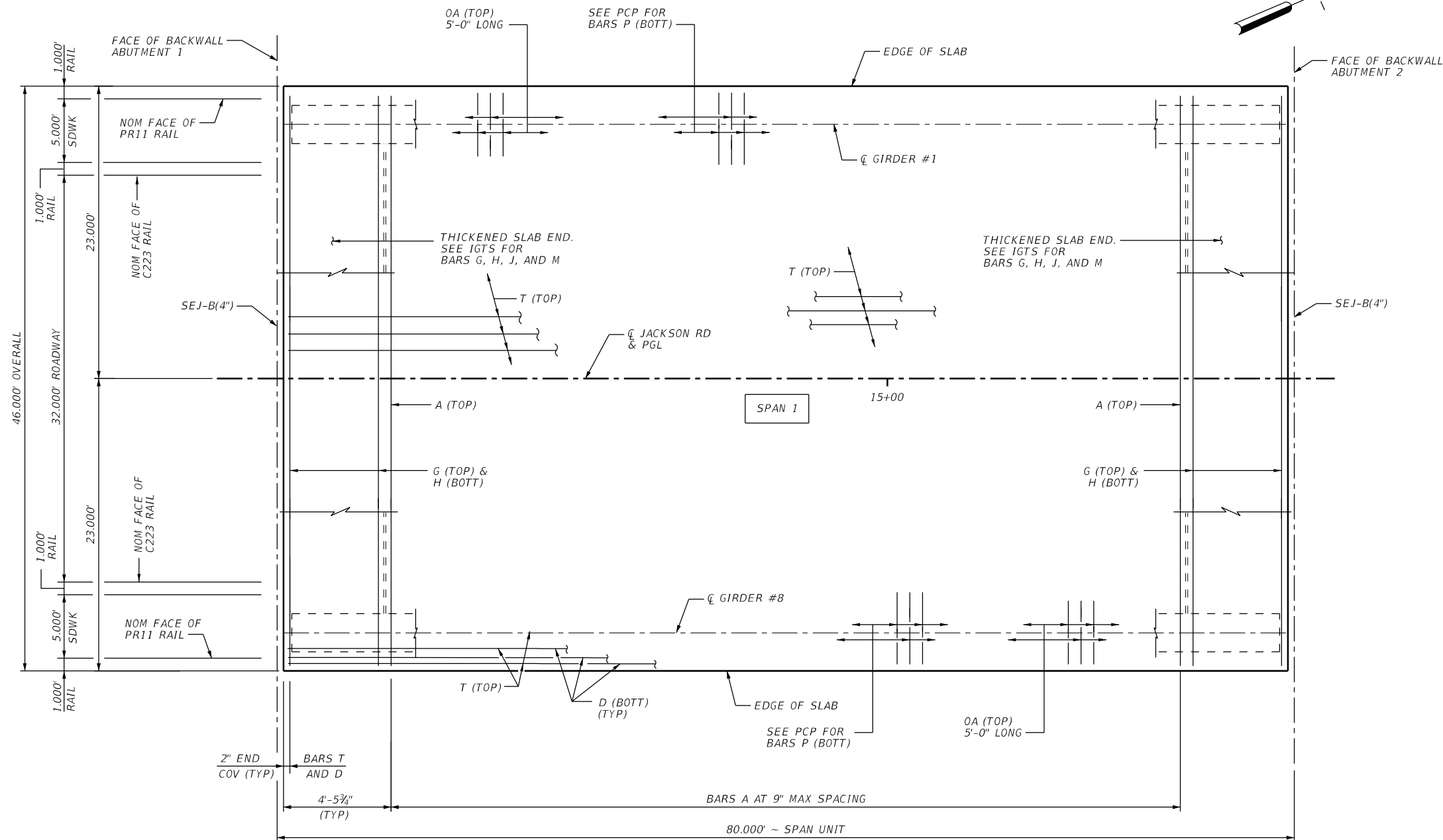
**BRIDGE FRAMING PLAN**  
JACKSON RD AT LITTLE BEAR CREEK

SCALE: N.T.S.

SHEET 10F 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	59
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	

TIME: 5:44:18 PM  
DATE: 1/25/2023



PLAN

**GENERAL NOTES:**

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (NOV 2021).

SEE IGTS STANDARD FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.

SEE IGMS STANDARD FOR MISCELLANEOUS SLAB DETAILS.

SEE PCP AND PCP-FAB STANDARDS FOR PANEL DETAILS NOT SHOWN.

SEE PCP(O) AND PCP(O)-FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.

SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

SEE C223 AND PR11 STANDARDS FOR RAIL ANCHORAGE IN SLAB.

SEE SEJ-B STANDARD FOR DETAILS OF JOINT TO BE PLACED WITHIN SLAB.

CONCRETE COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE.

**MATERIAL NOTES:**

PROVIDE CLASS "S" CONCRETE (HPC) ( $f'_c = 4,000$  psi).

PROVIDE GRADE 60 REINFORCING STEEL (EPOXY COATED).

BAR LAPS, WHERE REQUIRED, ARE AS FOLLOWS:

EPOXY COATED ~ #4 = 2'-5"  
#5 = 3'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, P OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.

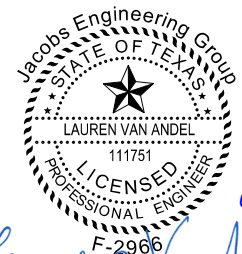
**TABLE OF ESTIMATED QUANTITIES**

SPAN	REINF CONCRETE SLAB (HPC)	PRESTR CONCRETE GIRDERS	REINF STEEL	STR STL (MISC NON-BRIDGE)
		(Tx28) ③	① ②	LB
NO.	SF	LF	LB	LB
1	3,680	636.00	8,464	271
TOTAL	3,680	636.00	8,464	271

**BAR TABLE**

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

- ① FOR CONTRACTOR'S INFORMATION ONLY.
- ② REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.
- ③ QUANTITIES SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE. SEE FRAMING PLAN SHEET FOR GIRDER LENGTHS.



02/08/2023

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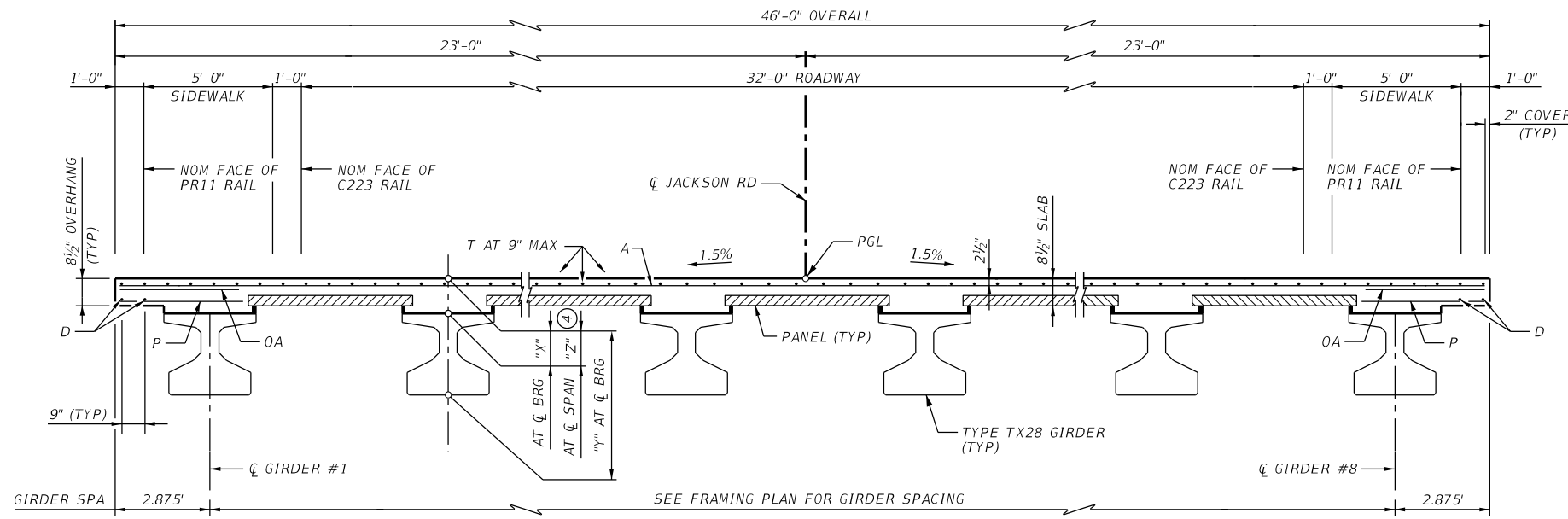
**80.00' PRESTRESSED CONCRETE GIRDER SPAN**  
JACKSON RD AT LITTLE BEAR CREEK

SCALE: NTS

SHEET 10F 2

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	60
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	

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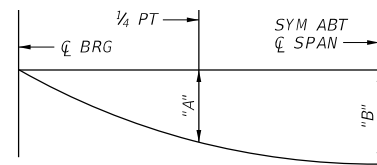


TYPICAL TRANSVERSE SECTION  
(SPAN 1)

④ THEORETICAL DIMENSION

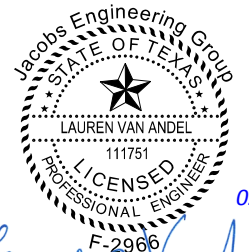
SPAN NO.	GIRDER NO.	"A" FT	"B" FT
1	1-8	-0.113	-0.161

SPAN NO.	GIRDER NO.	"X" AT $\bar{C}$ BRG	"Y" AT $\bar{C}$ BRG	"Z" AT $\bar{C}$ SPAN
1	1-8	10 1/2"	38 1/2"	12 1/4"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS AND CAST-IN-PLACE CONCRETE SLAB ONLY ( $E_c = 5000$  ksi). ADJUST DEFLECTIONS BASED ON FIELD OBSERVATIONS AS NEEDED.



02/08/2023

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80.00' PRESTRESSED  
CONCRETE GIRDER SPAN  
JACKSON RD AT LITTLE BEAR CREEK

SCALE: NTS

SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	61
CHECK LVA	CONTROL	SECTION	JOB	
	0902	90	132	

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DATE: FILE:

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				LOAD RATING FACTORS			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					DESIGN LOAD COMP STRESS (TOP $\epsilon$ ) (SERVICE I) fct(ksi)					DESIGN LOAD TENSILE STRESS (BOTT $\epsilon$ ) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR		STRENGTH I		SERVICE III	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" $\epsilon$ (in)		"e" END (in)	NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)			MINIMUM 28 DAY COMP STRGTH f'c (ksi)	Moment	Shear	Inv	Opr	Inv
JACKSON RD BRIDGE AT LITTLE BEAR CREEK	1	ALL	Tx28		32	0.6	270	9.11	5.73	6	24.5	5.900	6.600	3.961	-4.490	3.098	0.482	0.652	1.73	2.24	1.09

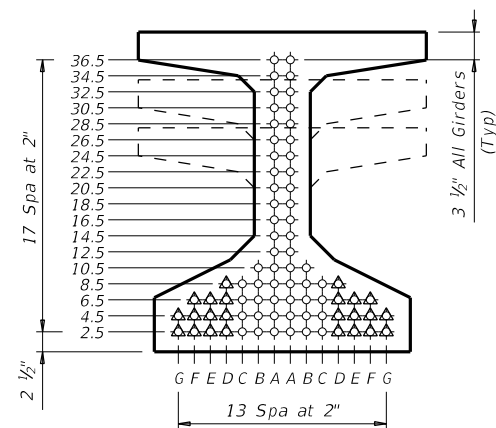
NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT $\epsilon$ OF GIRDER

- 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.

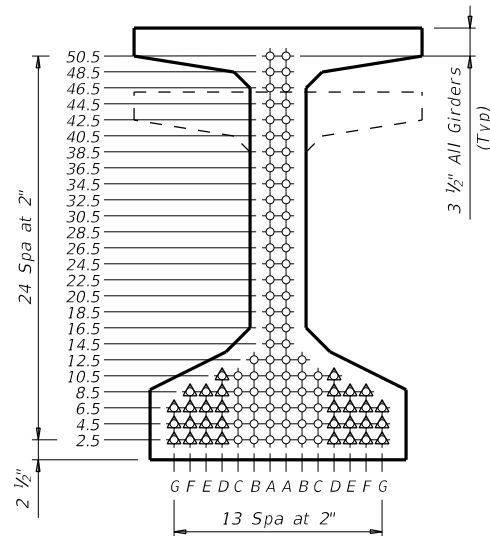
**DESIGN NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation. Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that 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.

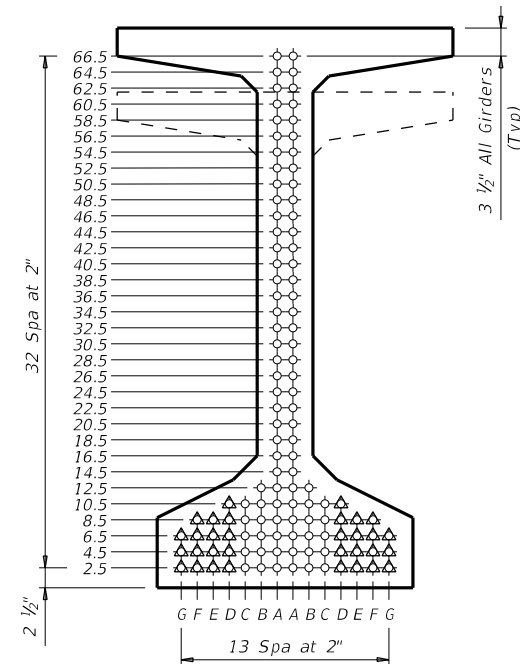
**DEPRESSED STRAND DESIGNS:**  
 Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number 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.



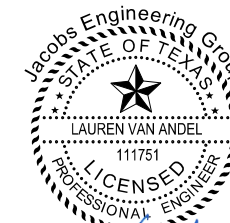
**TYPE Tx28, Tx34 & Tx40**



**TYPE Tx46 & Tx54**



**TYPE Tx62 & Tx70**



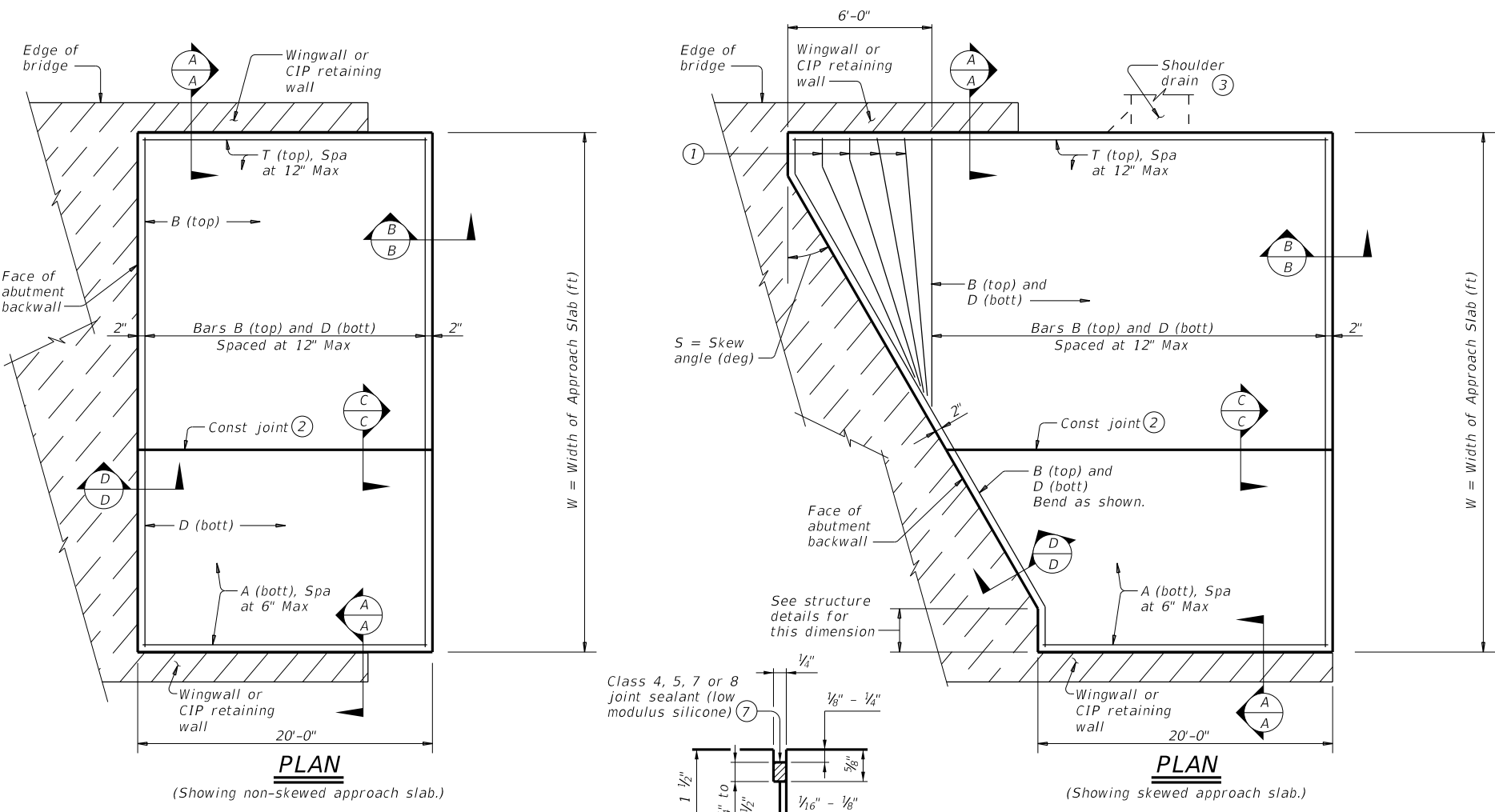
Lauren Van Andel  
 F-2966  
 03/31/2023

HL93 LOADING

Texas Department of Transportation		Bridge Division Standard	
<b>PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)</b>			
<b>IGND</b>			
FILE: 132IGND.sht	DW: TxDOT	CK: TxDOT	DW: EFC
©TxDOT August 2017	CONT	SECT	JOB
REVISIONS	0902	90	132
10-19: Modified for depressed strands only.	DIST	COUNTY	SHEET NO.
3-22: Added Load Rating	FTW	TARRANT	62

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DATE: 1/25/2023 5:45:11 PM  
 FILE: ... \Jackson\_Rd\132basaste1-20.dgn



BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

**APPROXIMATE QUANTITIES** ④

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

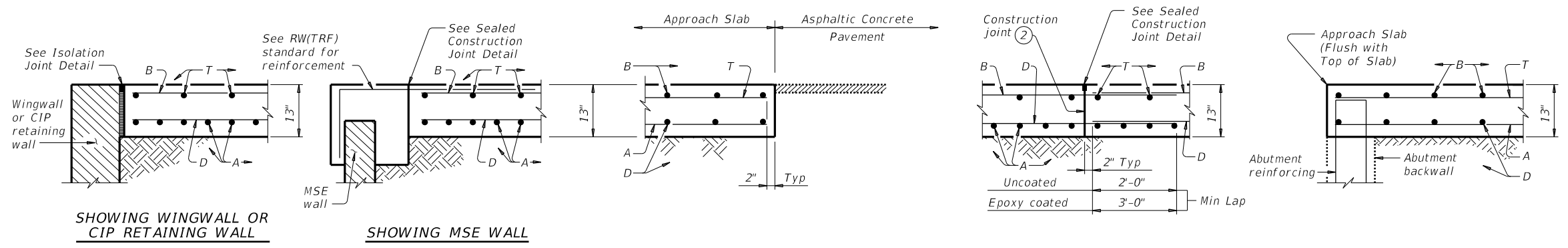
Volume of Appr Slab Conc (CY) = 0.802W + 0.02W<sup>2</sup> Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

- ① Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.
- ② Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.
- ③ See details elsewhere in plans for shoulder drain location and details.
- ④ For Contractor's information only. Quantities shown are for one approach slab.
- ⑤ Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.
- ⑥ See details elsewhere in plans for required cross-slope.
- ⑦ Place in accordance with Item 438.
- ⑧ Provide backer rod that is 25% larger than joint opening and compatible with the sealant.
- ⑨ If bridge rail is present at the wingwall or CIP retaining wall, place 1/2" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

**LONGITUDINAL SAW CUT JOINT DETAIL**



**GENERAL NOTES:**

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 1/2" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 1/2" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

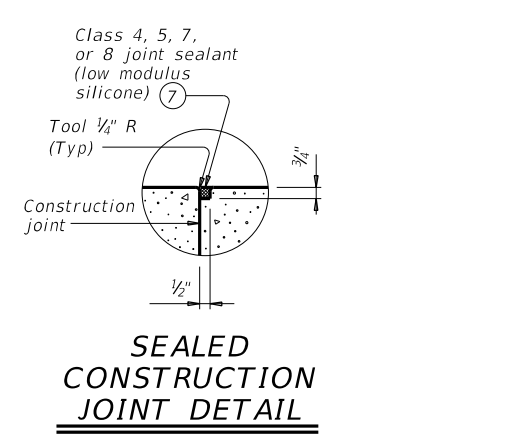
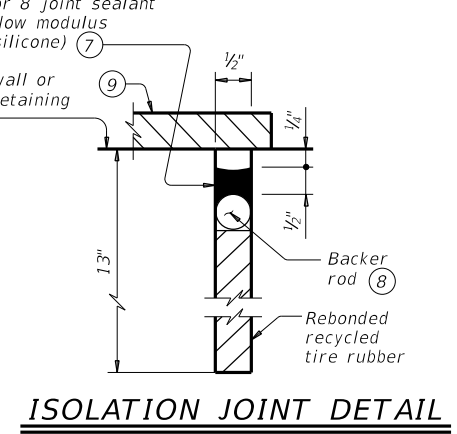
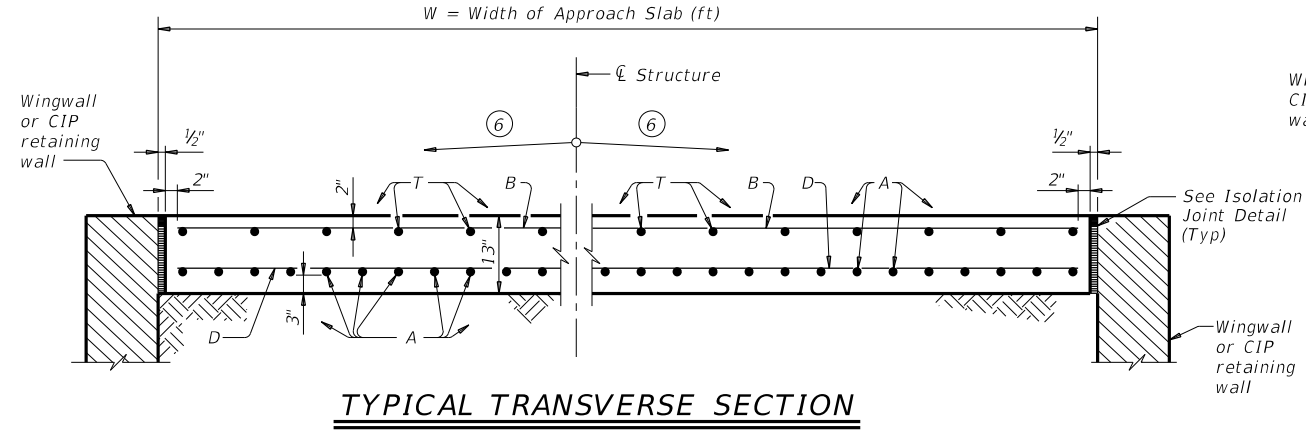
Cover dimensions are clear dimensions, unless noted otherwise.

**SECTION A-A**

**SECTION B-B**

**SECTION C-C** ⑤

**SECTION D-D**



**TYPICAL TRANSVERSE SECTION**

**ISOLATION JOINT DETAIL**

**SEALED CONSTRUCTION JOINT DETAIL**

Texas Department of Transportation  
 Bridge Division Standard

**BRIDGE APPROACH SLAB ASPHALTIC CONCRETE PAVEMENT**

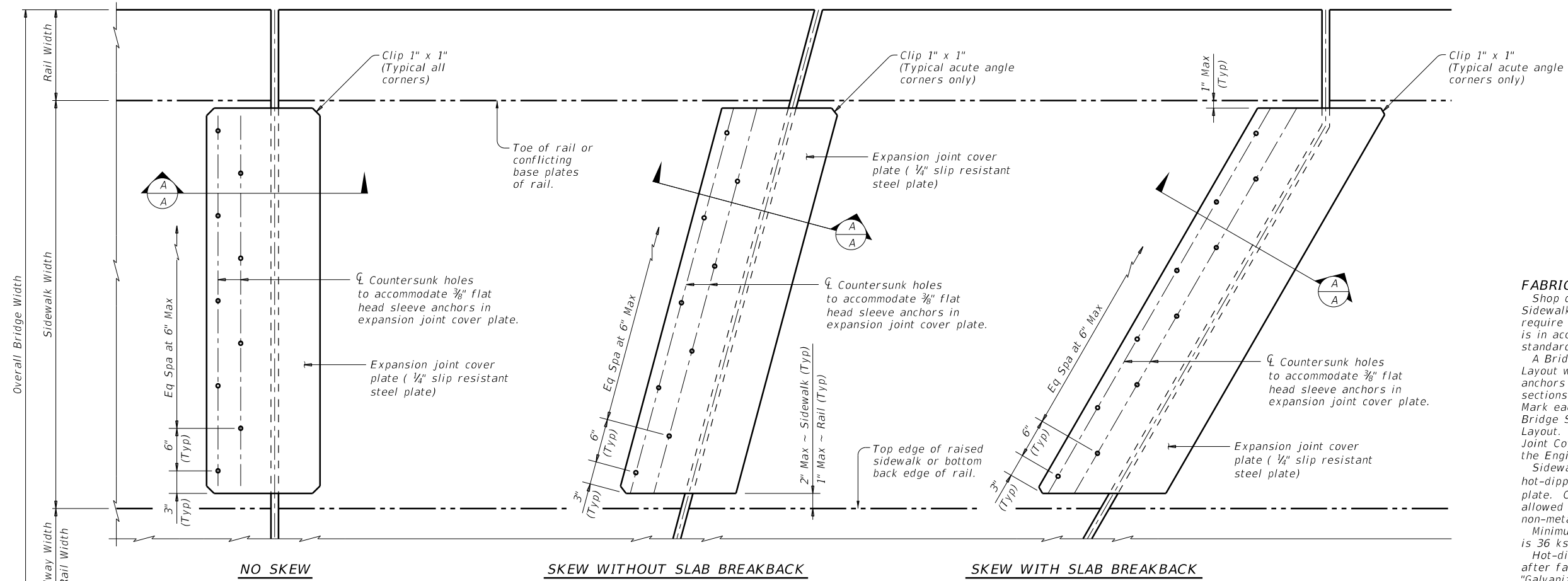
**BAS-A**

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
02-20: Removed stress relieving pad.	DIST	COUNTY	SHEET NO.	
FTW	TARRANT	63		



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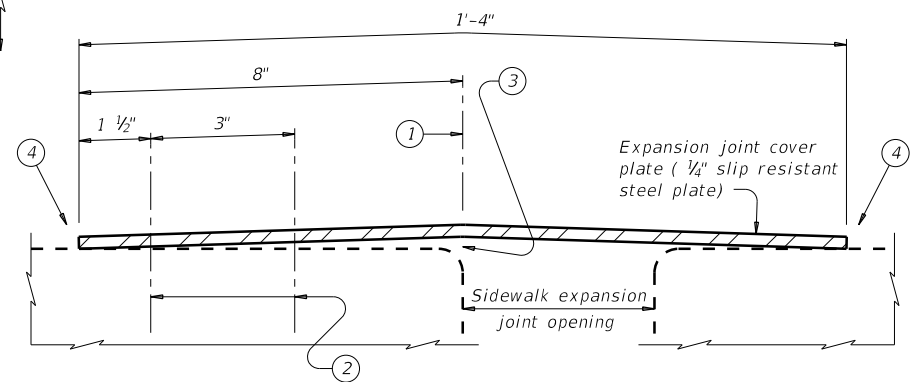
DATE: 1/25/2023 5:45:28 PM  
 FILE: ... \Jackson\_Rd\132bse\jste1-20.dgn



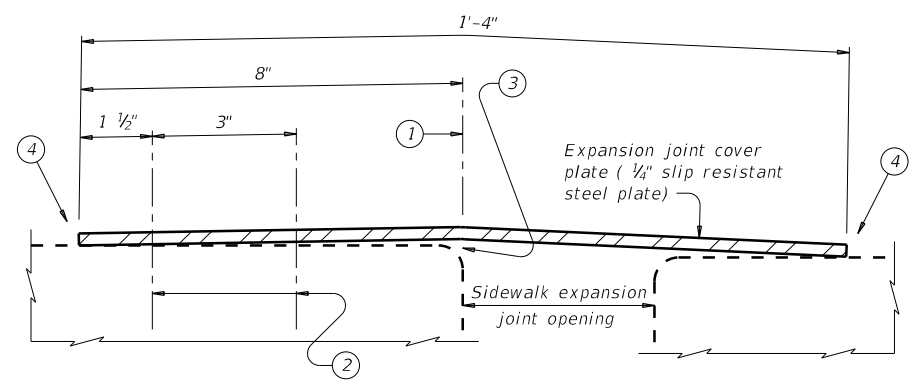
**PLAN**

**FABRICATION NOTES:**  
 Shop drawings for the fabrication of Bridge Sidewalk Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.  
 A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve anchors and orientation of all cover plate sections must be developed by the fabricator. Mark each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate Layout. A copy of the Bridge Sidewalk Expansion Joint Cover Plate Layout is to be provided to the Engineer.  
 Sidewalk expansion joint cover plates must be hot-dipped galvanized 1/4" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films and non-metallic coatings.  
 Minimum required yield strength of steel plate is 36 ksi.  
 Hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".  
 Provide stainless steel flat head sleeve anchors meeting the requirements of ASTM F 593, Group 1, Alloy 304. Countersink holes in slip-resistant plate for sleeve anchors. Drill holes in sidewalk as per sleeve anchor manufacturer's recommendations. Install sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.

**GENERAL NOTES:**  
 Sidewalk expansion joint cover plates can only accommodate up to a 7" maximum expansion joint opening.  
 Details provided are applicable to concrete walkway surfaces only.  
 Payment for sidewalk expansion joint cover plates are by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures".  
 Estimated weight of one sidewalk expansion joint cover plate is 14 plf.

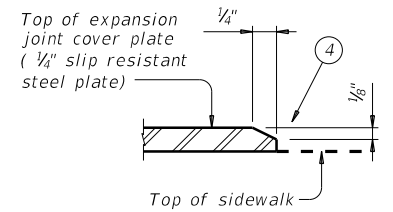


**SHOWING LEVEL EXP JOINT**



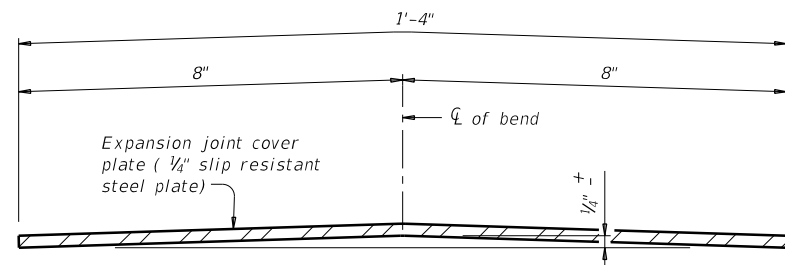
**SHOWING UNLEVEL EXP JOINT**  
 (Install sleeve anchors on high side of expansion joint)

**SECTION A-A**



**EXP JOINT COVER PLATE BEVEL DETAIL**

Bevel all plate edges as shown.



**BENDING DIAGRAM OF EXP JOINT COVER PLATE**

- ① Expansion joint cover plate and edge of expansion joint.
- ② 3/8" x 2 1/2" Min, Flat Head Sleeve Anchors, Stainless Steel. Countersink Flat Head Sleeve Anchors in 1/4" Slip Resistant Steel Plate.
- ③ It is not necessary to remove plate crown provided the plate is firmly secured to the sidewalk.
- ④ Transverse edges must be in contact with sidewalk surface after installation.

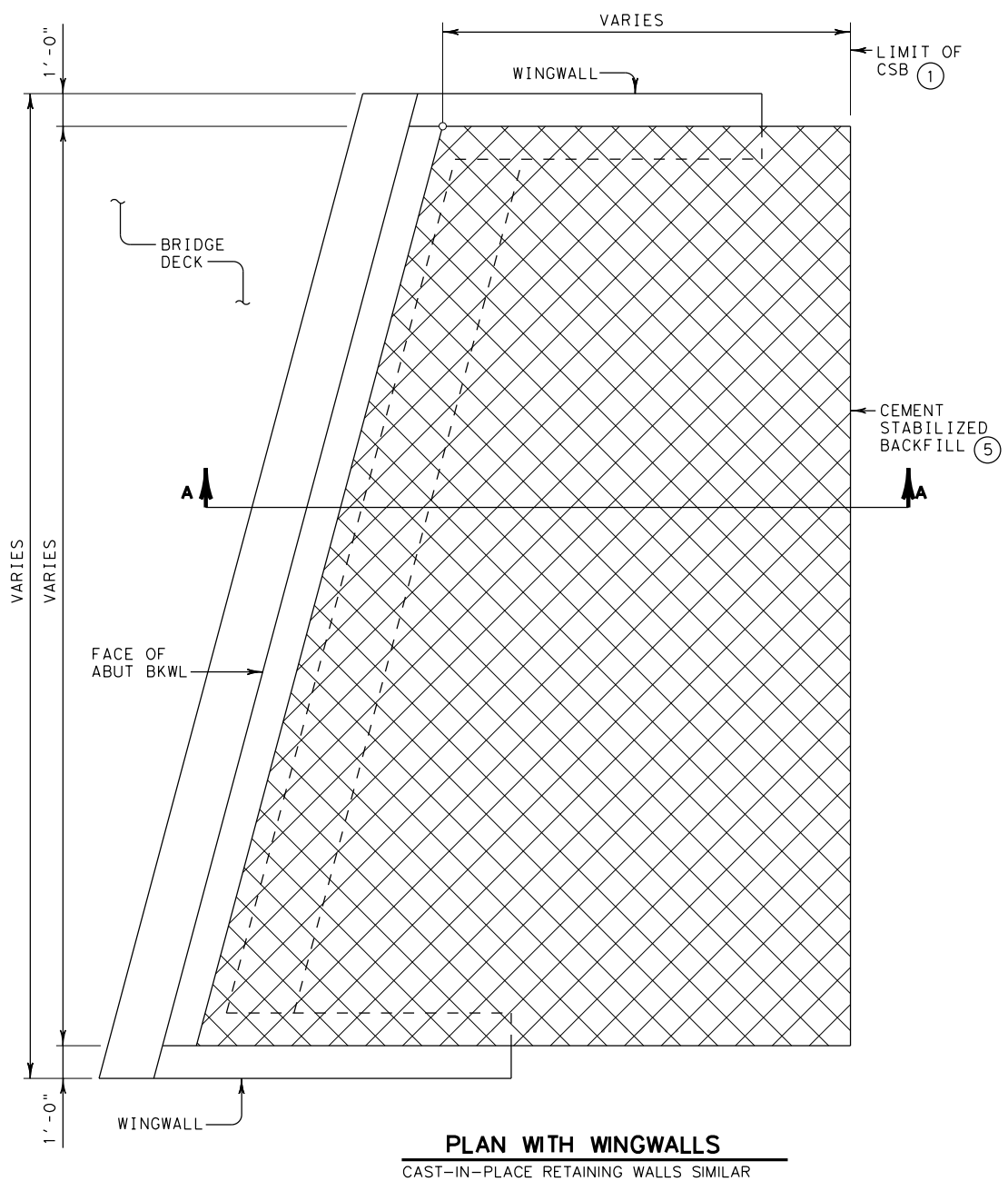
APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Provide cover plates fabricated with a product from this list. No exceptions are permitted.

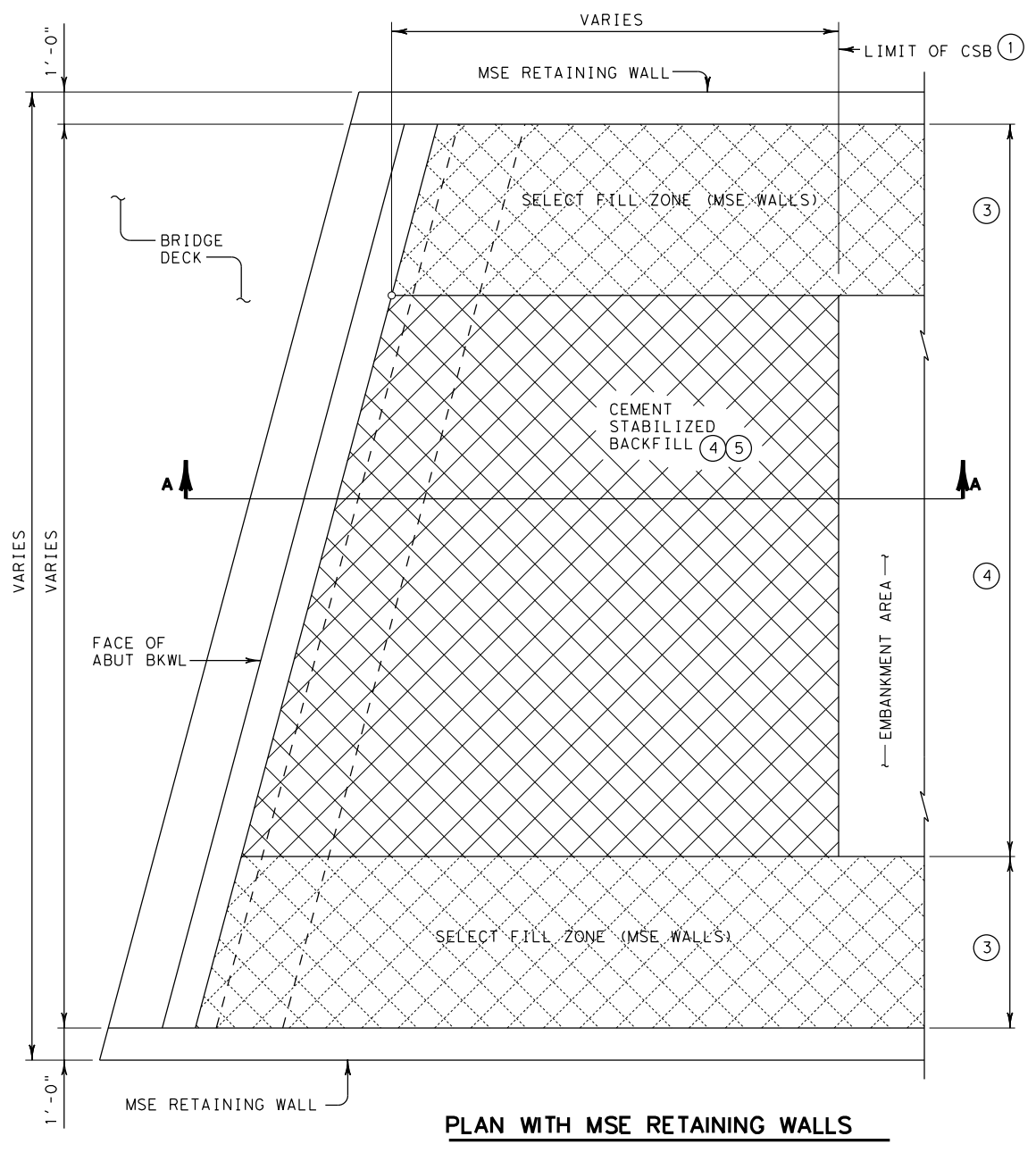
				<b>Bridge Division Standard</b>	
<b>BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)</b>					
<b>BS-EJCP</b>					
FILE: bsejste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CS: TxDOT	
©TxDOT April 2019	CONTRACT	SECTION	JOB	HIGHWAY	
REVISIONS	0902	90	132		CS
8-20: Closer tolerances on cover plate.	DISTRICT	COUNTY			SHEET NO.
	FTW	TARRANT			<b>64</b>

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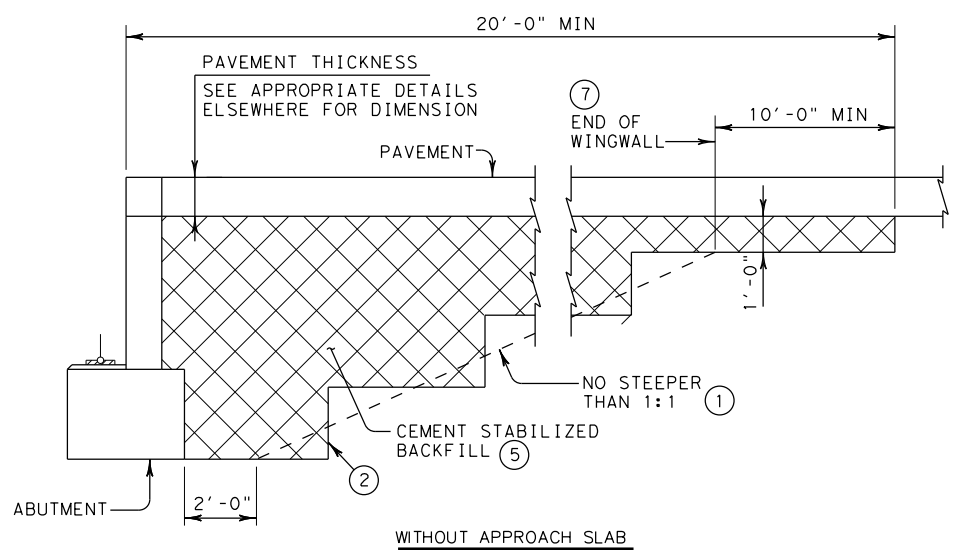
http://www.dot.state.tx.us/ftw/specinfo/standard.htm  
 1/25/2023 5:45:46 PM  
 \$PATH\$  
 ... \Jackson Rd\132csab-ftw.dgn



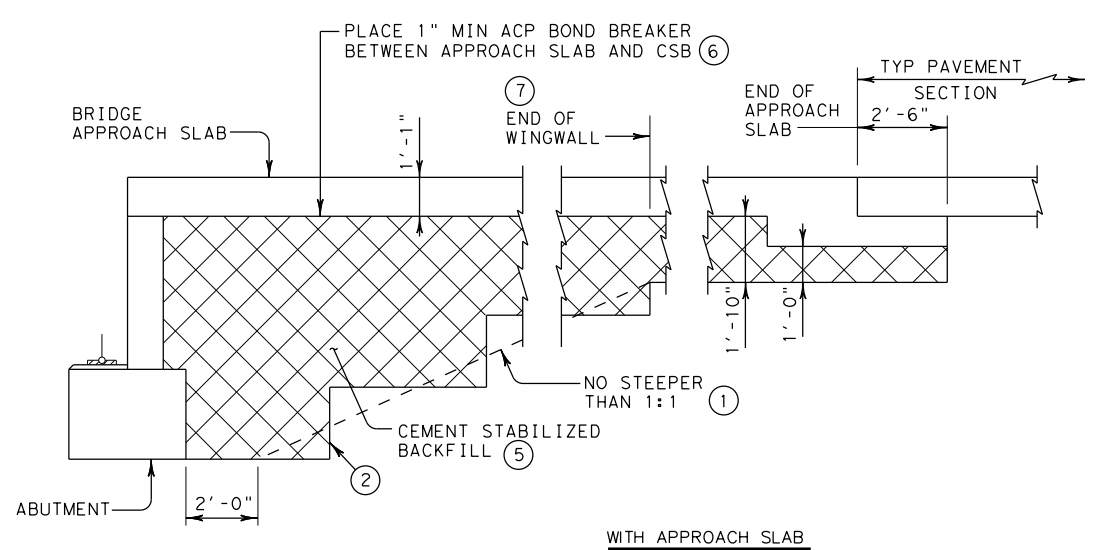
**PLAN WITH WINGWALLS**  
 CAST-IN-PLACE RETAINING WALLS SIMILAR



**PLAN WITH MSE RETAINING WALLS**



**WITHOUT APPROACH SLAB**



**WITH APPROACH SLAB**  
 (SHOWING BAS-C, BAS-A SIMILAR)

**GENERAL NOTES**

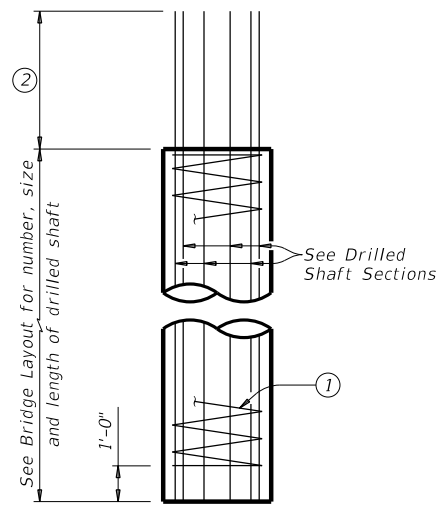
1. PROVIDE CEMENT STABILIZED BACKFILL (CSB) MEETING THE REQUIREMENTS OF ITEM 400, "EXCAVATION AND BACKFILL FOR STRUCTURES", TO THE LIMITS SHOWN AT BRIDGE ABUTMENTS. PLACE CSB IN ACCORDANCE WITH ITEM 400.
2. DETAILS ARE DRAWN SHOWING LEFT FORWARD SKEW. SEE BRIDGE LAYOUT FOR ACTUAL SKEW.
3. THESE DETAILS DO NOT APPLY WHEN CONCRETE BLOCK RETAINING WALLS ARE USED IN LIEU OF WINGWALLS. CONTACT THE BRIDGE DIVISION FOR MORE INFORMATION.
- ① USUAL LIMIT OF CEMENT STABILIZED BACKFILL IS AT 20' FROM BACK OF ABUTMENT BACKWALL, IF NO APPROACH SLAB, OR AT END OF SUPPORT SLAB IF APPROACH SLAB IS USED.
- 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 APPROVED BY THE ENGINEER, "NON-EXCAVATABLE" FLOWABLE BACKFILL, AS DEFINED BY ITEM 401, TABLE 2, MAY BE USED AS A SUBSTITUTE FOR CEMENT STABILIZED BACKFILL, WITH THE FOLLOWING CONSTRAINTS:
  - a. IF FLOWABLE BACKFILL IS TO BE PLACED OVER MSE BACKFILL, PLACE A FILTER FABRIC OVER THE MSE BACKFILL; AND
  - b. PLACE FLOWABLE FILL IN LIFTS NOT EXCEEDING 2 FEET IN DEPTH; PLACE EACH SUCCESSIVE LIFT WHEN THE PREVIOUS LIFT HAS STIFFENED/HARDENED (HAS LOST ITS FLOWABILITY).
  - c. NO ADJUSTMENT IN PAYMENT WILL BE MADE FOR SUBSTITUTION OF FLOWABLE FILL IN LIEU OF CEMENT STABILIZED BACKFILL.
- ⑥ OTHER MATERIALS MAY BE USED AS A BOND BREAKER IF PERMITTED BY THE ENGINEER. 2 LAYERS OF 30 LB ROOFING FELT OR 2 LAYERS OF HEAVY MIL POLYETHYLENE SHEETING ARE EXAMPLES. BOND BREAKER WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
- ⑦ 10'-0" FROM BACK OF ABUTMENT BACKWALL, IF NO WINGWALLS.

		<b>Fort Worth District Standard</b>	
<h2>CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT CSAB (FTW)</h2>			
ORIGINAL DRAWING: 05/2019	csab-ftw.dgn	PROJECT NO.	SHEET NO.
DATE	REVISIONS	(See Title Sheet)	65
05/2019	NEW STANDARD	STATE	COUNTY
11/2020	REVISE NOTES; ELIMINATE SKEWED END.	TEXAS	TARRANT
		CONT.	HIGHWAY NO.
		0902	132
		90	CS

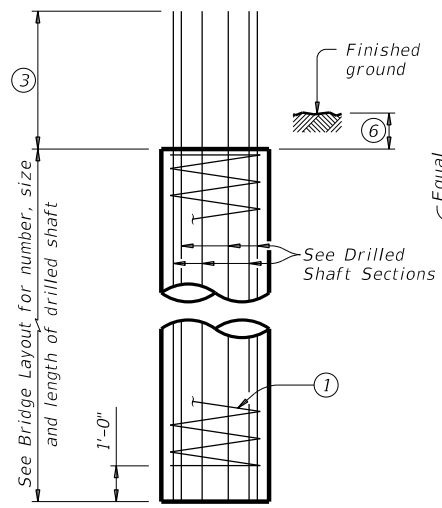
**SECTION A-A**

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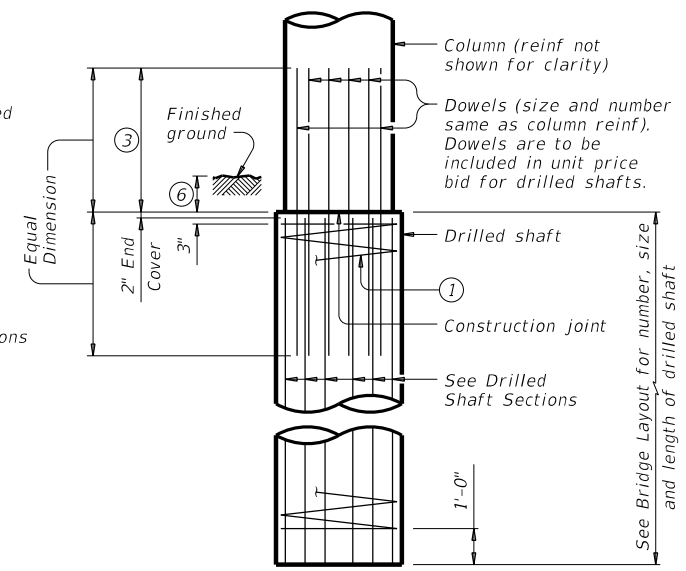
DATE: 1/25/2023 5:46:02 PM  
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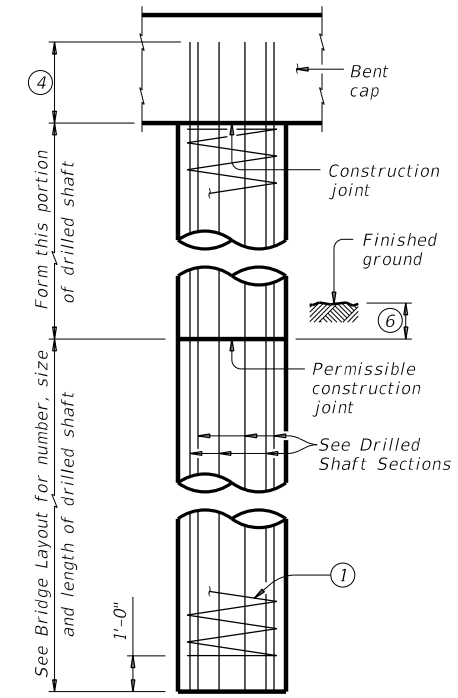
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



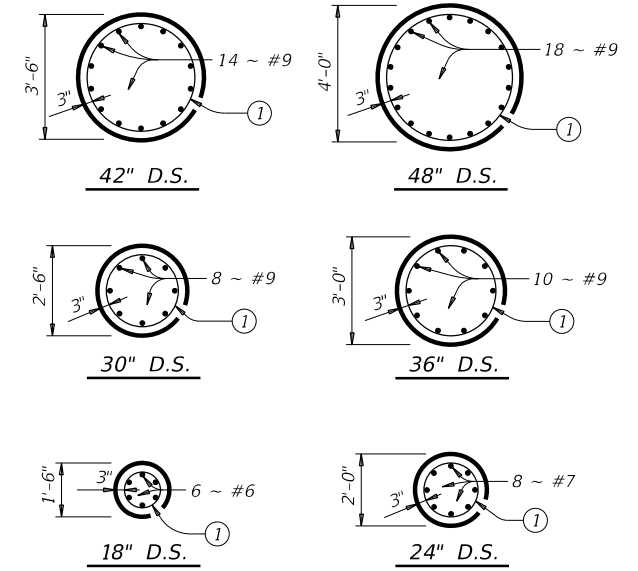
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

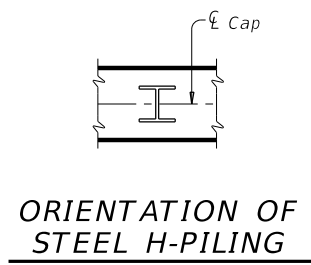


DRILLED SHAFT SECTIONS

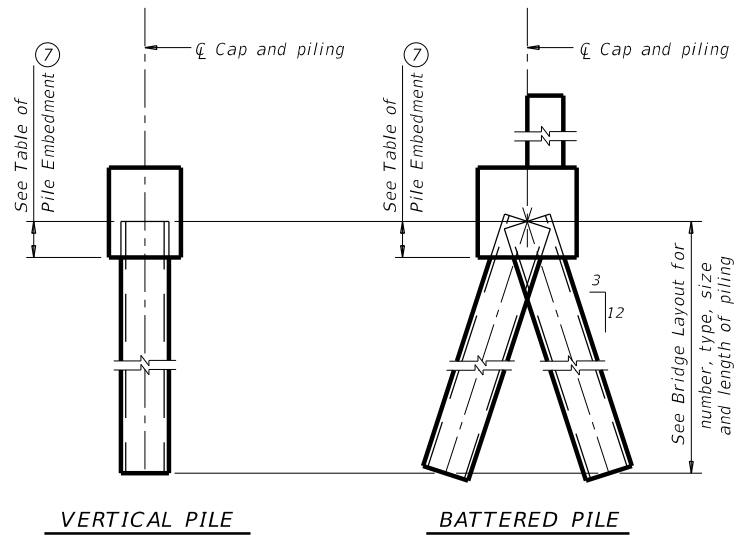
**DRILLED SHAFT DETAILS**

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.

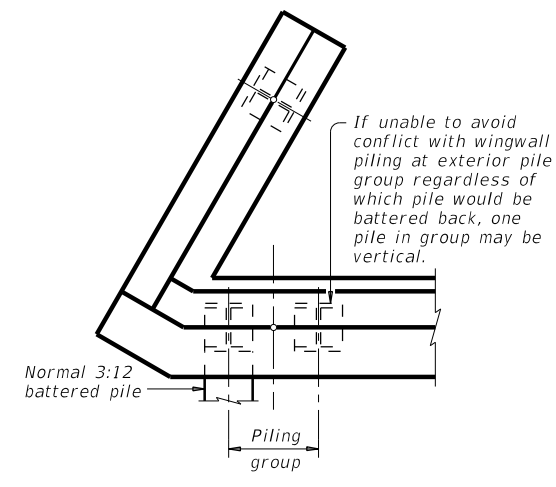


ORIENTATION OF STEEL H-PIILING



VERTICAL PILE BATTERED PILE

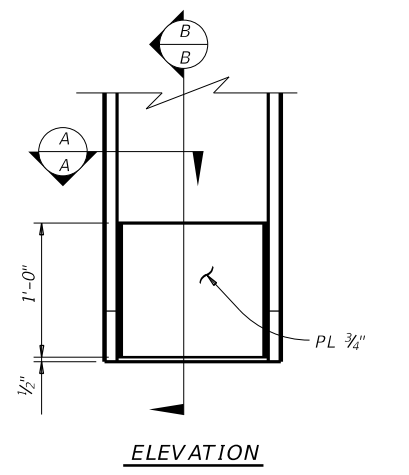
**PIILING DETAILS**  
(Concrete or steel H)



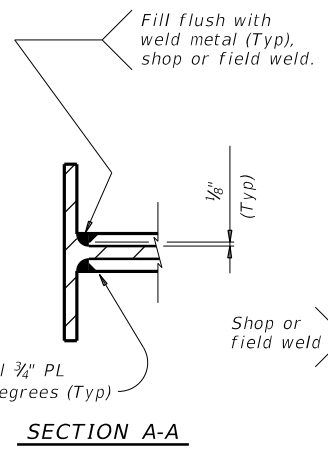
DETAIL "A"

(Showing plan view of a 30° skewed abutment)

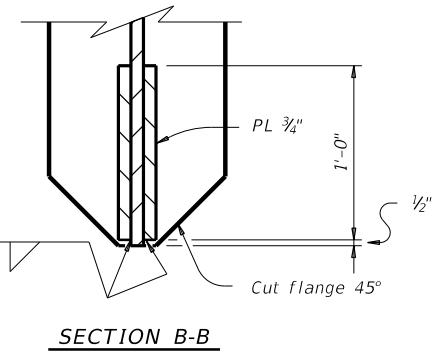
- ① #3 spiral at 6" pitch (one and a half flat turns top and bottom).
- ② Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-0"  
#9 Bars = 2'-3"
- ③ Min lap with column reinf:  
#7 Bars = 2'-11"  
#9 Bars = 3'-9"  
#11 Bars = 4'-8"
- ④ Min extension into supported element:  
#6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



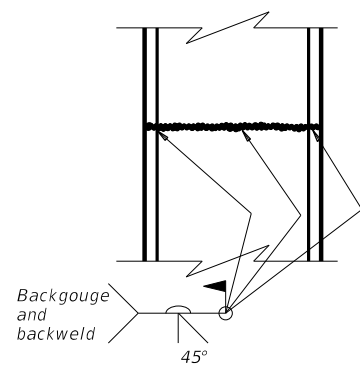
ELEVATION



SECTION A-A

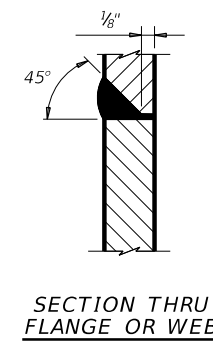


SECTION B-B



STEEL H-PILE SPLICE DETAIL

Use when required.



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.

SHEET 1 OF 2

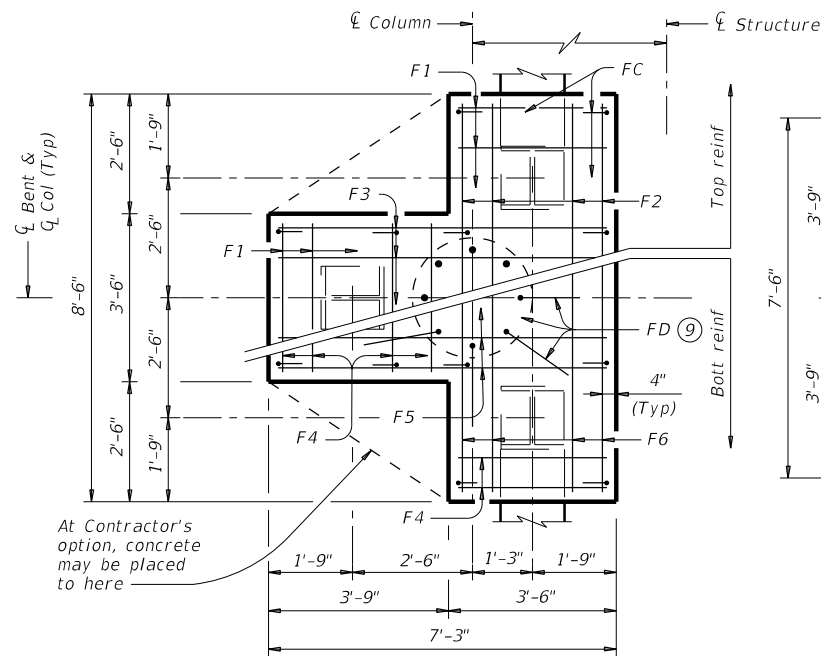
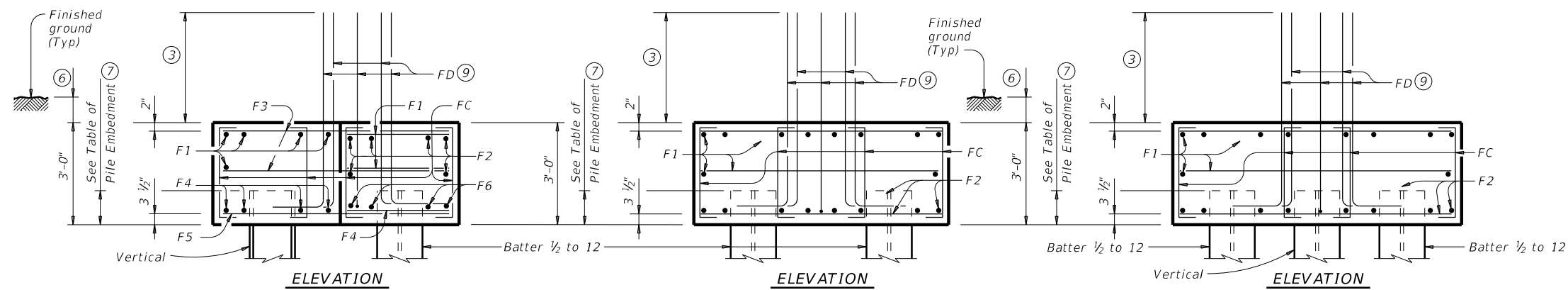
		<b>Bridge Division Standard</b>	
<b>COMMON FOUNDATION DETAILS</b>			
<b>FD</b>			
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT: 0902	SECTION: 90	JOB: 132
REVISIONS	DIST: FTW		COUNTY: TARRANT
01-20: Added #11 bars to the FD bars.	SHEET NO.		66

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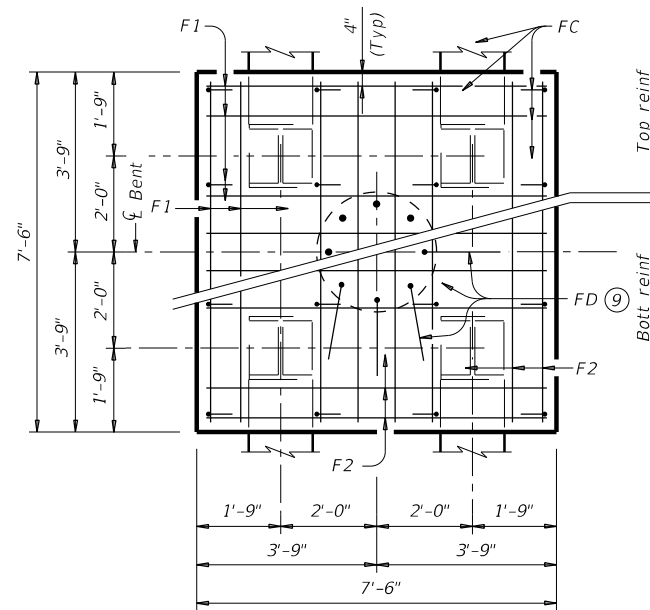
DATE: 1/25/2023 5:46:03 PM  
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### TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

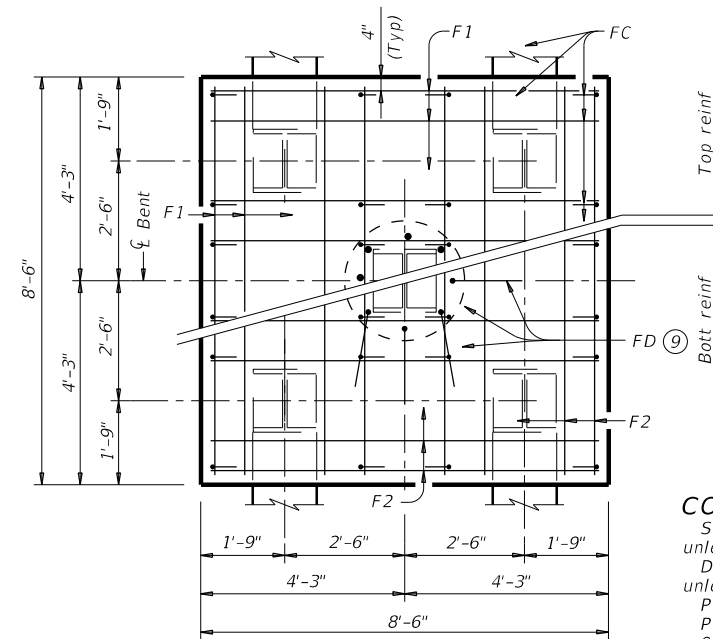
ONE 3 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	11	#4	3'- 2"	23	
F2	6	#4	8'- 2"	33	
F3	6	#4	6'- 11"	28	
F4	8	#9	3'- 2"	86	
F5	4	#9	6'- 11"	94	
F6	4	#9	8'- 2"	111	
FC	12	#4	3'- 6"	28	
FD <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	623
Class "C" Concrete				CY	4.8
ONE 4 PILE FOOTING		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



**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.

#### 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"

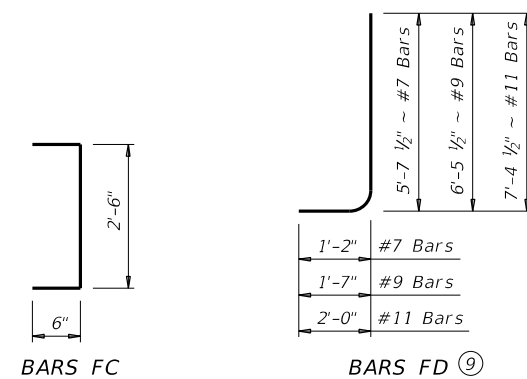
#### GENERAL NOTES:

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



- 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.



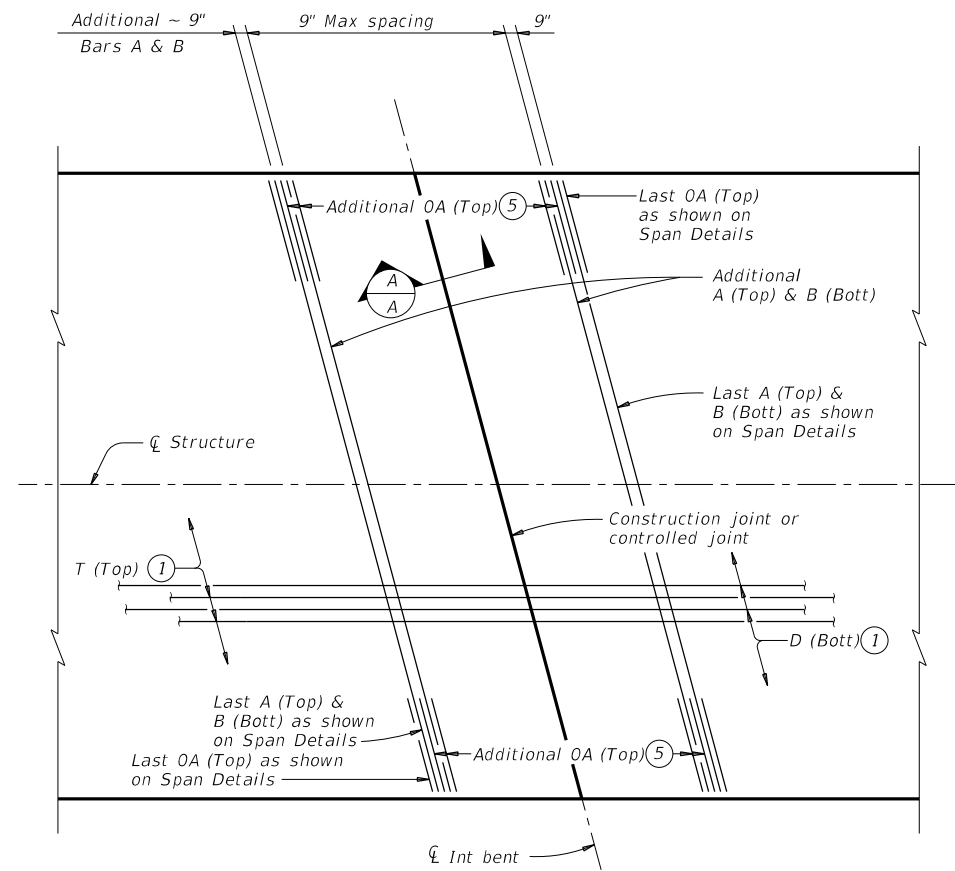
## COMMON FOUNDATION DETAILS

FD

FILE: fstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	67	

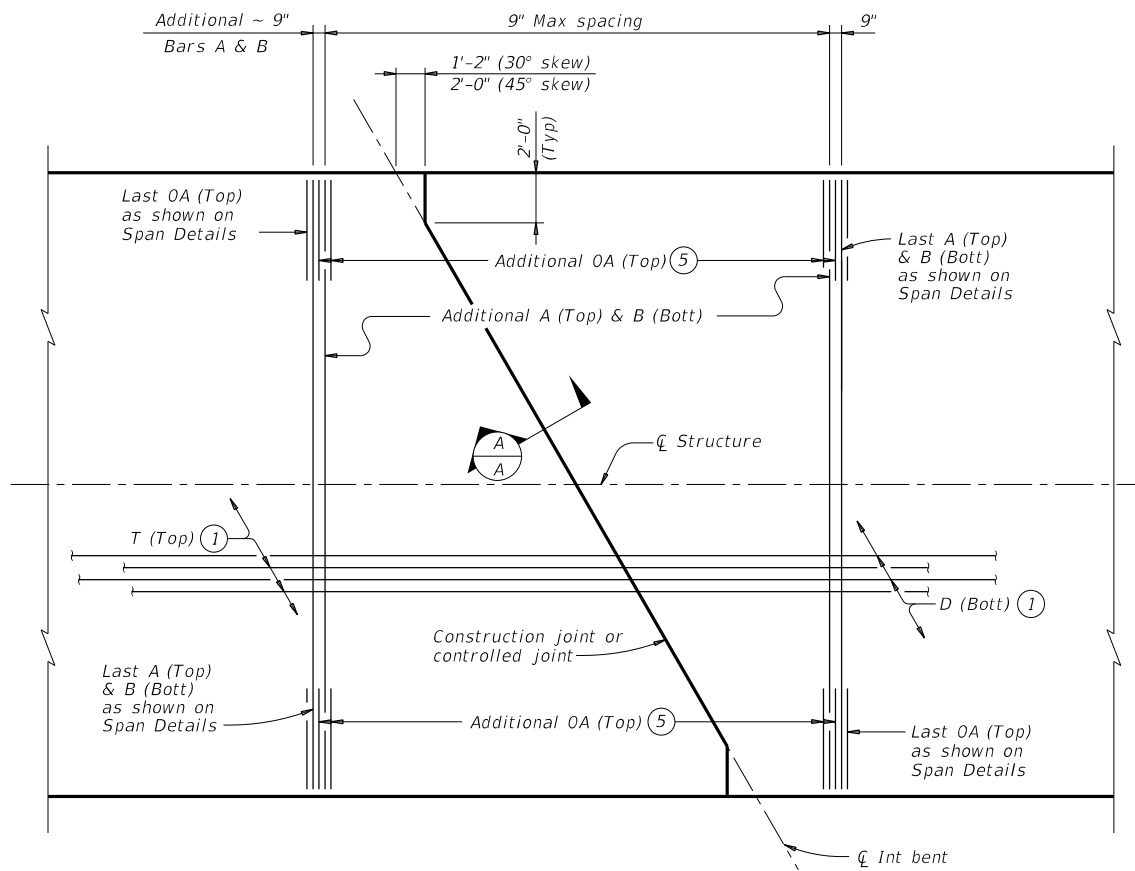
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 3/6/2023 11:06:25 AM  
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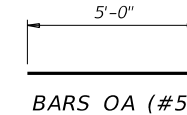
**PLAN FOR 0° OR 15° SKEW**

(Showing 15° skew)

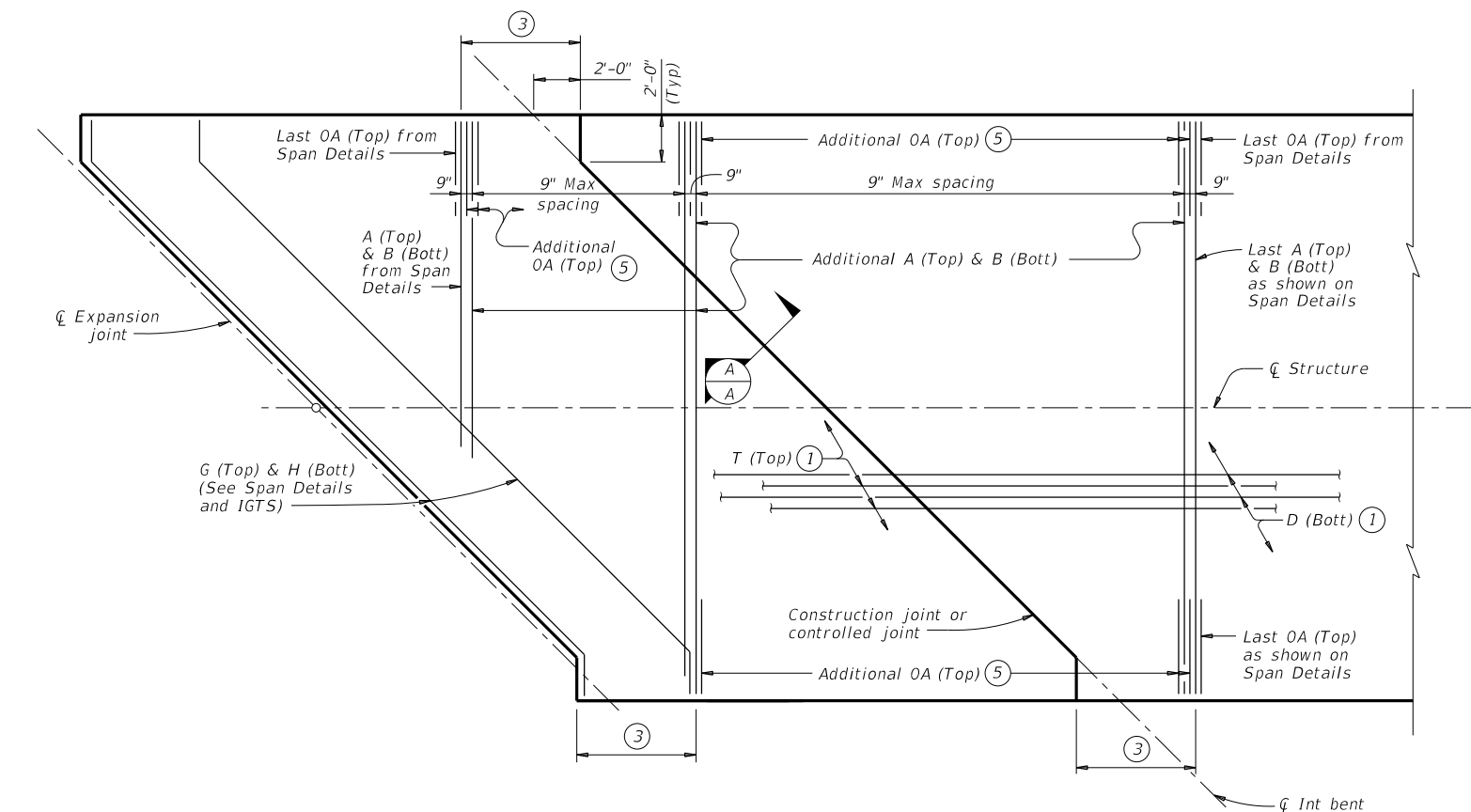


**PLAN FOR 30° OR 45° SKEW**

(Showing 30° skew)

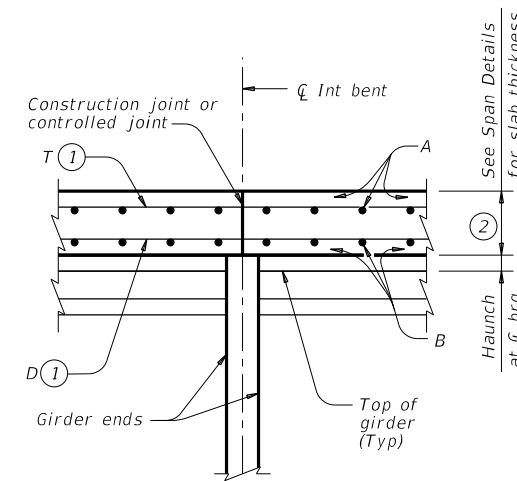


BARS OA (#5)



**PLAN FOR 45° SKEW**

(Showing short span condition.)



**SECTION A-A**

Bars OA (Top) not shown for clarity.

- ① Top and bottom mats must be continuous through joint.
- ② Maintain a constant slab thickness over the bent.
- ③ 5'-4" as shown on Span Details.
- ④ Use these details when no full slab width bars A and B are shown on Span Details.
- ⑤ Bars OA (Top) at 9" Max spacing between Bars A (Top).
- ⑥ Values in table assume a temperature change of 70° F after erection when calculating thermal movement in one direction (not total).

TABLE OF ⑥ ALLOWABLE UNIT LENGTH	
Max Rdwy Grade, Percent	Unit Length Factor
0.00	4.1
1.00	3.9
2.00	3.7
3.00	3.5
4.00	3.3
5.00	3.1

Unit length must not exceed the length of the shortest end span times the Unit Length Factor shown in table or 400', whichever is less.

The details shown on this sheet are applicable for two and three span units comprised of the same girder type. Units may be comprised of different span lengths. See "Table of Allowable Unit Length".

BAR TABLE	
BAR	SIZE
A	#4
B	#4
D	#4
T	#4
OA	#5

**GENERAL NOTES:**

Designed according to AASHTO LRFD Bridge Design Specifications.  
 This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

**CONSTRUCTION NOTES:**

Where multi-span units are indicated on the Bridge Layout, the thickened slab end details and reinforcement shown on IGTS standard (Bars AA, G, H, J, K, and M) and on the Span Details will be omitted where slabs are continuous over interior bents. At these locations, the slab details and reinforcement will be as shown on this sheet or on PCP standard (if using this option).  
 Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units).  
 See Span Details for remainder of slab reinforcement and details.

**MATERIAL NOTES:**

Provide Grade 60 reinforcing steel.  
 Provide Class "S" concrete (f'c = 4,000 psi).  
 Provide Class "S" (HPC) if shown elsewhere on the plans.  
 Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"

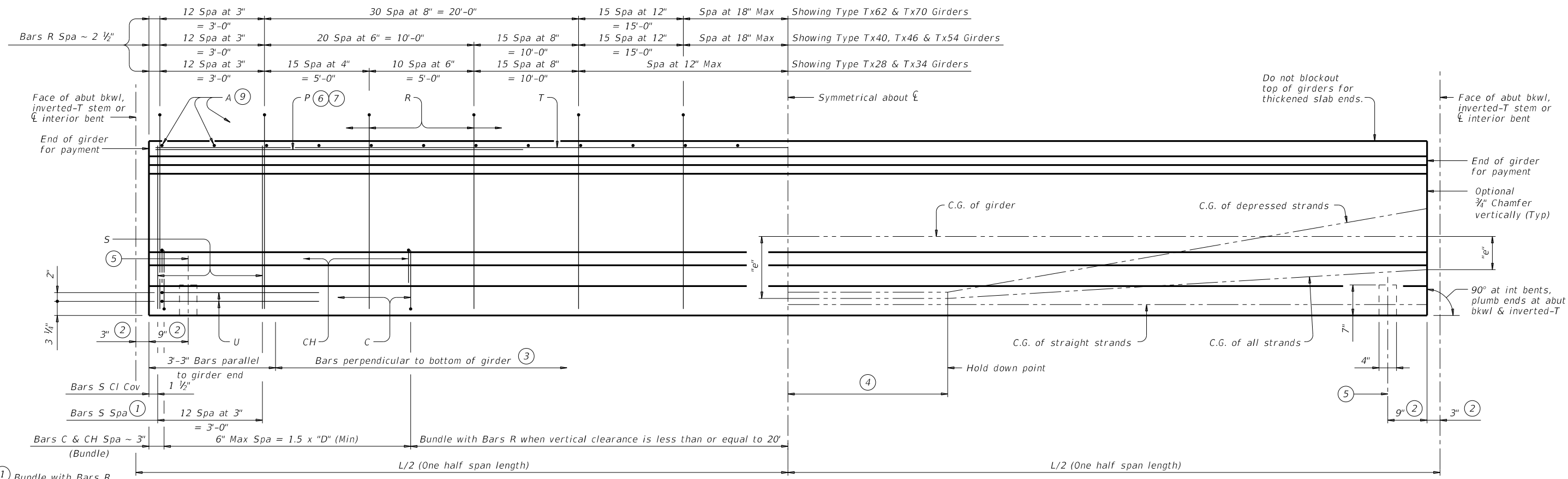
The details shown on this sheet are applicable for use only with the Prestressed Concrete I-Girder Standard Designs shown on standards IGSD-24, IGSD-28, IGSD-30, IGSD-32, IGSD-34, IGSD-38, IGSD-40 and IGSD-44.

**HL93 LOADING**

		<b>Bridge Division Standard</b>	
<b>CONTINUOUS SLAB DETAILS</b> <b>PRESTR CONC I-GIRDER SPANS</b>			
<b>IGCS</b>			
FILE: IG-IGCS-23.dgn	DN: JMH	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT	SECT	JOB
REVISIONS	0902	90	132
10-19: Added bubble note 6.	DIST	COUNTY	SHEET NO.
01-23: Added 34' Rdwy.	FTW	TARRANT	68

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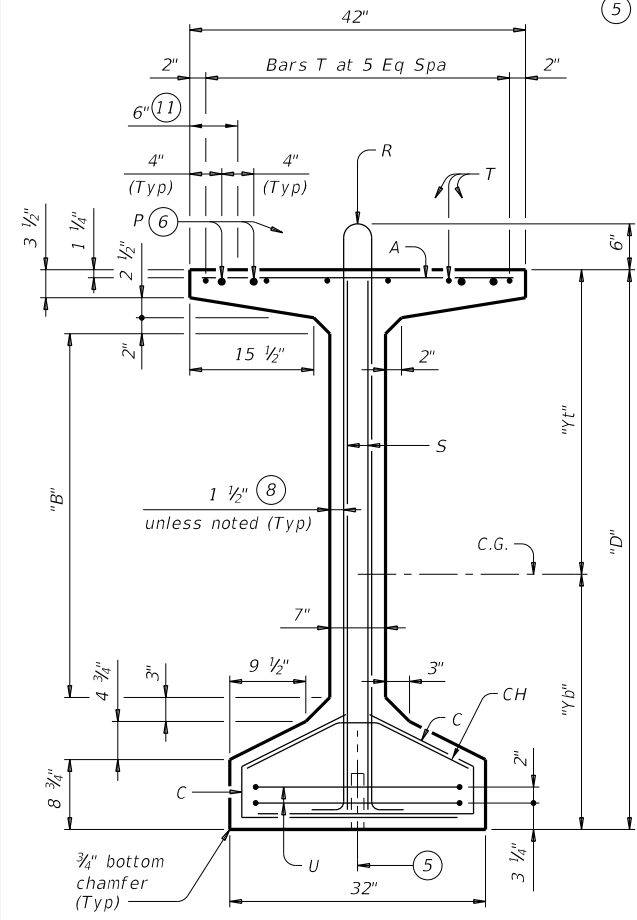
- ① Bundle with Bars R.
- ② Measured along  $\xi$  Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.
- ③ The average of the top and bottom spacing of Bars R cannot exceed the required spacing.
- ④ L/20, but not less than 5'-0" (-0,+2').

**GIRDER ELEVATION**

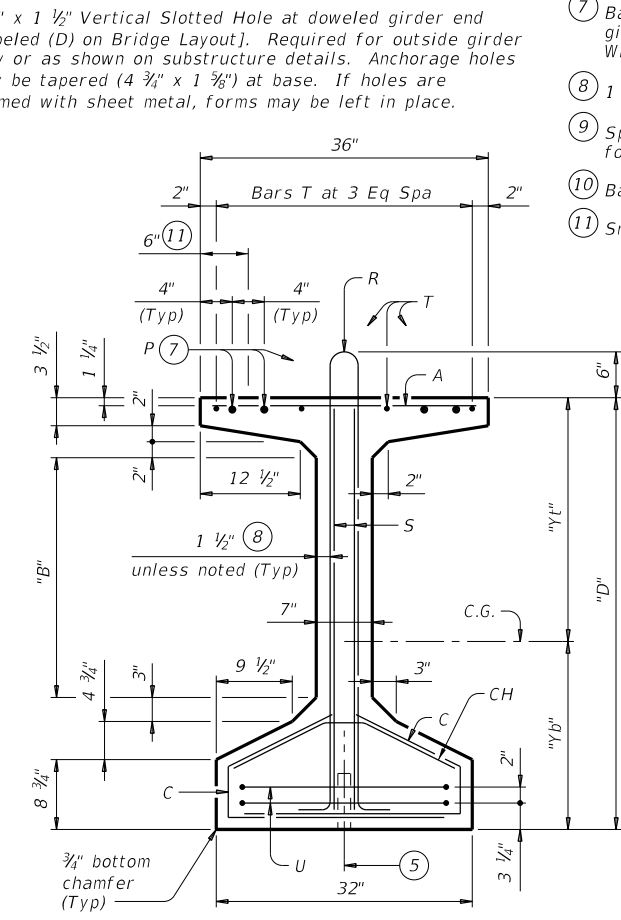
- ⑥ Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.
- ⑦ Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends 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

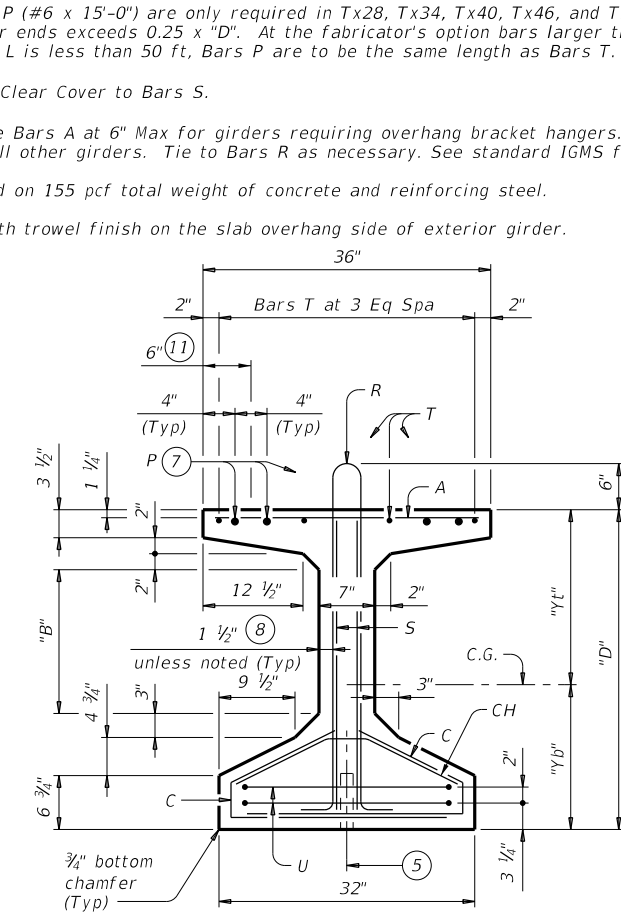
**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Provide Class H concrete. Provide Grade 60 reinforcing steel. An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted. It is permissible 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**

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation Bridge Division Standard

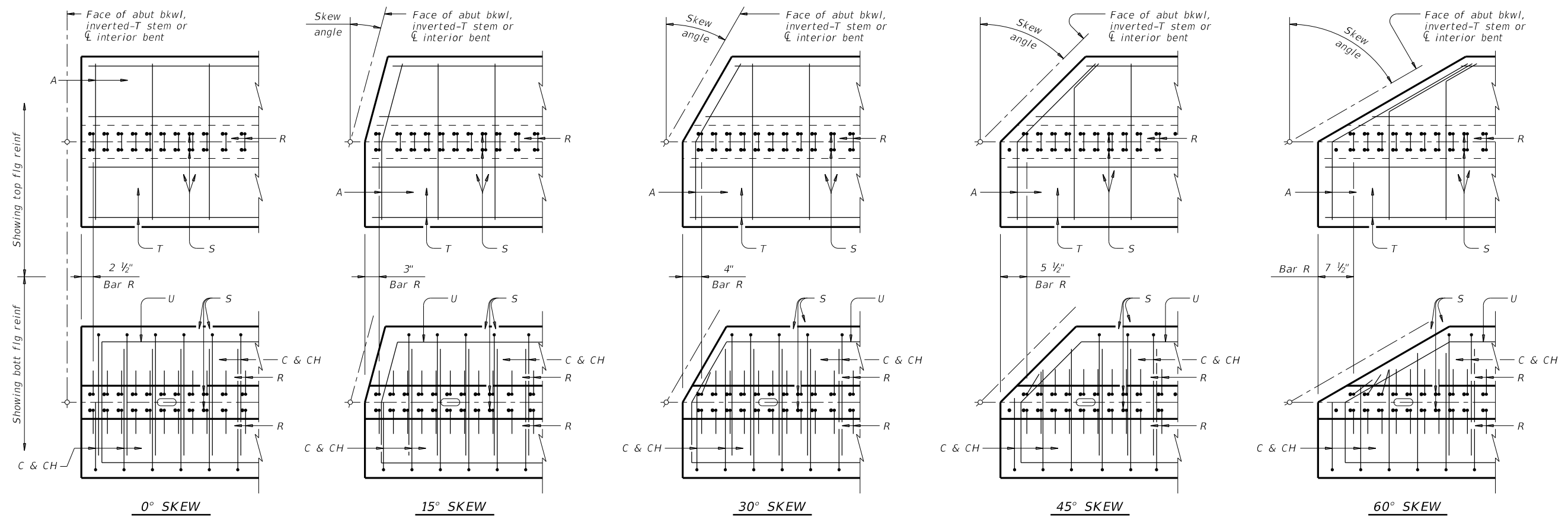
**PRESTRESSED CONCRETE I-GIRDER DETAILS**

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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10-19: Added Bars C and CH full length for VC <= 20'	DIST	COUNTY	SHEET NO.	
FTW	TARRANT	69		

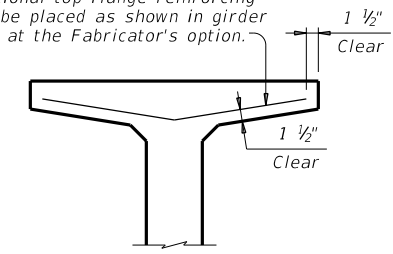
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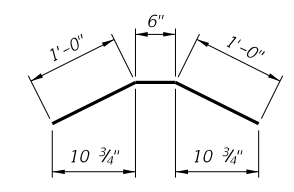


**PLAN OF GIRDER ENDS** <sup>(12)</sup>

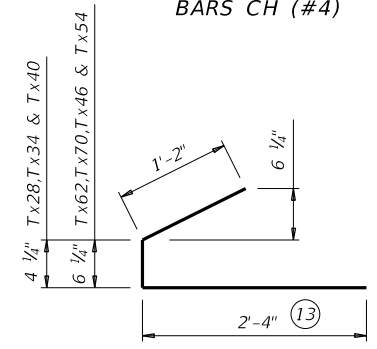
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



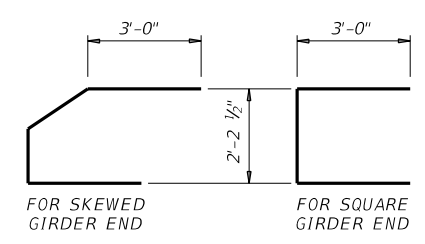
**OPTIONAL TOP FLANGE REINFORCING DETAIL**



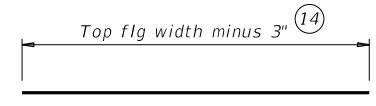
**BARS CH (#4)**



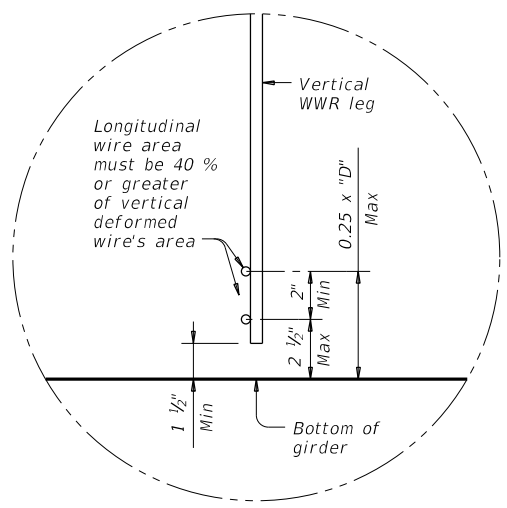
**BARS C (#4)**



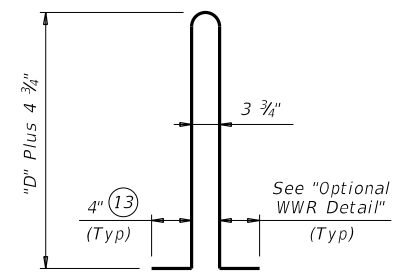
**BARS U (#5)**



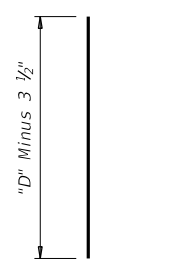
**BARS A (#3)**



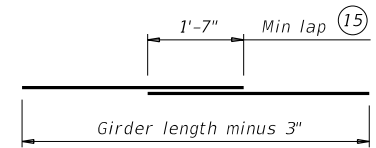
**OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL**



**BARS R (#4)** <sup>(16)</sup>



**BARS S (#6)**



**BARS T (#4)**

- <sup>(12)</sup> 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.
- <sup>(13)</sup> Bars may be cut or bent at skewed end as required.
- <sup>(14)</sup> Increase as necessary for bars at skewed end.
- <sup>(15)</sup> No portion of bar less than 10 ft.
- <sup>(16)</sup> 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.



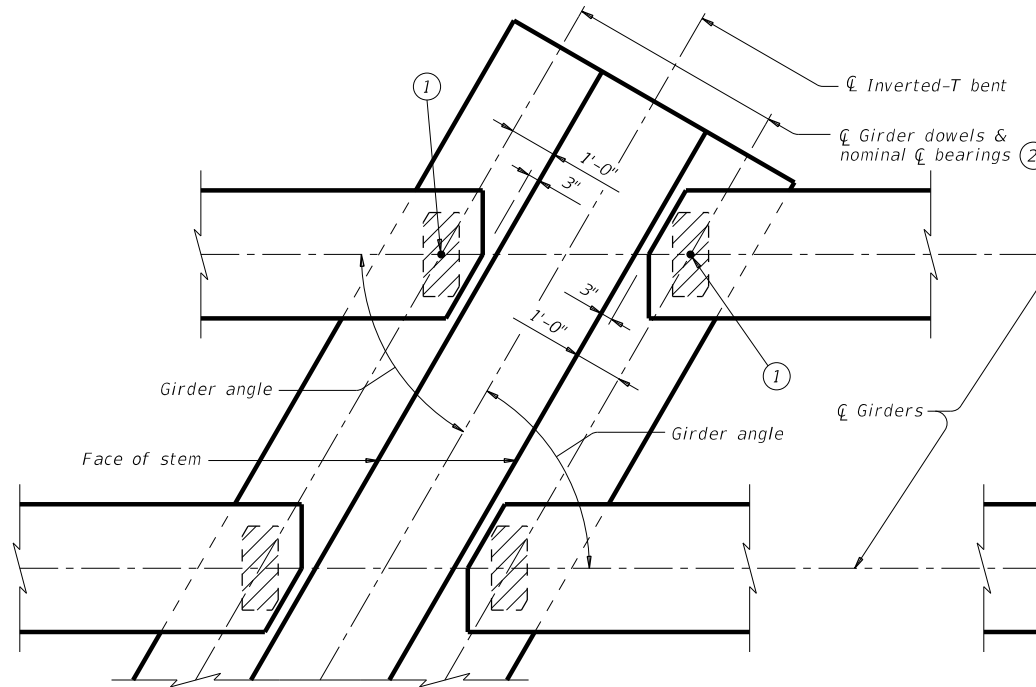
**PRESTRESSED CONCRETE I-GIRDER DETAILS**

IGD

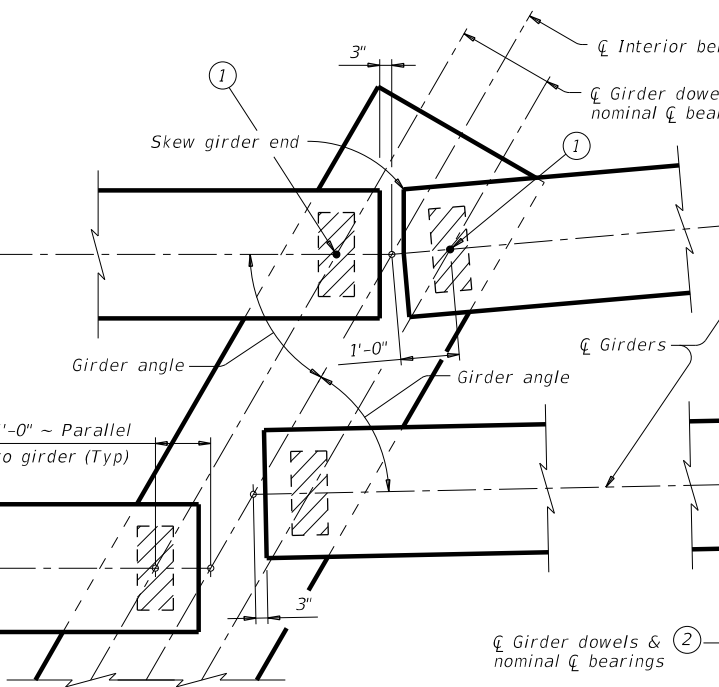
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
10-19: Added Bars C and CH full length for VC <= 20'	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	70	

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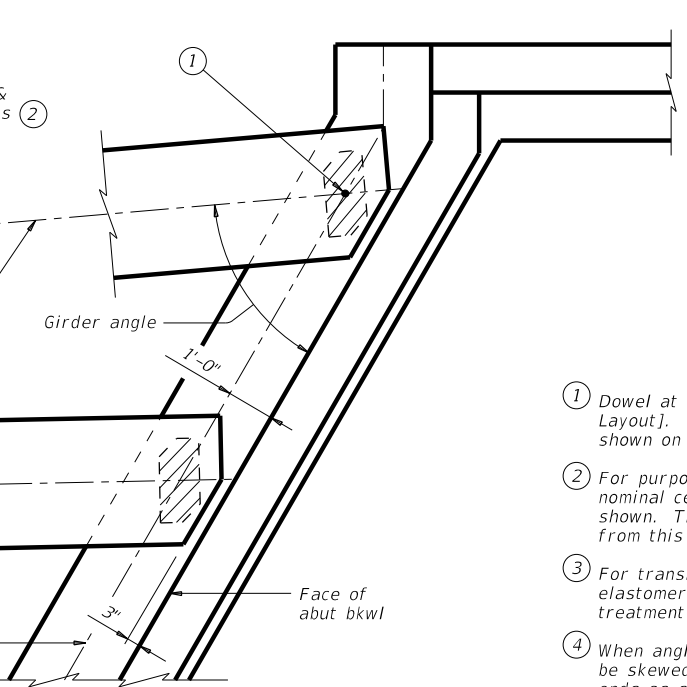
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AT INVERTED-T BENT W/SKEW

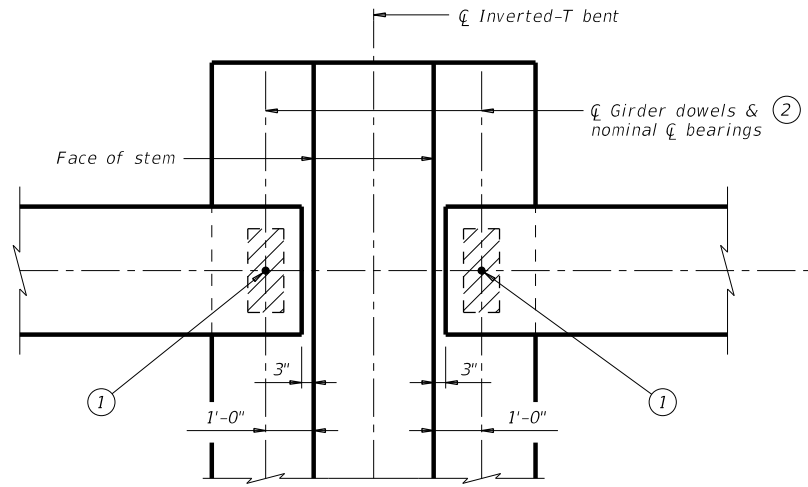


AT CONVENTIONAL INTERIOR BENT W/SKEW

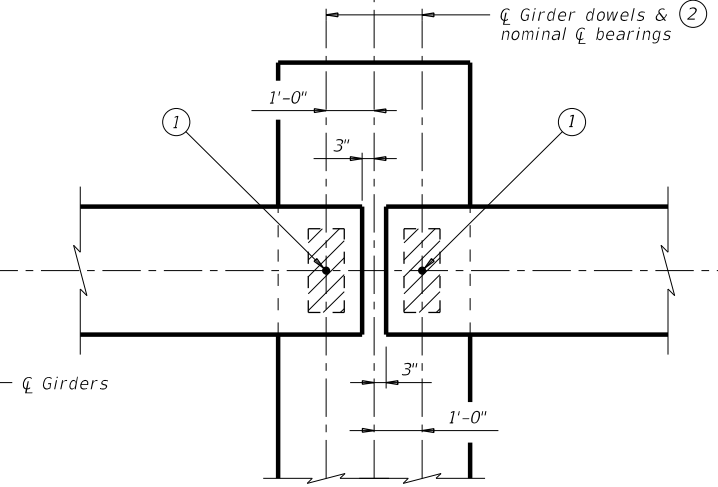


AT ABUTMENT W/SKEW

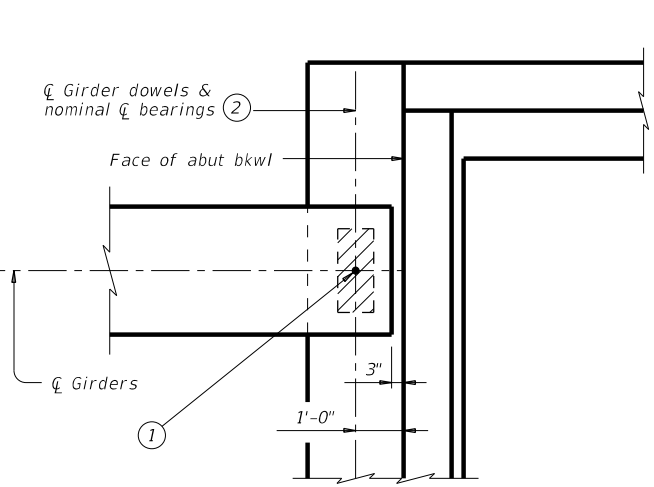
- ① Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.
- ② For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- 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 girder 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



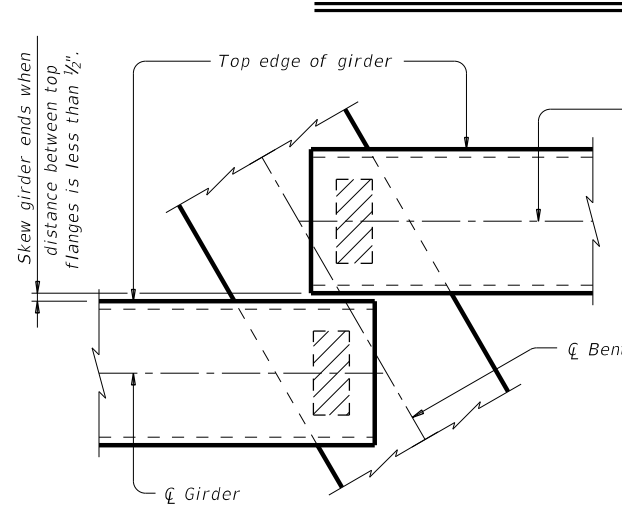
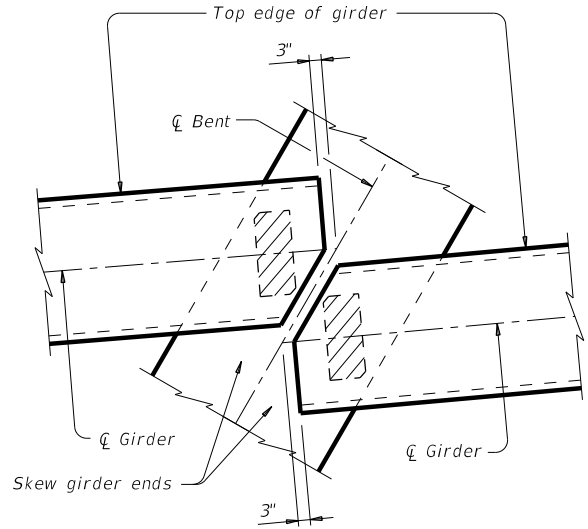
AT CONVENTIONAL INTERIOR BENT



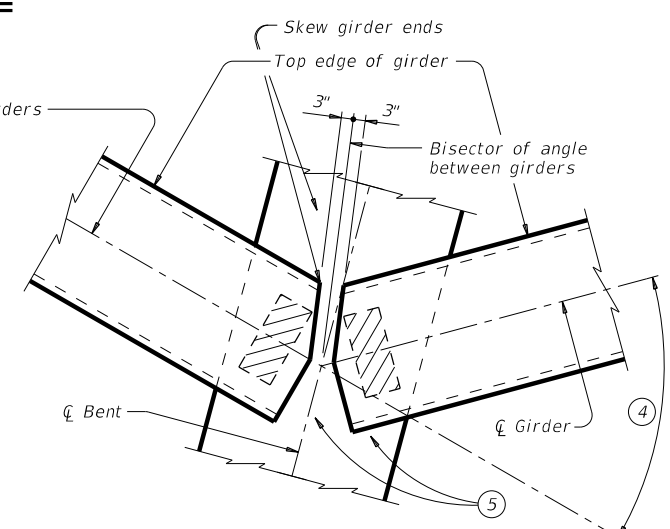
AT ABUTMENT

**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 END DETAILS**



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

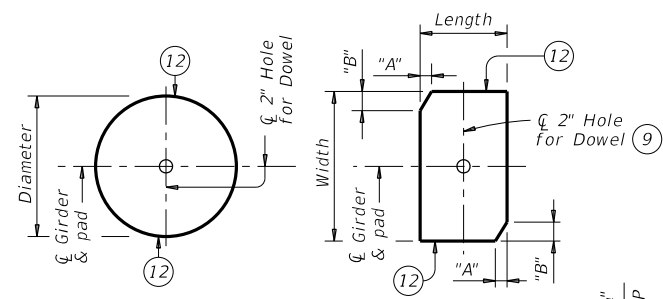
**IGEB**

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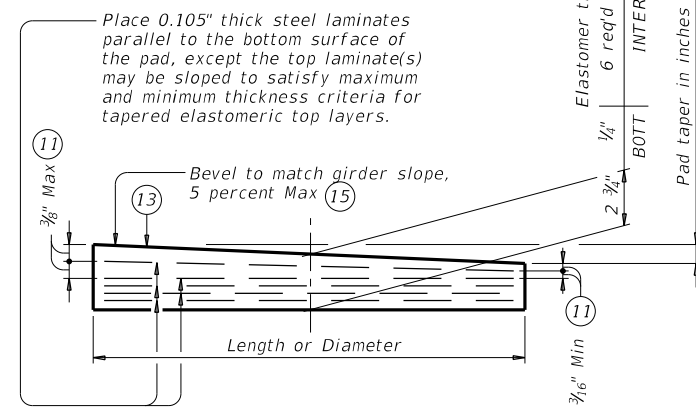


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PLANS (10)



ELEVATION

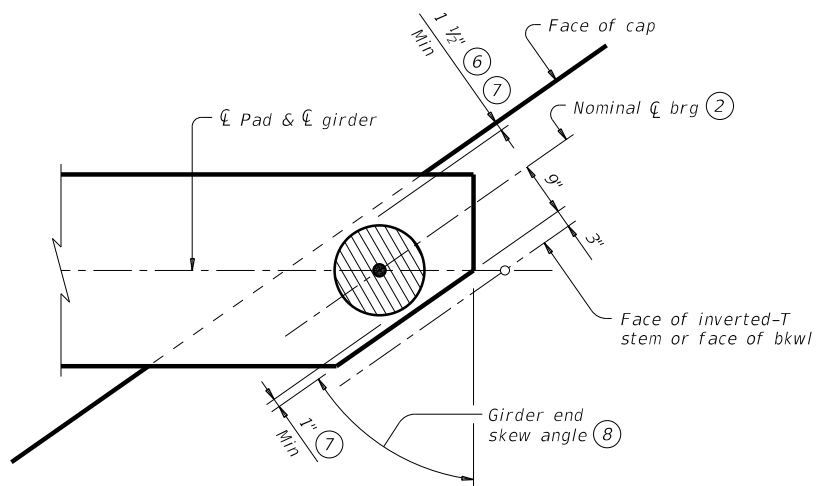
**LAMINATED ELASTOMERIC BEARING PAD**  
 (50 DUROMETER)

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

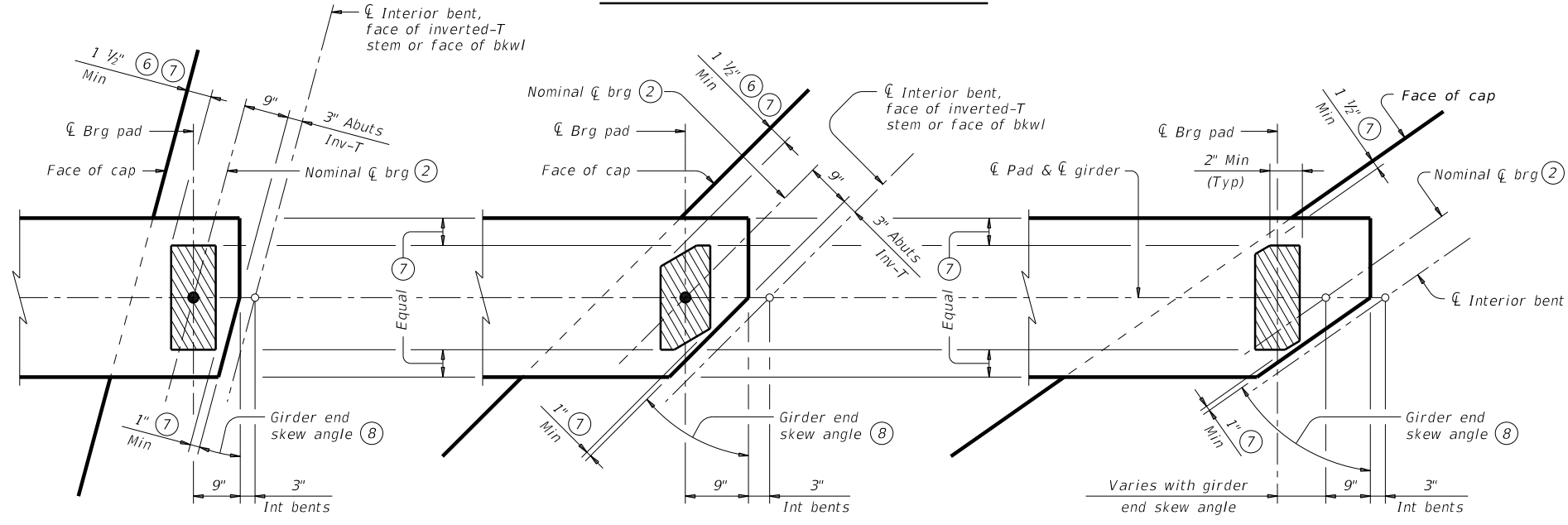
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 1/2"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 1/2"

**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-11-"N"	18°+ thru 30°	9" x 21"	---	---
G-12-"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**



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

**SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (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" / Length or Dia) 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



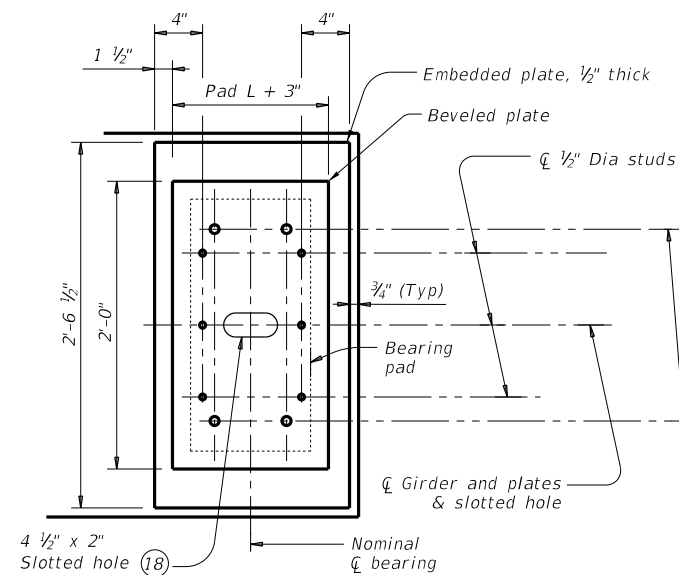
**ELASTOMERIC BEARING AND GIRDER END DETAILS PRESTR CONCRETE I-GIRDERS**

IGEB

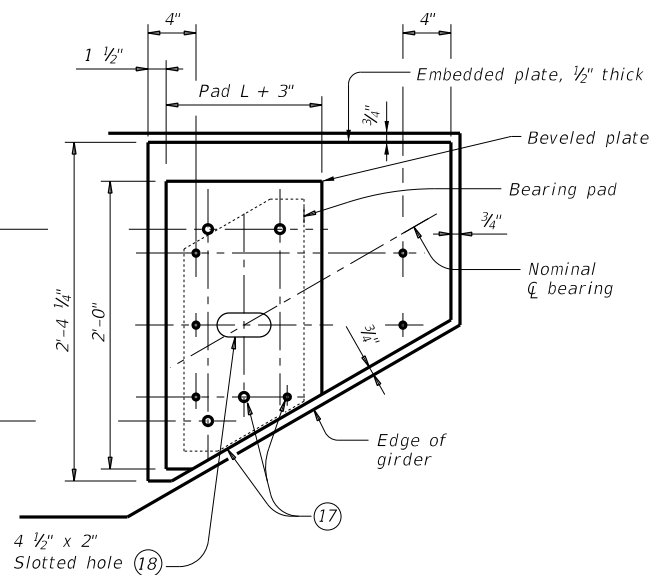
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
DIST	COUNTY		SHEET NO.	
FTW	TARRANT		72	

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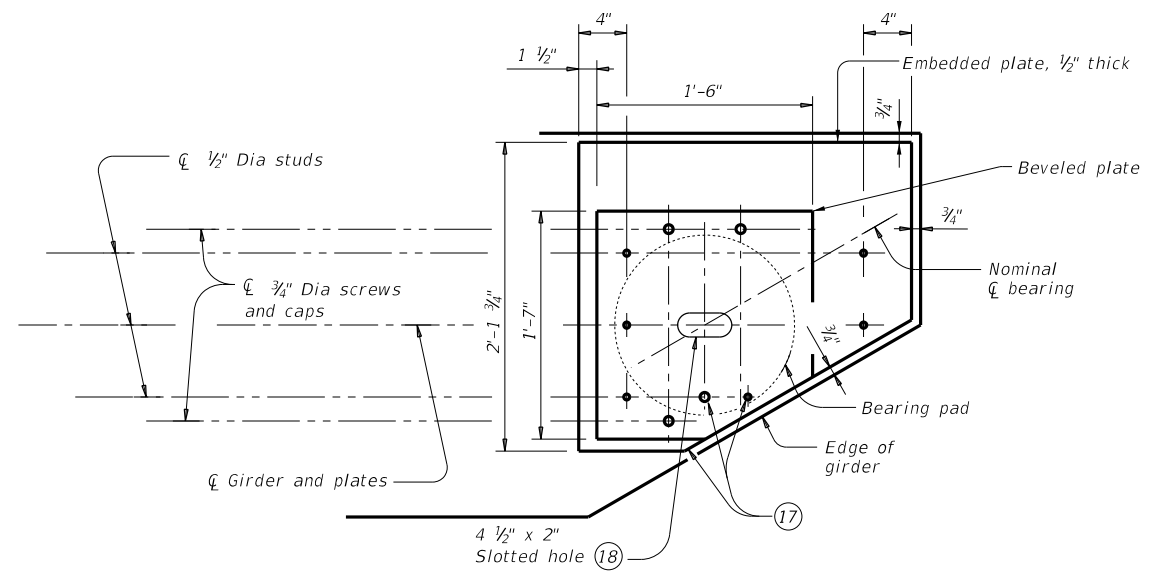
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**NORMAL GIRDER END**  
**RECTANGULAR BEARING PAD**

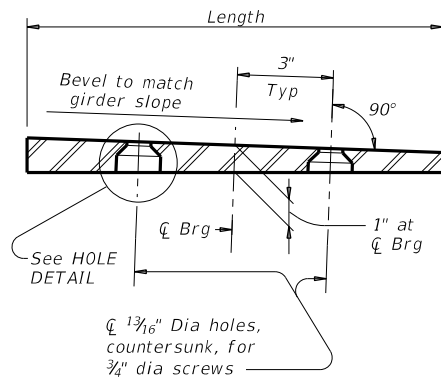


**SKewed GIRDER END**  
**CLIPPED RECTANGULAR BEARING PAD**

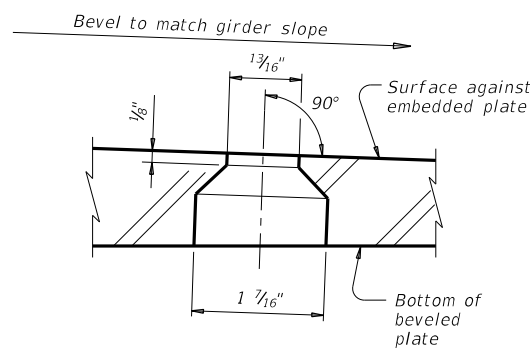


**SKewed GIRDER END**  
**15" DIA BEARING PAD**

**PLAN VIEW OF SOLE PLATE DETAILS**



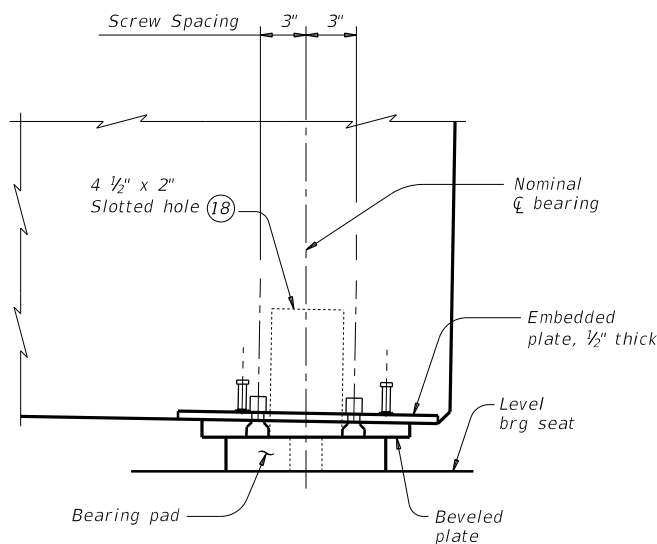
**SECTION**



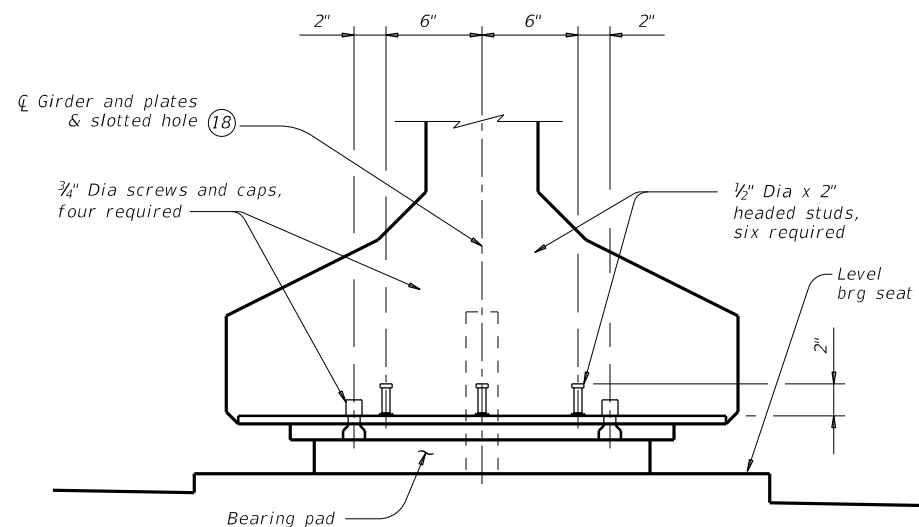
**HOLE DETAIL**

- (17) Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.
- (18) Slotted hole is required at doweled girder end locations.

**BEVELED PLATE DETAILS**



**SIDE ELEVATION**



**END ELEVATION**  
 Showing normal girder end.

**GIRDER DETAILS**

**SOLE PLATE NOTES:**

Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when the girder slope exceeds 5 percent or if otherwise required in the plans. Provide for all girders in the span.

On the shop drawings, dimension sole plates to the nearest 1/16" based on required thickness at centerline of bearing and slope of girder. Thickness tolerance variation from the approved shop drawings is 1/16" +/-, except variation from a plane parallel to the theoretical top surface can not exceed 1/16" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.

Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

3/4" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a 3/4" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than 1/2" deep or deeper than 1".

Install beveled sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

HL93 LOADING SHEET 3 OF 3



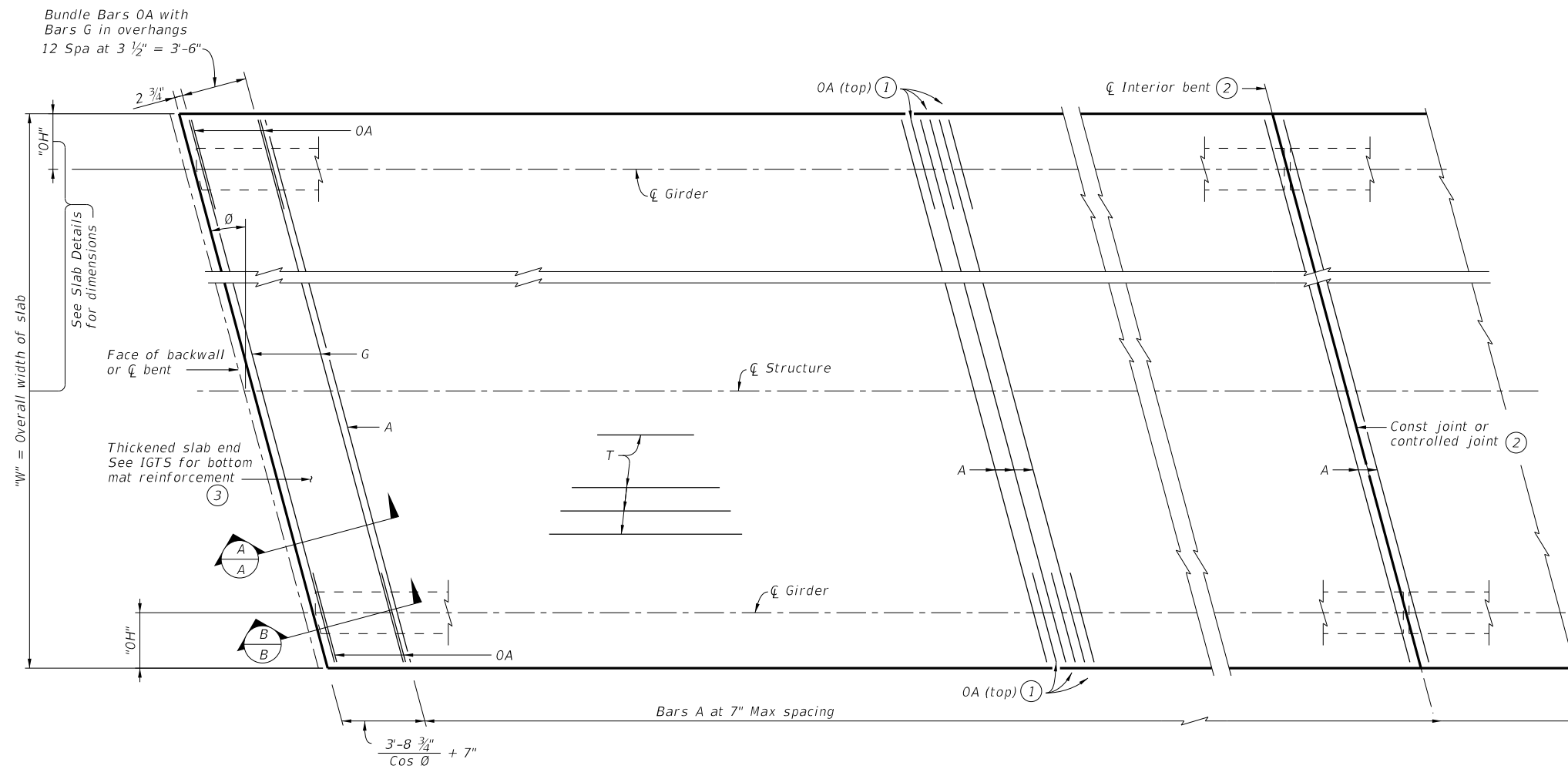
**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
**PRESTR CONCRETE I-GIRDERS**

**IGEB**

FILE: igebs1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
DIST	COUNTY		SHEET NO.	
FTW	TARRANT		73	

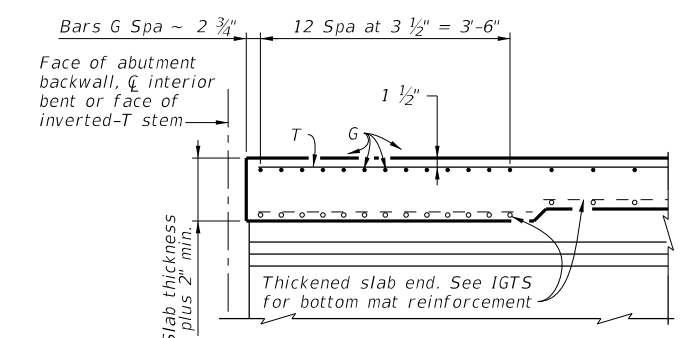
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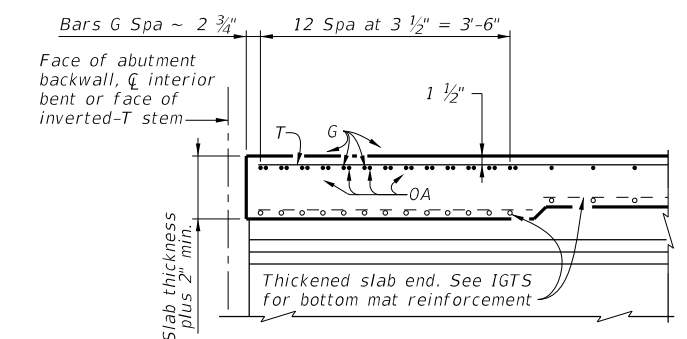
**PLAN FOR SLABS WITHOUT BREAKBACKS**

Showing top mat reinforcement only.



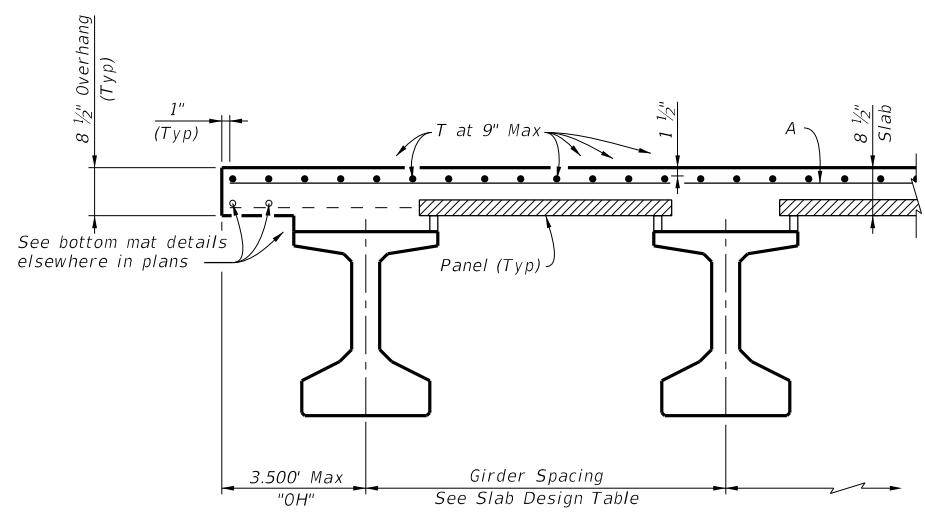
**SECTION A-A**

Showing Thickened Slab End with PCP Option 1. Option 2 similar.

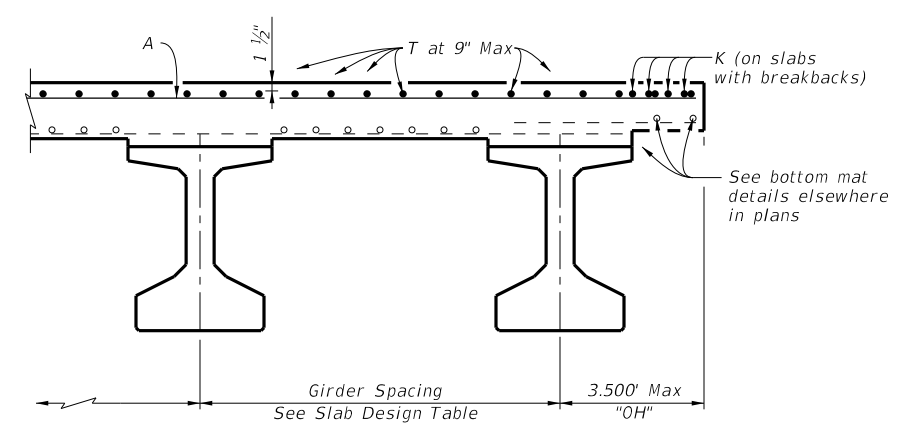


**SECTION B-B**

Showing Thickened Slab End with PCP Option 1. Option 2 similar.



**PARTIAL TYPICAL TRANSVERSE SECTION**



**SECTION OF THICKENED SLAB END**

Showing PCP Option 1. Option 2 similar.

- ① Place Bars OA midway between Bars A at overhang.
- ② Bars are continuous through joint.
- ③ Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

HL93 LOADING SHEET 1 OF 2



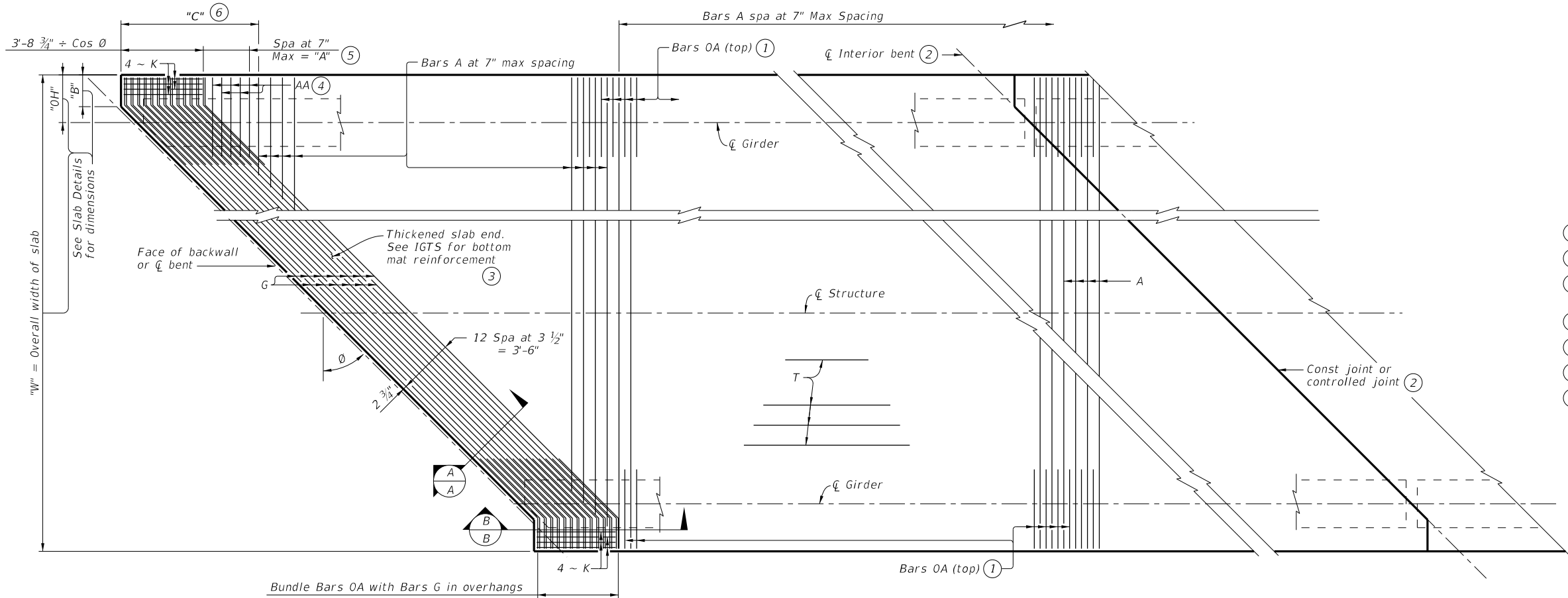
**GFRP SLAB TOP MAT REINFORCEMENT PRESTRESSED CONC I-GIRDER SPANS**

**IGFRP**

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
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	FTW	TARRANT	74	

**BAR TABLE**

BAR	SIZE
A	#5
AA	#5
G	#5
K	#5
OA	#5
T	#5



- ① Place Bars OA midway between Bars A at overhang.
- ② Bars are continuous through joint.
- ③ Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.
- ④ Tie Bars AA to bottom of Bars G in this location.
- ⑤  $A = ("OH" + 2.333' - "B") \times \tan \theta$
- ⑥  $C = \frac{3.729'}{\cos \theta} + "A" + \text{Bar A spacing}$
- ⑦ Only required on slabs with breakbacks.

**AT THICKENED SLAB END**

**PLAN FOR SLABS WITH BREAKBACKS**

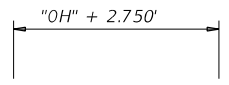
Showing top mat reinforcement only.

**AT SLAB CONTINUOUS OVER INTERIOR BENTS**

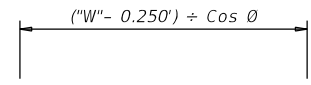
**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition. These details are restricted to Prestressed Concrete I-Girder spans with an 8 1/2" slab and up to a 10'-0" girder spacing.  
 These details are to be used in conjunction with the Span Details and PCP Standard (if prestressed concrete panels are used).  
 This standard provides Glass Fiber Reinforced Polymer (GFRP) reinforcement details for the top mat of slab reinforcement. The bottom mat reinforcement and other slab details are as shown elsewhere in the plans.  
 The Contractor has the option to provide GFRP reinforcement, in accordance with the details shown, when epoxy-coated steel bars are specified for the deck slab. The Contractor may provide an alternate GFRP slab design with calculations signed and sealed by a Professional Engineer.

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

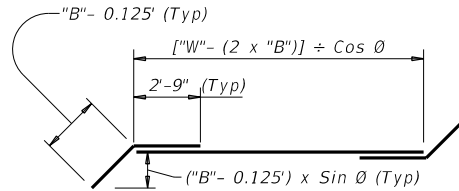
**MATERIAL NOTES:**  
 Provide GFRP bars, conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.  
 Provide Grade 60 steel bars for all bottom mat reinforcement as shown elsewhere in plans.  
 Provide bar laps, where required, as follows:  
 #5 GFRP bar = 2'-9"



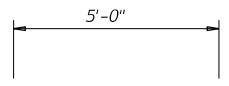
**BARS AA (#5)** ⑦



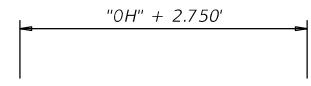
**BARS G (#5)**  
(For slabs without breakbacks)



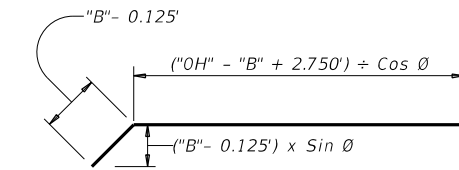
**BARS G (#5)**  
(For slabs with breakbacks)



**BARS K (#5)** ⑦



**BARS OA (#5)**



**BARS OA (#5)**  
(For slabs with breakbacks)

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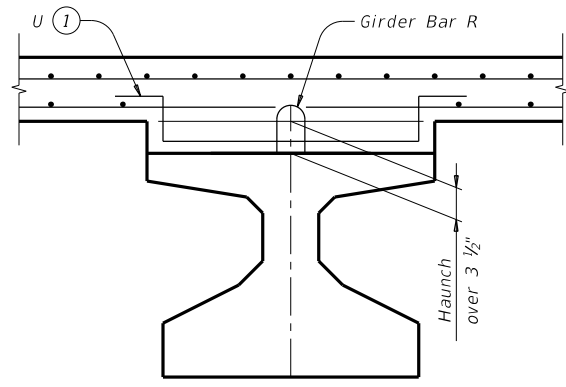
**GFRP SLAB TOP MAT REINFORCEMENT  
 PRESTRESSED CONC I-GIRDER SPANS**

**IGFRP**

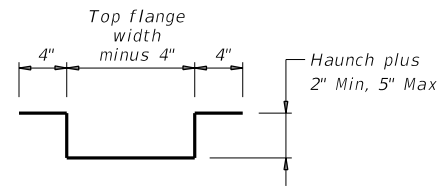
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
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	FTW	TARRANT	75	

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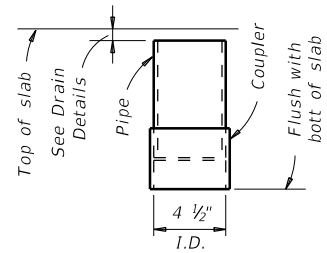
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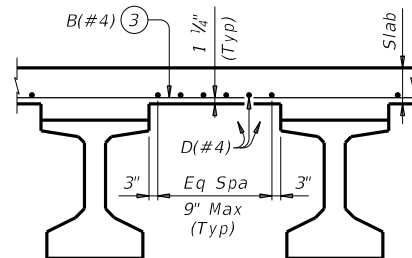
**HAUNCH REINFORCING DETAIL**



**BARS U (#4)**

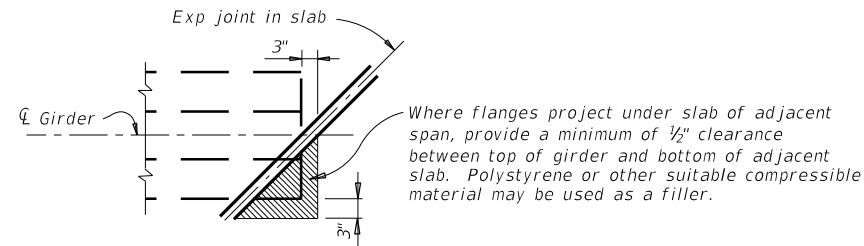


**C-I-P DRAIN DETAIL**

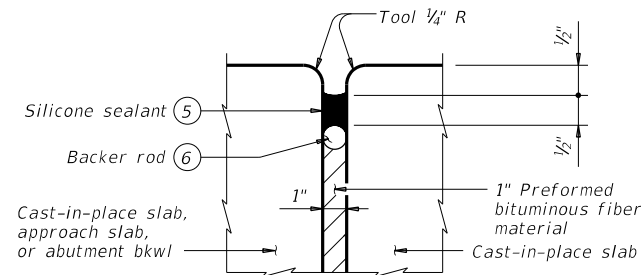


**TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP**

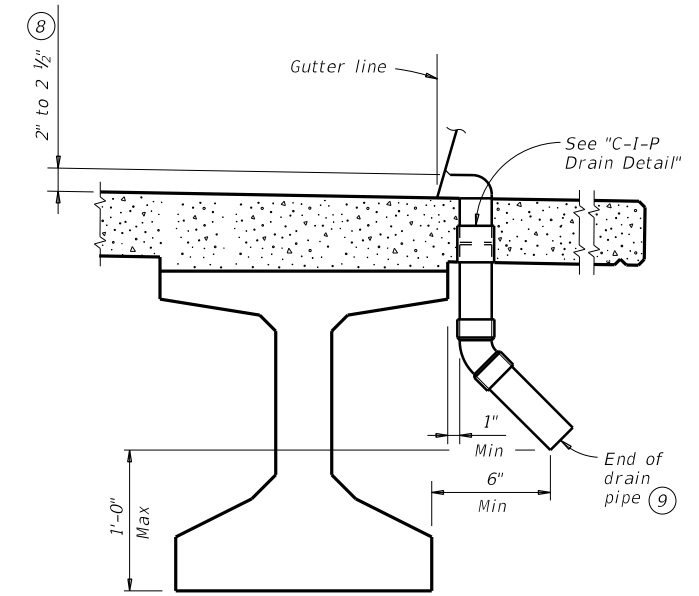
Top reinforcing steel not shown for clarity.



**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.

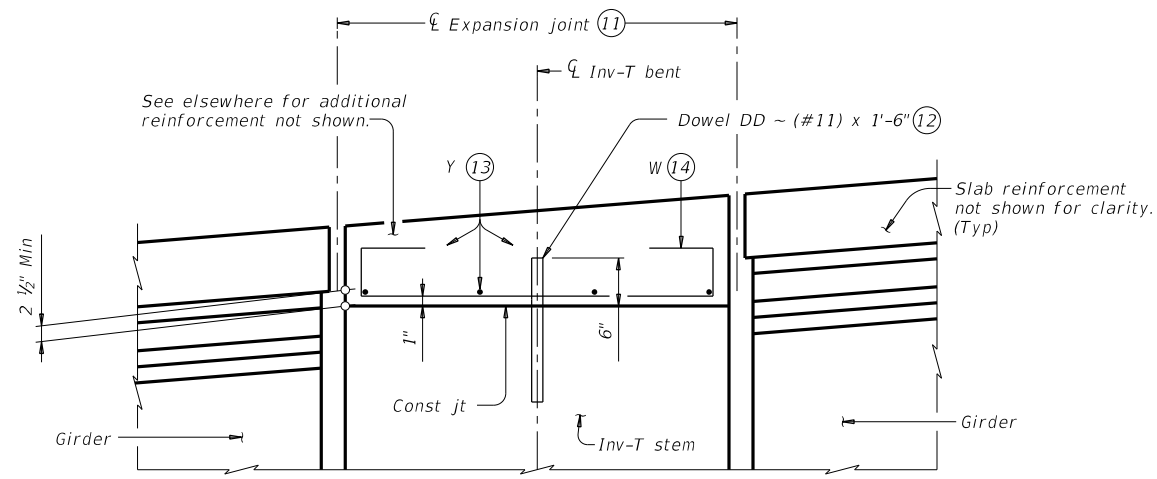
- ① Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 1/2".
- ② Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
- ③ Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline 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

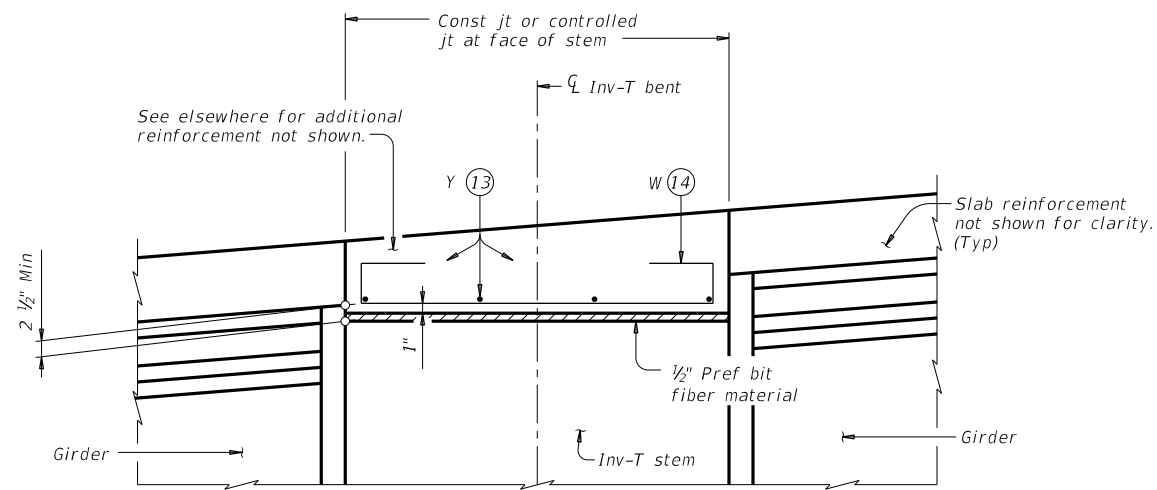
				<b>Bridge Division Standard</b>	
<b>MISCELLANEOUS SLAB DETAILS</b> <b>PRESTR CONCRETE I-GIRDERS</b>					
<b>IGMS</b>					
FILE: igssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT	
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0902	90	132	CS	
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY	SHEET NO.		
	FTW	TARRANT			76

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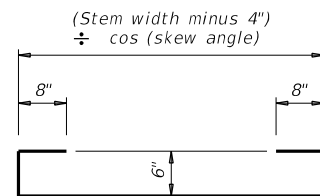
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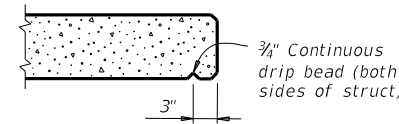
**SHOWING EXPANSION JOINTS**



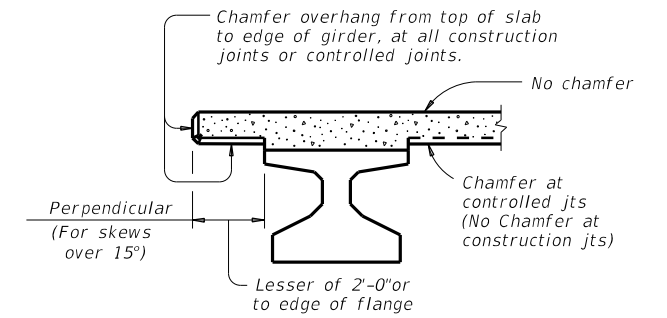
**SHOWING CONST JTS OR CONTROLLED JTS  
 REINFORCEMENT OVER INV-T BENTS**



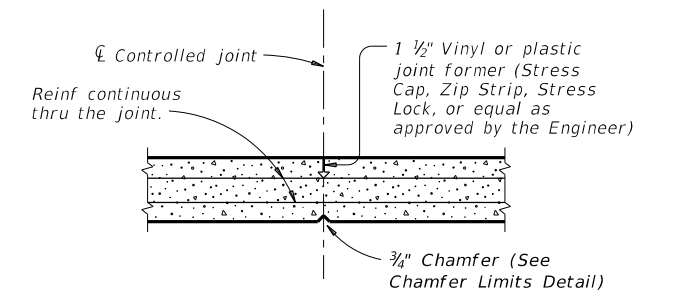
**BARS W (#4)**



**DRIP BEAD DETAIL**



**CHAMFER LIMITS DETAIL (15)**



**CONTROLLED JOINT DETAIL**

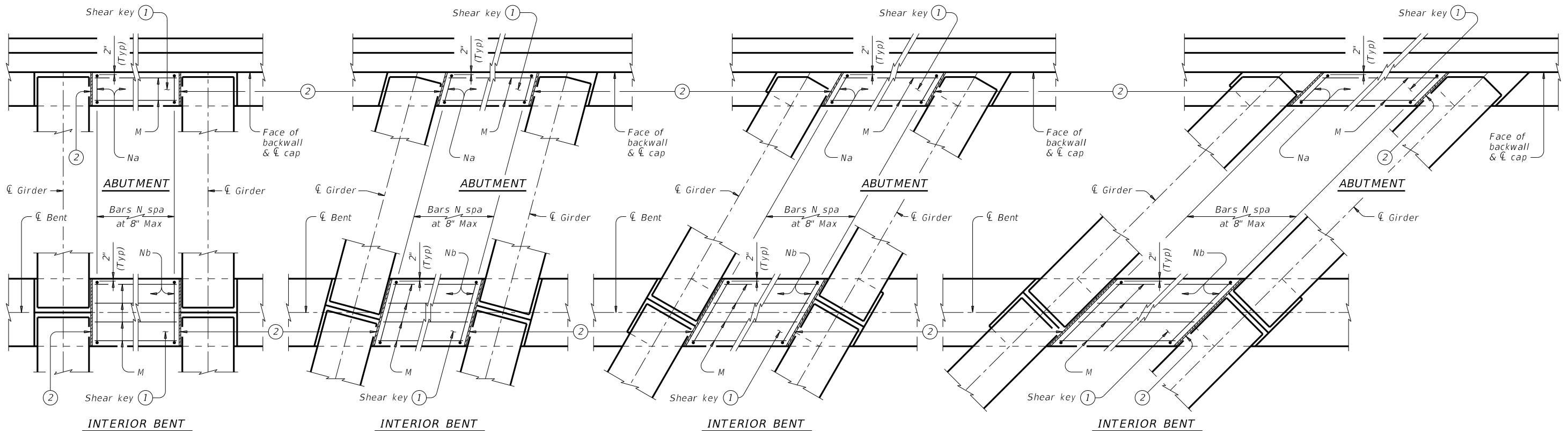
(Saw-cutting is not allowed)

- (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.

		<b>Bridge Division Standard</b>	
<b>MISCELLANEOUS          SLAB DETAILS          PRESTR CONCRETE I-GIRDERS</b>			
<b>IGMS</b>			
FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT	SECT	HIGHWAY
REVISIONS	0902	90	132
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY	SHEET NO.
	FTW	TARRANT	77

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**PARTIAL PLANS WITH NO SKEW**

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

**PARTIAL PLANS WITH 15° SKEW**

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

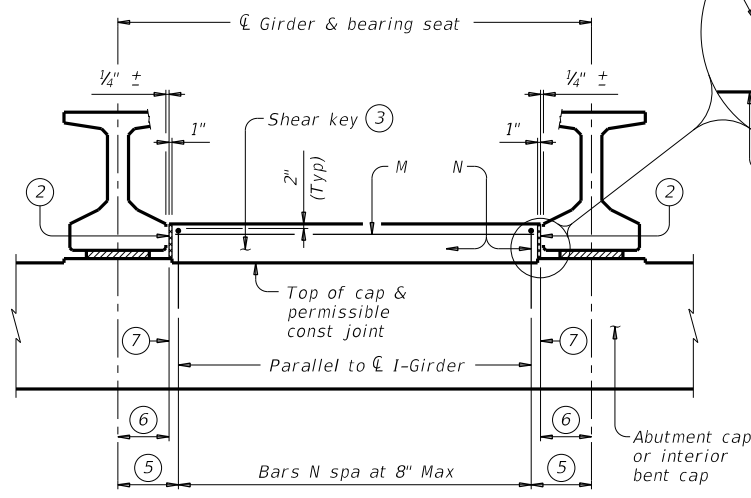
**PARTIAL PLANS WITH 30° SKEW**

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

**PARTIAL PLANS WITH 45° SKEW**

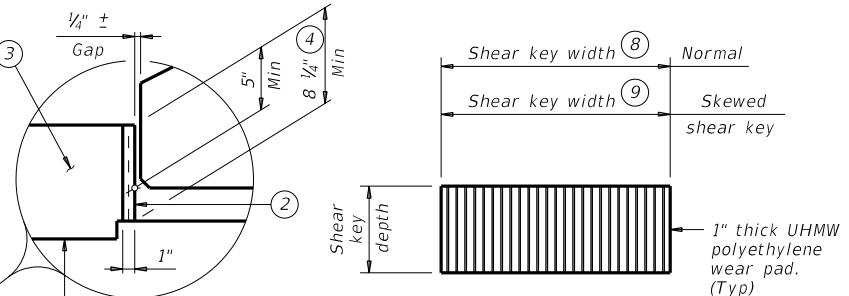
Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

- ① Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.
- ② UHMW polyethylene wear pad. (Typ)
- ③ Leave a 1/4" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."
- ④ Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.
- ⑤ With No Skew = 1'-8 1/4", measured along  $\bar{\ell}$  cap.  
 With Skew =  $1'-8 \frac{1}{4} \div \cos \text{Skew}$ , measured along  $\bar{\ell}$  cap.
- ⑥ With No Skew = 1'-4 1/4", measured along  $\bar{\ell}$  cap.  
 With Skew =  $1'-4 \frac{1}{4} \div \cos \text{Skew}$ , measured along  $\bar{\ell}$  cap.
- ⑦ Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.
- ⑧ Abutments = 1/2 Cap width.  
 Interior bents = Cap width.
- ⑨ Abutments = 1/2 Cap width  $\div \cos \text{Skew}$ .  
 Interior bents = Cap width  $\div \cos \text{Skew}$ .

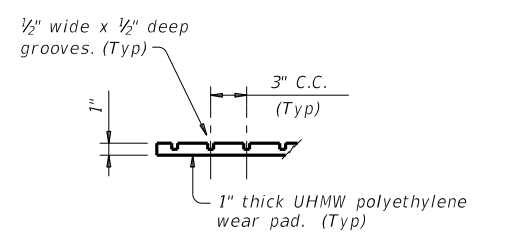


**PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP**

Showing shear key with girder Type Tx46. Other I-Girder types similar.

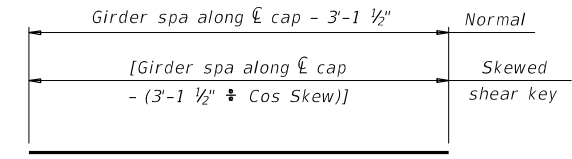


**ELEVATION**

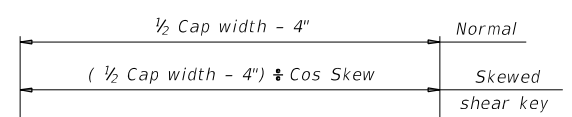


**PART SECTION**

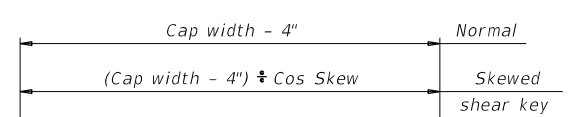
**ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS**



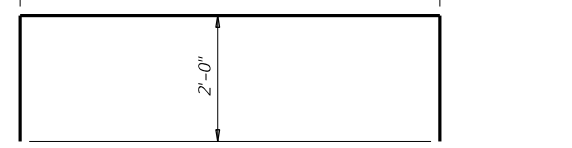
**BARS M (#5)**



**BARS Na (#5) (For abutments)**



**BARS Nb (#5) (For interior bents)**



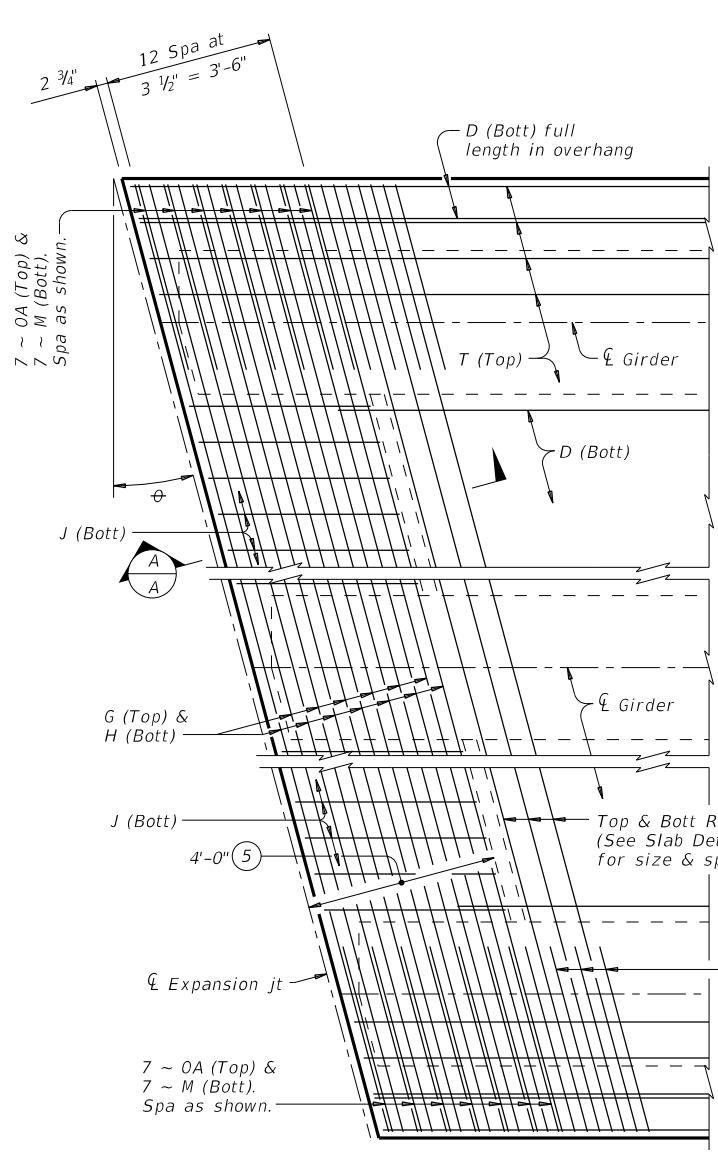
**CONSTRUCTION NOTES:**  
 Provide Class "C" concrete ( $f'_c = 3,600$  psi). Provide Class "C" (HPC) if shown elsewhere on the plans.  
 Provide Grade 60 reinforcing steel.  
 Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.  
 Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.  
 These details are limited to bridges skewed 45 degrees and less. This standard is only applicable for I-Girders.  
 Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.  
 Include shear key concrete in abutment or bent concrete for payment.  
 UHMW polyethylene wear pads are subsidiary to Class "C" concrete.  
 Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

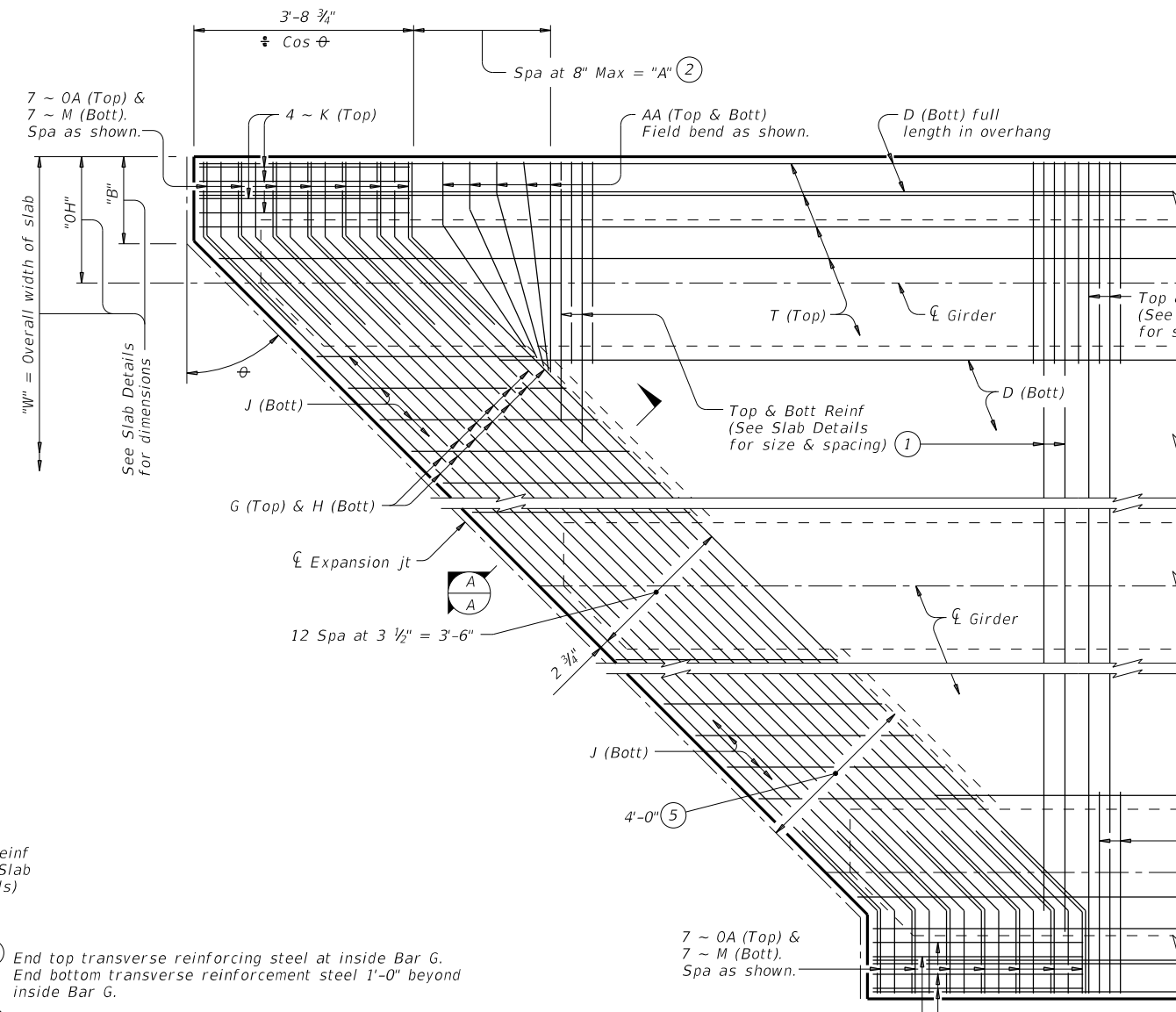
		<b>Bridge Division Standard</b>	
<b>SHEAR KEY DETAILS</b> <b>PRESTR CONCRETE I-GIRDERS</b>			
<b>IGSK</b>			
FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
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DIST	COUNTY	SHEET NO.	
FTW	TARRANT	78	

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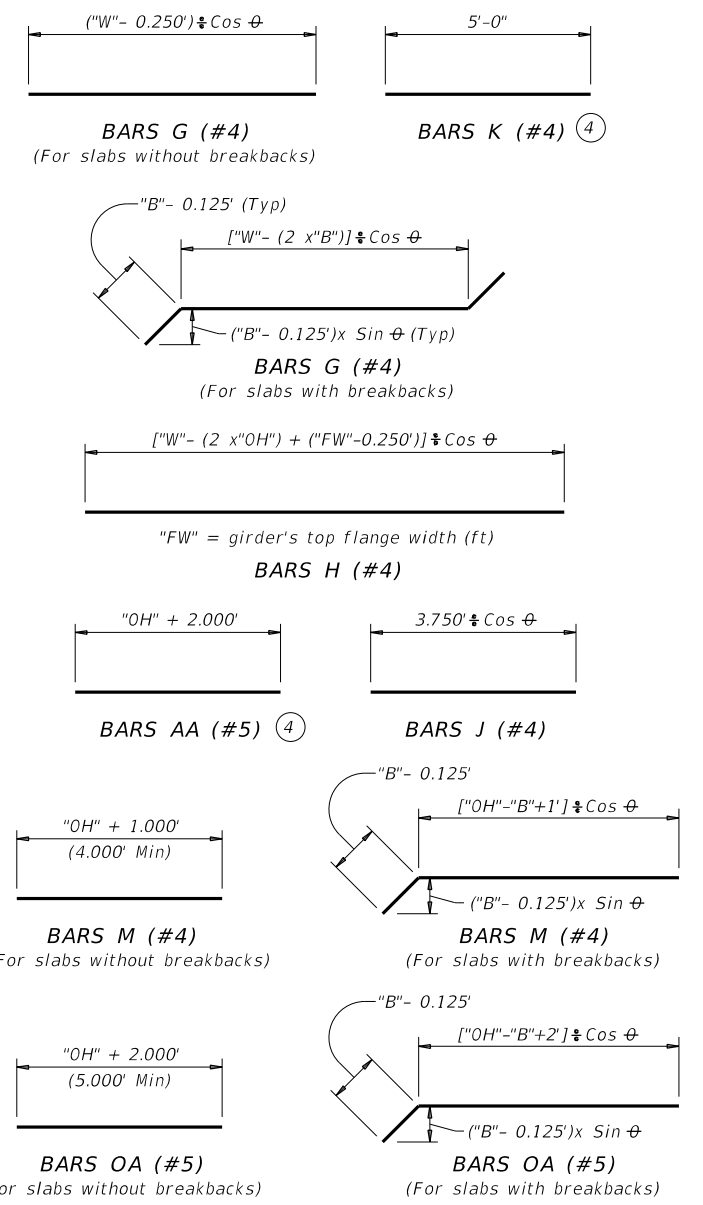


**PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK**



**PARTIAL PLAN FOR SLABS WITH BREAKBACK**

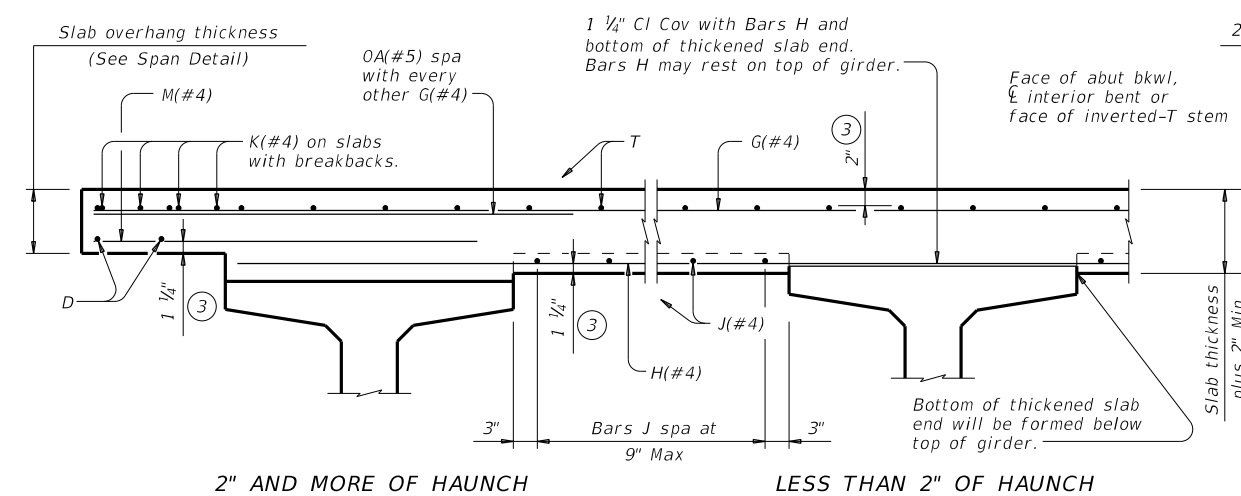
- ① End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
- ② "A" = ("OH" + 2.333 "B") x Tan phi
- ③ Provide clear cover as indicated unless otherwise shown on Span Details.
- ④ Only required on slabs with breakbacks.
- ⑤ Thickened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



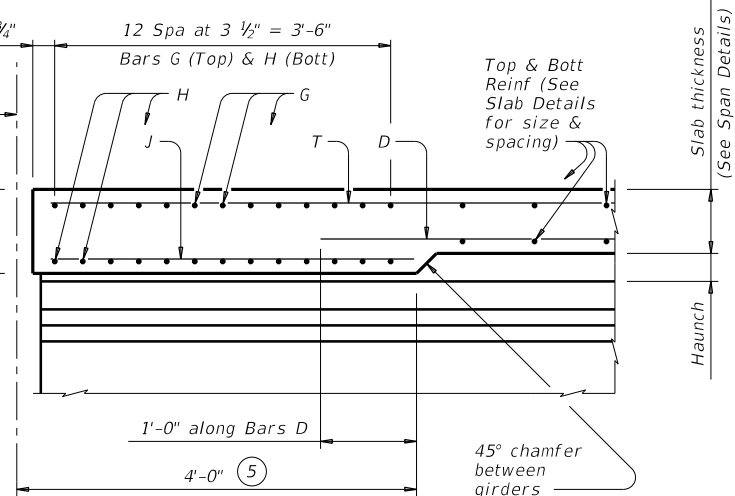
**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. These details are restricted to Prestressed Concrete I-Girder Spans. These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used). When Option 2 from PCP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



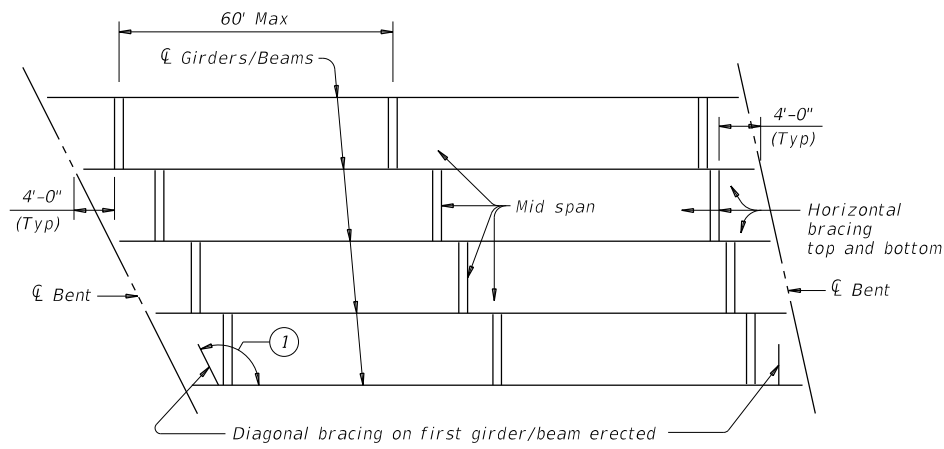
**SECTION A-A**  
 (Showing with 2" and more of haunch)

HL93 LOADING		Bridge Division Standard	
<b>THICKENED SLAB END DETAILS</b>			
<b>PRESTRESSED CONCRETE I-GIRDER SPANS</b>			
<b>IGTS</b>			
FILE: igtss1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT August 2017	CONT	SECT	JOB
REVISIONS	0902	90	132
DIST	COUNTY	SHEET NO.	
FTW	TARRANT	79	

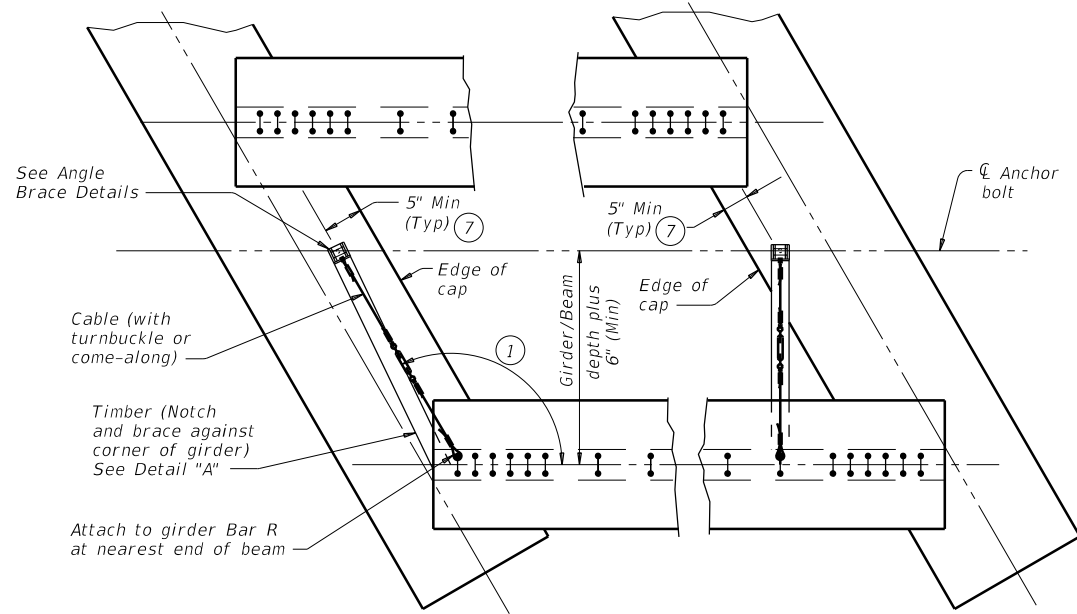


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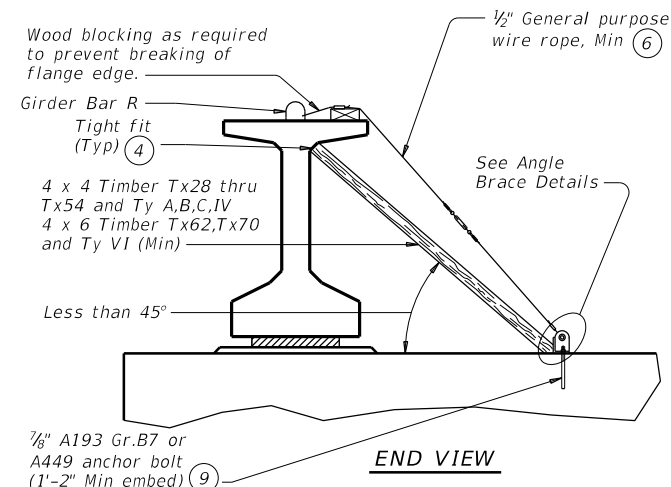
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**ERECTOR BRACING**



**PLAN**



**END VIEW**

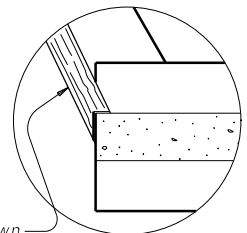
**DIAGONAL BRACING DETAILS**

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

**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.

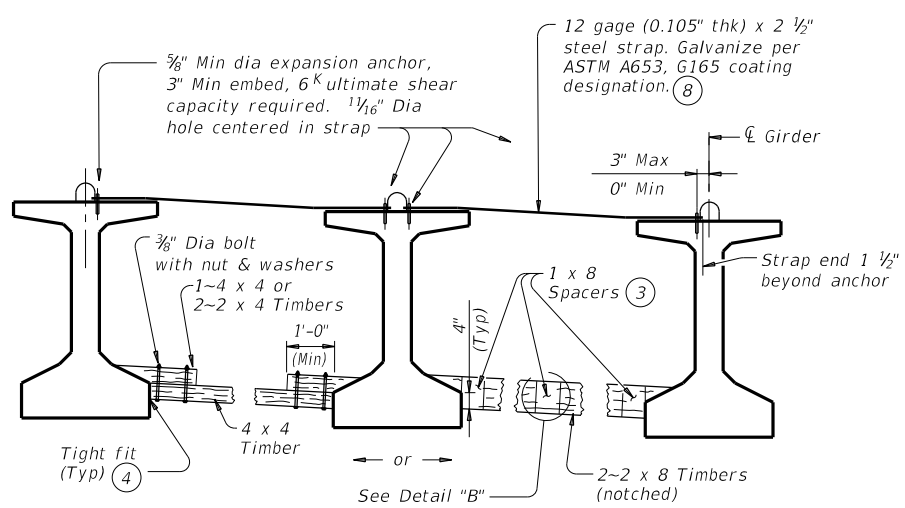
**PHASED CONSTRUCTION:**  
 Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction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



**DETAIL "A"**

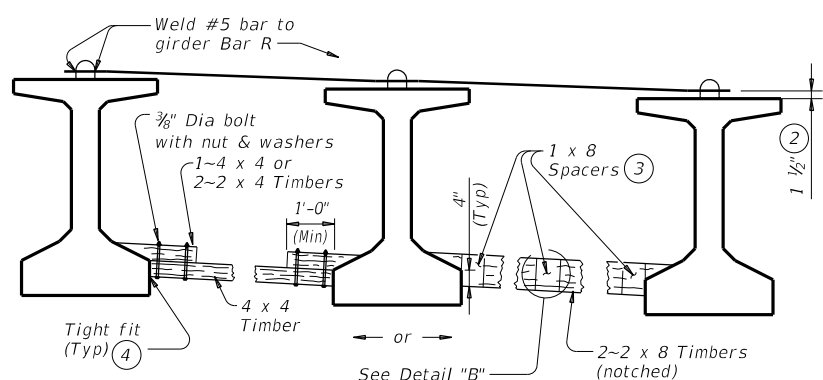
- 1 If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.
- 2 Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, 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



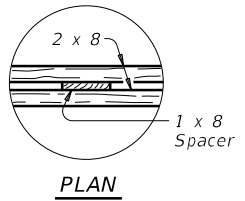
**FOR ERECTION BRACING, OPTION 1**

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

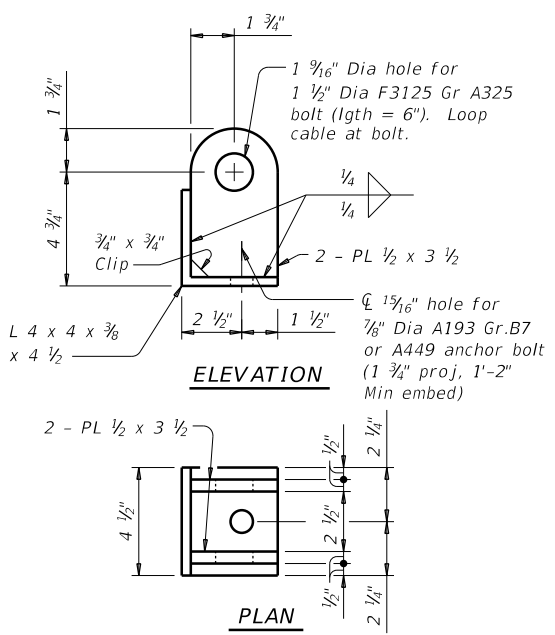


**FOR ERECTION BRACING, OPTION 2**

**HORIZONTAL BRACING DETAILS**



**DETAIL "B"**

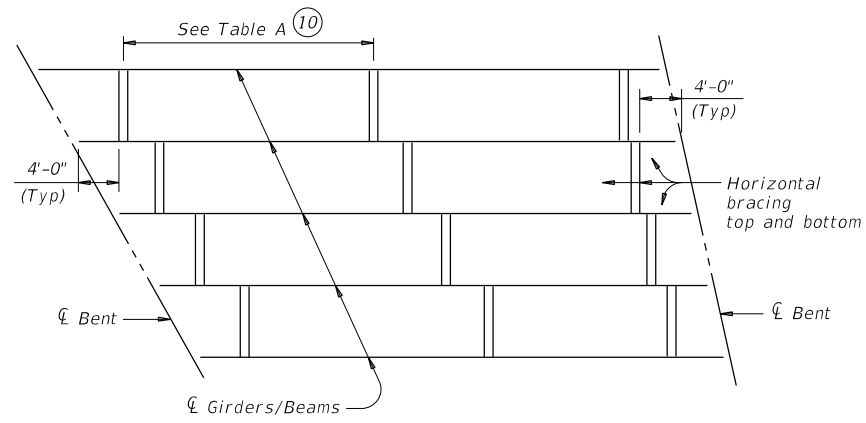


**ANGLE BRACE DETAILS**

		<b>Bridge Division Standard</b>	
<b>MINIMUM ERECTION AND BRACING REQUIREMENTS PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS</b>			
<b>MEBR(C)</b>			
FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT August 2017	CONTRACT NO: 0902	SECTION: 90	JOB NO: 132
	DIST: FTW	COUNTY: TARRANT	SHEET NO: 80

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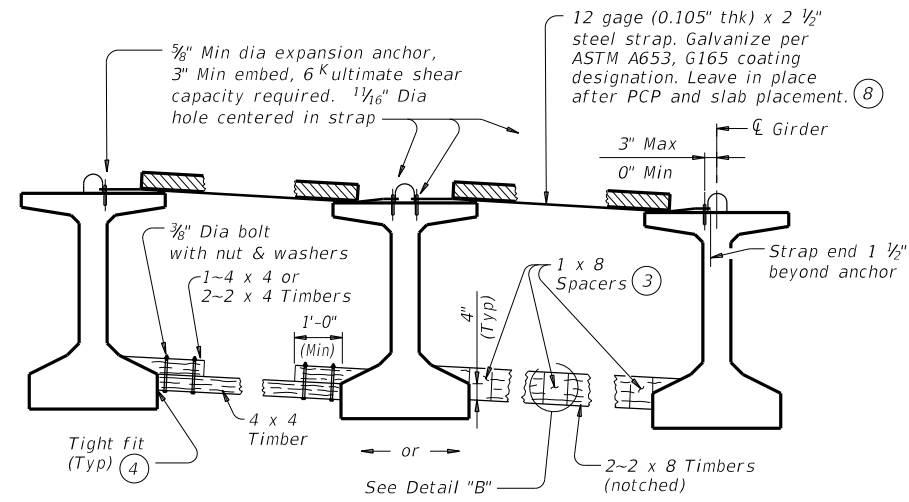


**SLAB PLACEMENT BRACING**

TABLE A		
Girder or Beam Type	OPTION 1-RIGID BRACING (STEEL STRAP)	
	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	1/4 points	1/4 points
Tx34	1/4 points	1/4 points
Tx40	1/4 points	1/8 points
Tx46	1/4 points	1/8 points
Tx54	1/4 points	1/8 points
Tx62	1/4 points	1/8 points
Tx70	1/4 points	1/8 points
A	1/8 points	1/8 points
B	1/8 points	1/8 points
C	1/8 points	1/8 points
IV	1/4 points	1/8 points
VI	1/4 points	1/8 points

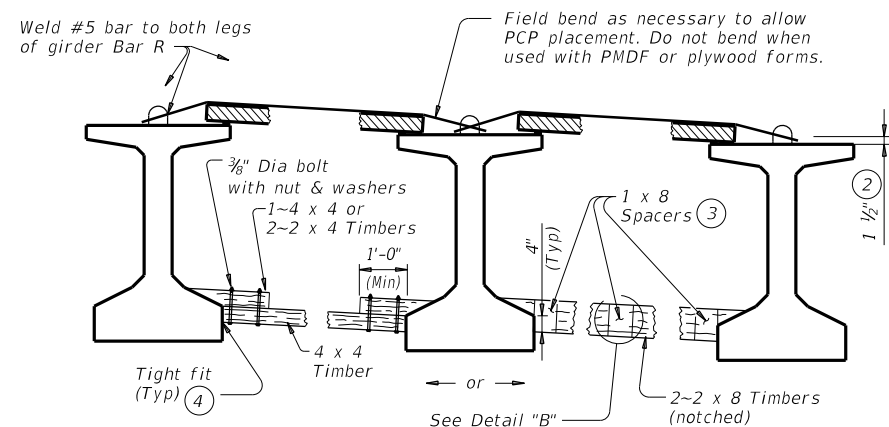
  

Girder or Beam Type	OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)	
	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	1/4 points	1/8 points
Tx34	1/4 points	1/8 points
Tx40	1/4 points	1/8 points
Tx46	1/4 points	1/8 points
Tx54	1/4 points	1/8 points
Tx62	1/4 points	1/8 points
Tx70	1/4 points	1/8 points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	1/4 points	4.0 ft
VI	1/4 points	4.0 ft



**FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID**

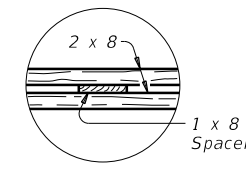
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



**FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE**

(Showing slab formed with PCP.)

**HORIZONTAL BRACING DETAILS (5)**



**PLAN  
 DETAIL "B"**

- (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.
- (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.
- (8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.
- (10) Bracing spacing (1/4 and 1/8 points) measured between first and last typical brace location.
- (11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

**SLAB PLACEMENT BRACING:**

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425. Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

**GENERAL NOTES:**

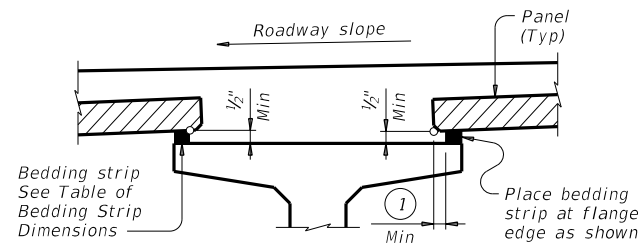
Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection. Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection. Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure. Removal of bracing for short periods of time to align girders and beams is permissible. All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown. Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

SHEET 2 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: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
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REVISIONS	0902	90	132
	DIST	COUNTY	SHEET NO.
	FTW	TARRANT	81

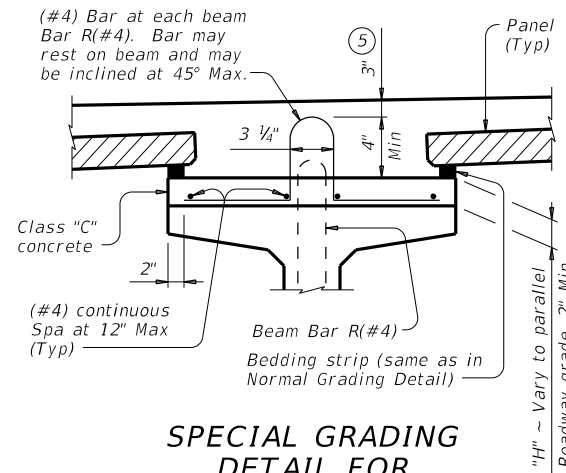
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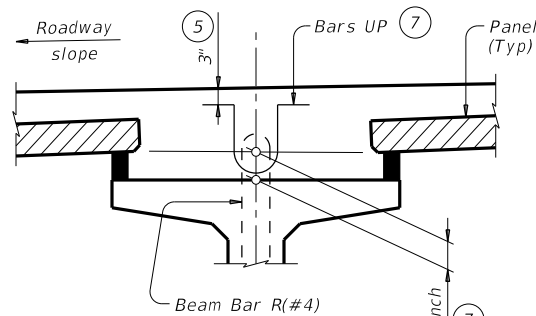
**NORMAL GRADING DETAIL** ③

Showing prestressed concrete I-girders.  
 (Other beam types similar)



**SPECIAL GRADING DETAIL FOR CONCRETE BEAMS**

Showing prestressed concrete I-girders.  
 (Other beam types similar)

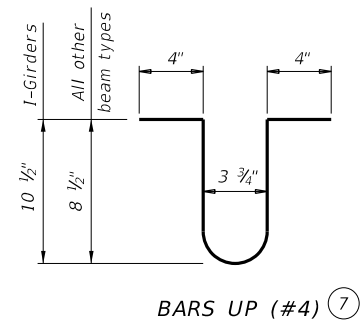


**HAUNCH REINFORCING DETAIL**

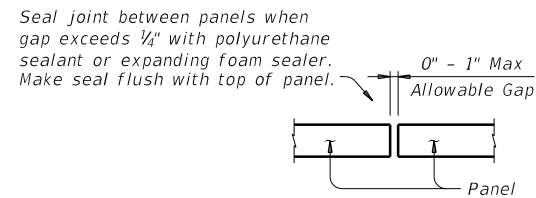
Showing prestressed concrete I-girders.  
 (Other beam types similar)

WIDTH	HEIGHT ④	
	Min	Max
1" (Min)	1/2"	2"
1 1/4"	1/2"	2 1/2"
1 1/2"	1/2"	3"
1 3/4"	1/2"	3 1/2"
2"	1/2"	4"
2 1/4"	1/2"	4 1/2" ②
2 1/2"	1/2"	5" ②
2 3/4"	1/2"	5 1/2" ②
3" (Max)	1/2"	6" ②

- ① 2" Min for I-girders, 1 1/2" Min for all other beam types.
- ② Allowed for I-girders, not allowed on other beam types.
- ③ To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in 1/4" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is 1/4". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.
- ④ Height must not exceed twice the width.
- 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.
- ⑦ Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 1/2" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.
- ⑧ Do not locate construction joints on top of a panel.
- 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..

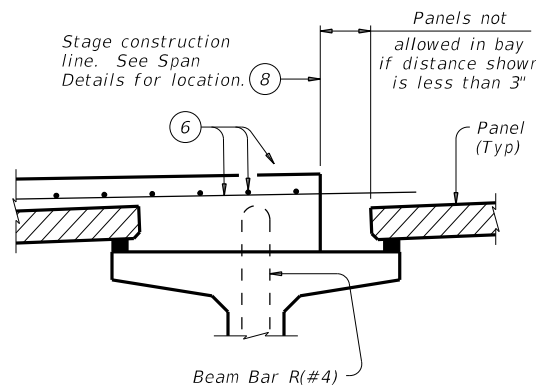


**BARS UP (#4) ⑦**

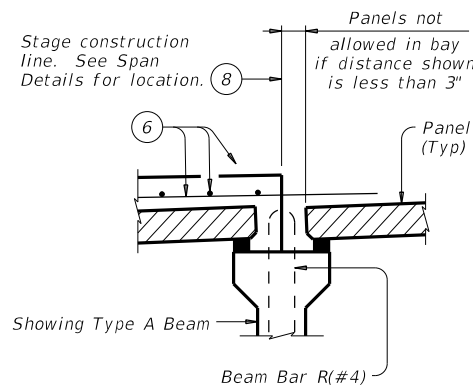


**PANEL JOINTS**

(Panel reinforcing not shown for clarity.  
 The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



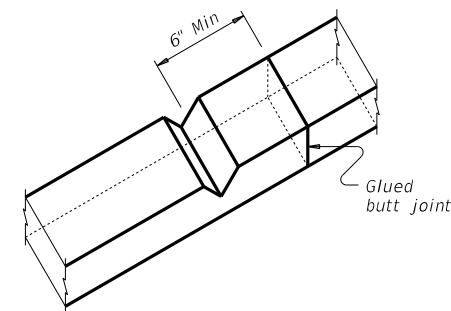
**PRESTR CONC I-GIRDERS**



**PRESTR CONC I-BEAMS**

**STAGE CONSTRUCTION LIMITATIONS**

(Other beam types similar)



**BEDDING STRIP DETAIL ⑨**

**CONSTRUCTION NOTES:**  
 Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges. Placing panels to minimize joint openings is recommended. If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction. Bars U, shown on PCP-FAB, may be bent over or cut off if necessary. Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 1/2" under the panels as the slab concrete is placed. To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least 1/2". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required. For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement. If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated. Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees. Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use. These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings. When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer. Any additional reinforcing or concrete required on this standard is considered subsidiary to the bid item "Reinforced Concrete Slab".

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

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation Bridge Division Standard

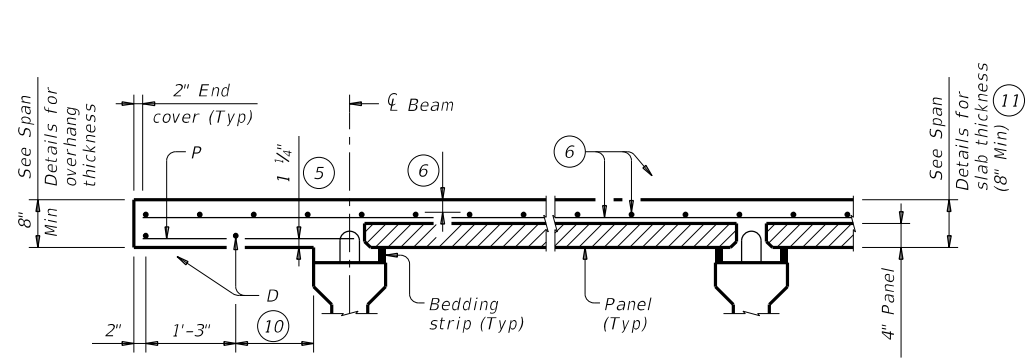
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

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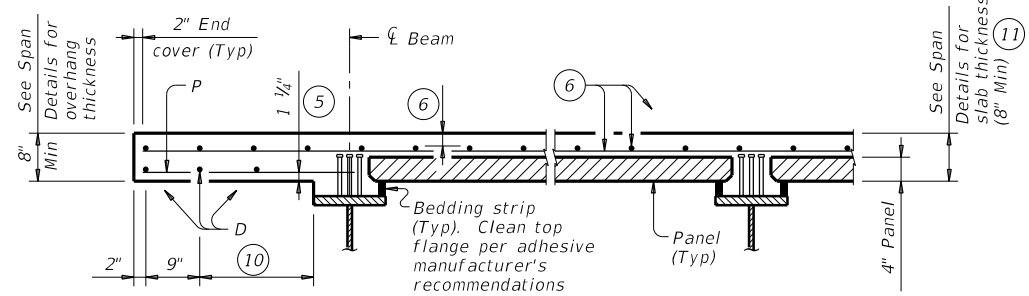
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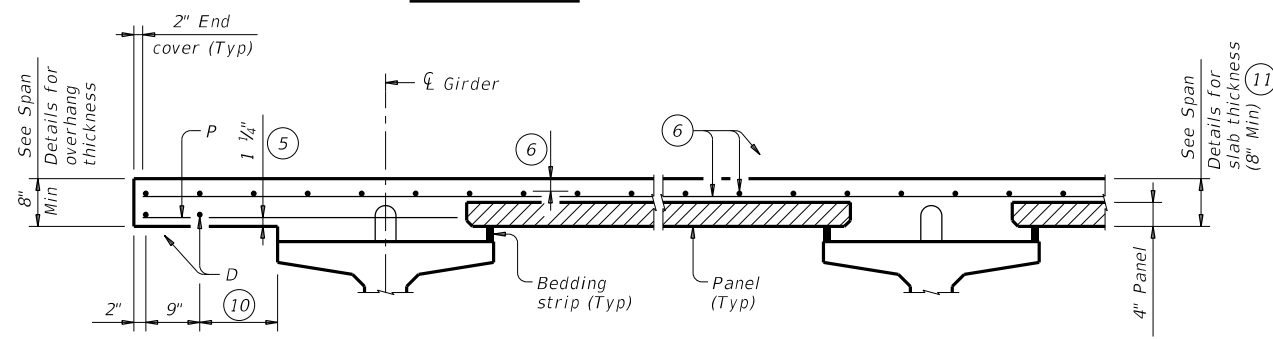
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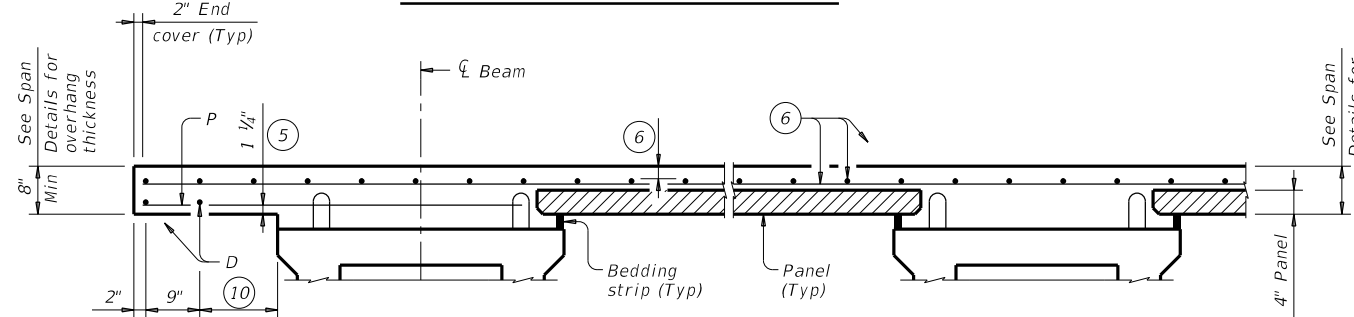
**PRESTRESSED CONCRETE I-BEAMS**



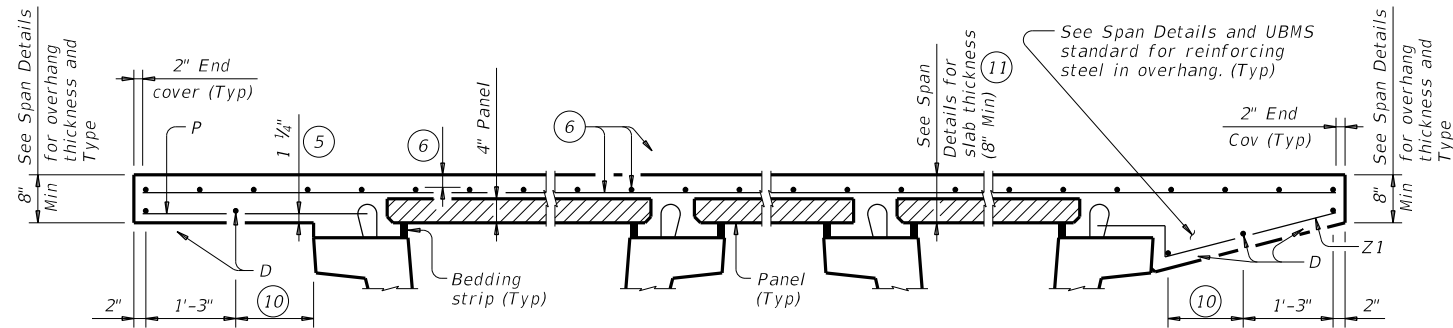
**STEEL BEAMS**



**PRESTRESSED CONCRETE I-GIRDERS**



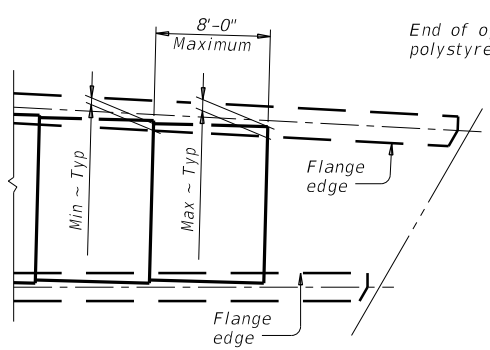
**PRESTRESSED CONCRETE X-BEAMS**



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

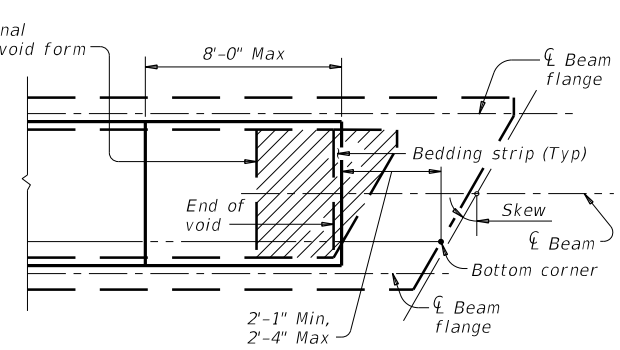
**TYPICAL PART TRANSVERSE SECTIONS**

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



**AT FLARED BEAMS OR GIRDERS**

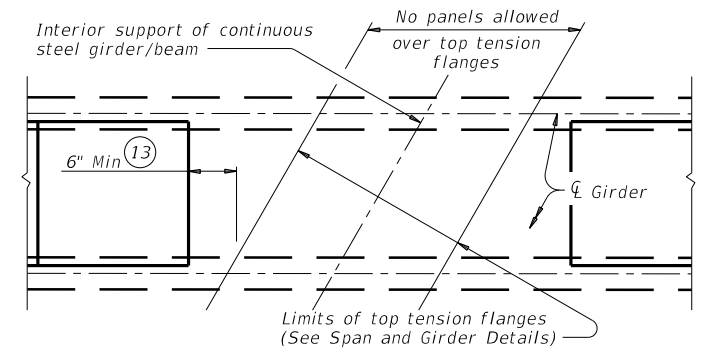
See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



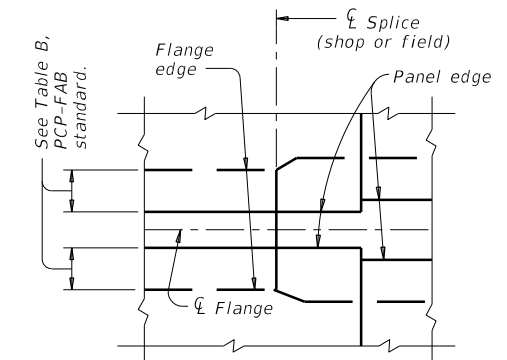
**OVER CONC U-BEAMS**

**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.



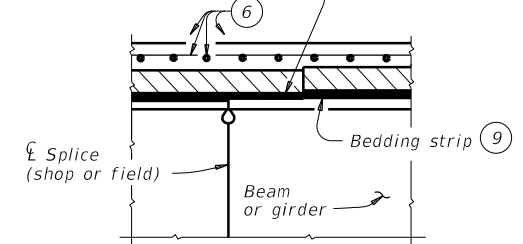
**AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS**



**PLAN AT SPLICE**

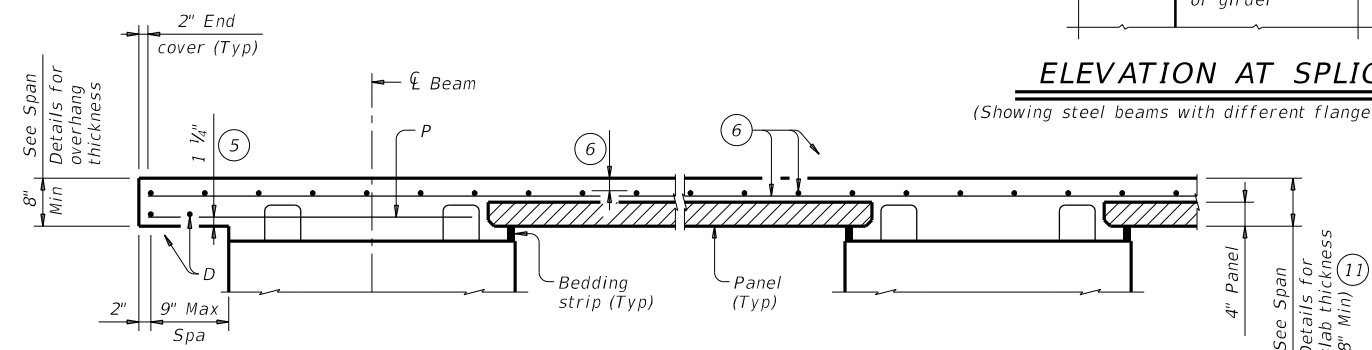
(Showing steel beams with flange width transition)

Cut bedding strip to adjust for difference in flange thickness.



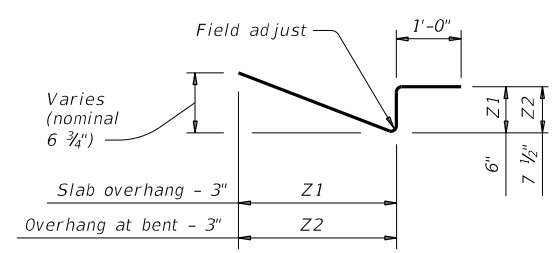
**ELEVATION AT SPLICE**

(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)**

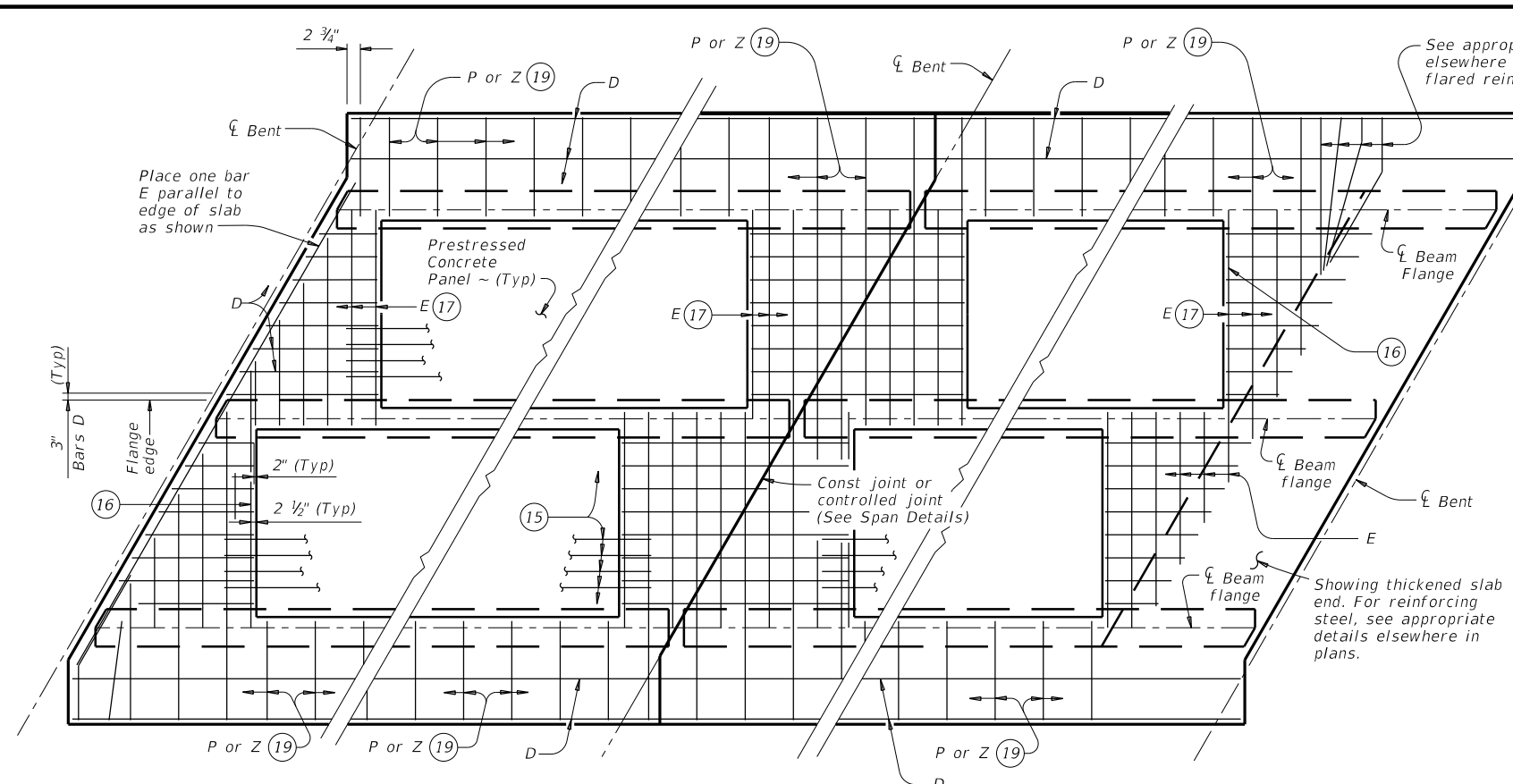
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

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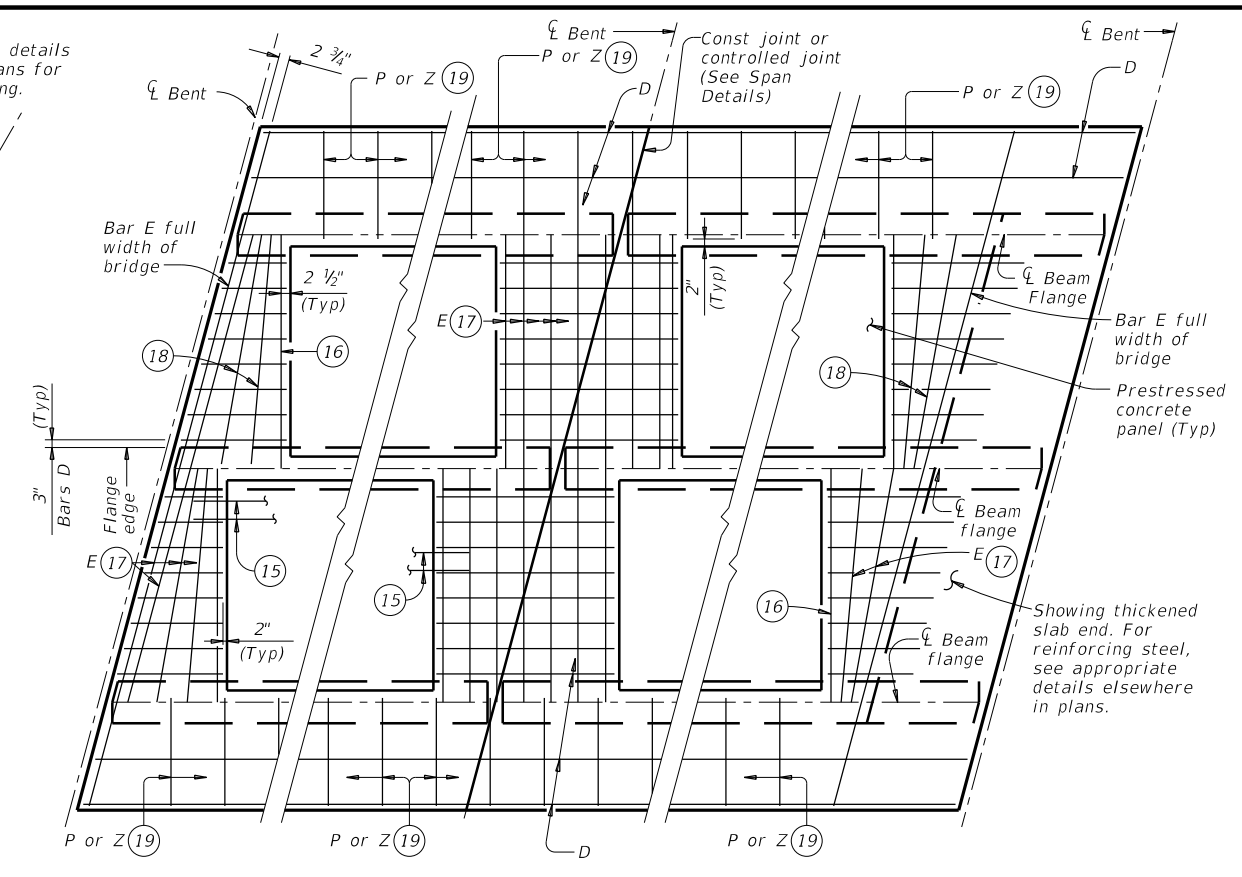
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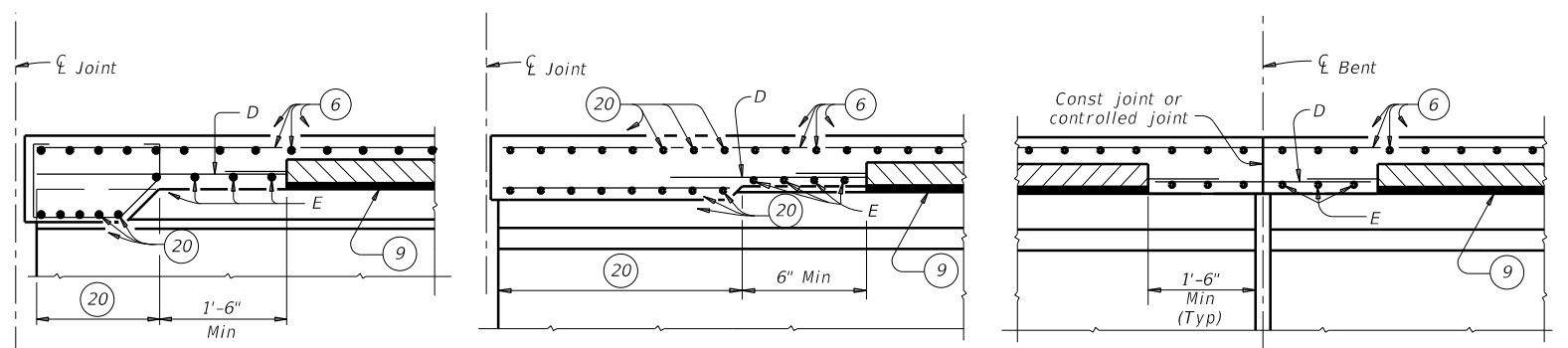
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE  
 AT INTERIOR BENTS  
 AT THICKENED END SLABS

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

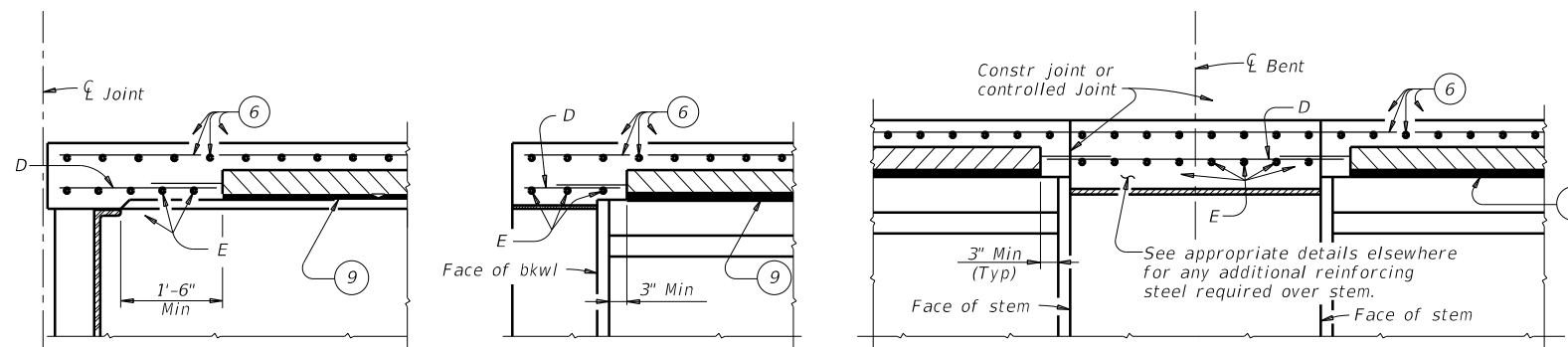


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE  
 AT INTERIOR BENTS  
 AT THICKENED END SLABS

**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

HL93 LOADING SHEET 3 OF 4



**PRESTRESSED CONCRETE PANELS DECK DETAILS**

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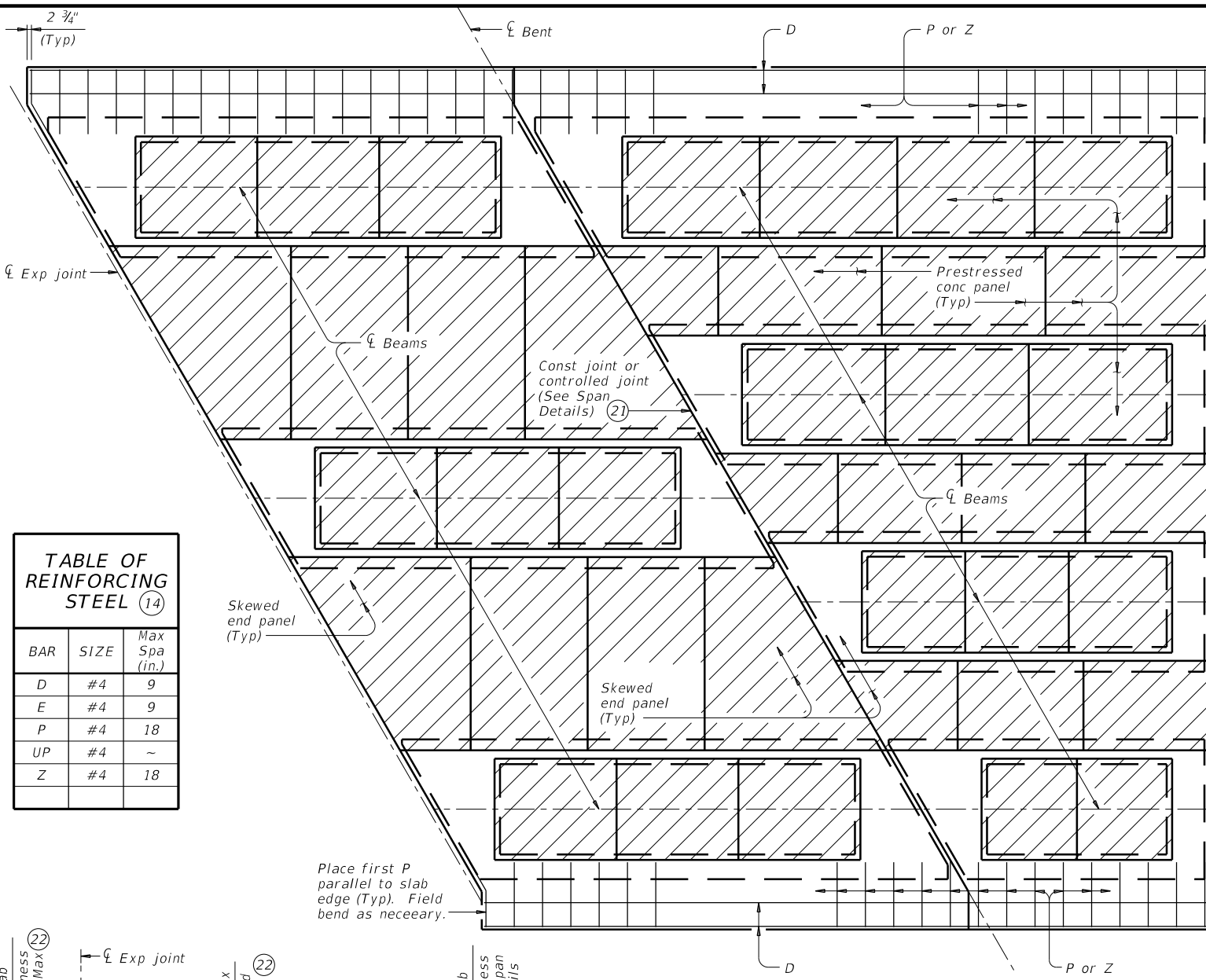
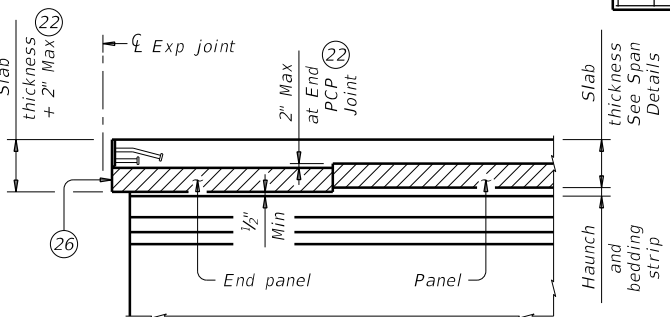
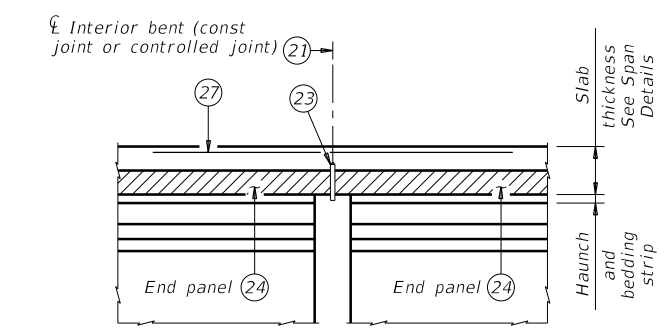


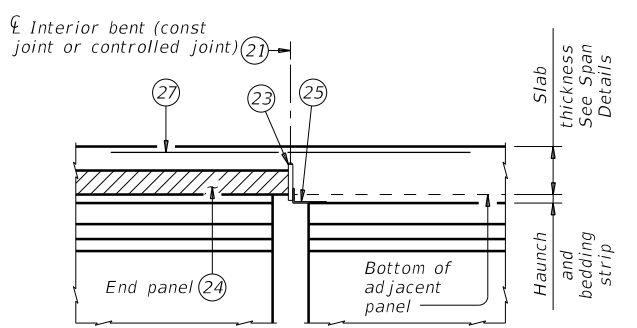
TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



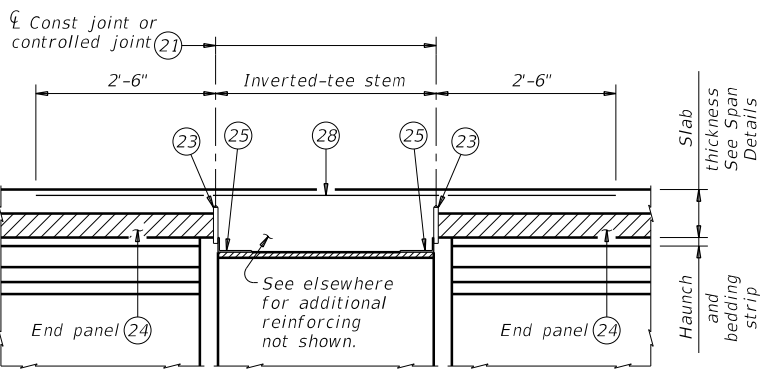
**JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)**  
 For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



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



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



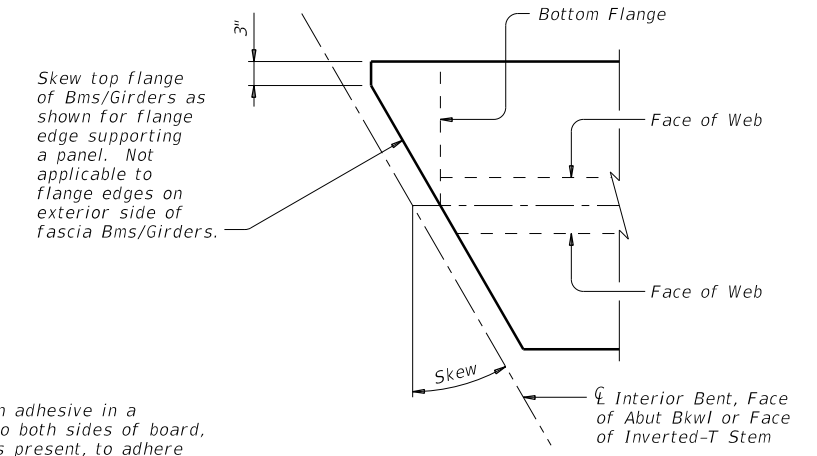
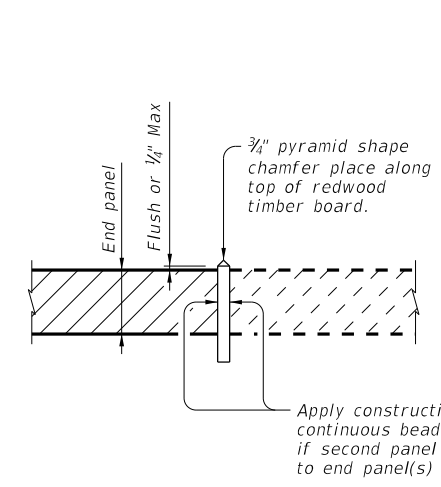
**INVERTED-T BENT**  
 Panels against inverted-tee stem

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

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

See "Option 2 ~ Elevation At Beam Ends".

- (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.



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

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

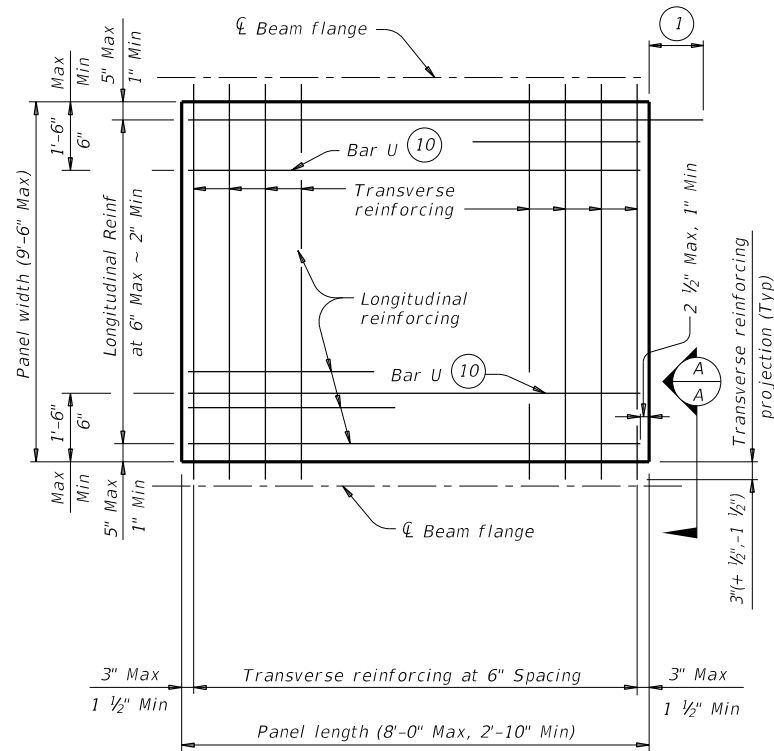
**SPECIAL OPTION 2 CONSTRUCTION NOTES:**

- When Option 2 is chosen bottom mat of thickened end 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-B, SEJ-M, 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.

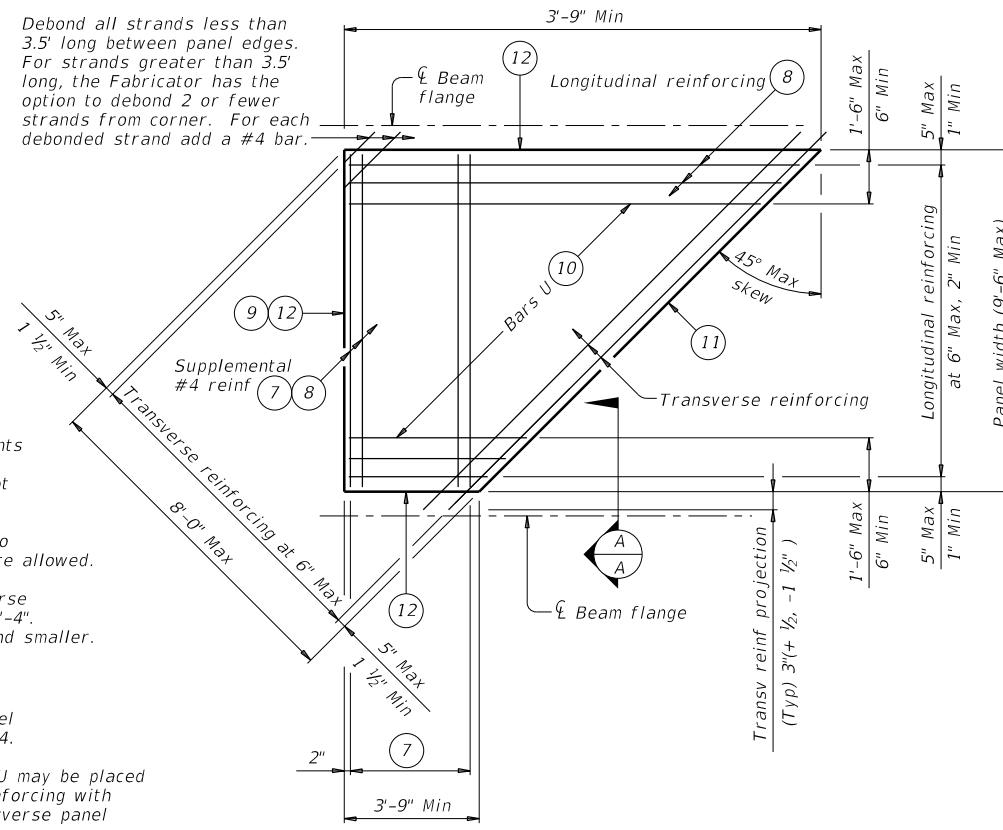
		<b>Bridge Division Standard</b>	
<b>PRESTRESSED CONCRETE PANELS DECK DETAILS</b>			
<b>PCP</b>			
FILE: pcpside1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT April 2019	CONTRACT: 0902	SECTION: 90	JOB: 132
REVISIONS	COUNT: FTW	COUNTY: TARRANT	HIGHWAY: CS
			SHEET NO. 85

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**TYPICAL NON-SKEWED PANEL PLAN**



**TYPICAL SKEWED END PANEL PLAN**

(Only to be used with details shown elsewhere in the plans.)

- 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)				TABLE B (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)	Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
A	3	2 1/2	3 1/2	11" to 12"	2 3/4	2 1/2	2 3/4
B	3	2 1/2	3 1/2	Over 12" to 15"	3 1/4	3	3 1/4
C	4	3	4 1/2	Over 15" to 18"	4	3	4 3/4
IV	6	4	7 1/2	Over 18"	5	3 1/2	6 1/4
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				

**GENERAL NOTES:**

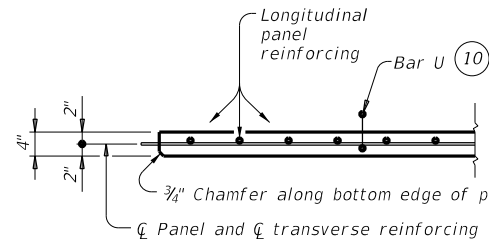
Provide Class H concrete for panels. Release strength  $f'_{ci}=3,500$  psi. Minimum 28 day strength  $f'_{c}=5,000$  psi.  
 Provide 3/4" chamfer along bottom edge of panel on beam side.  
 Do not use epoxy-coated reinforcing steel bar or strand in panels. Remove laitance from top panel surface.  
 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:**

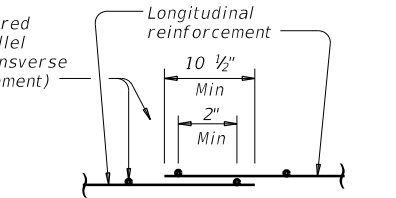
Any of the following options may be used for longitudinal panel reinforcement:  
 1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.  
 2. 3/8" Dia prestressing strands at 4 1/2" Max Spacing (unstressed). No splices allowed.  
 3. 1/2" Dia prestressing strands at 6" Max Spacing (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.



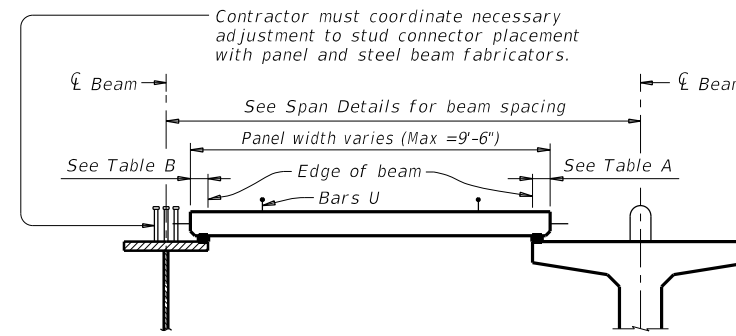
**SECTION A-A**

(Not showing supplemental #4 bars for skewed end panels.)

No splice required for wires parallel to strands (transverse panel reinforcement)

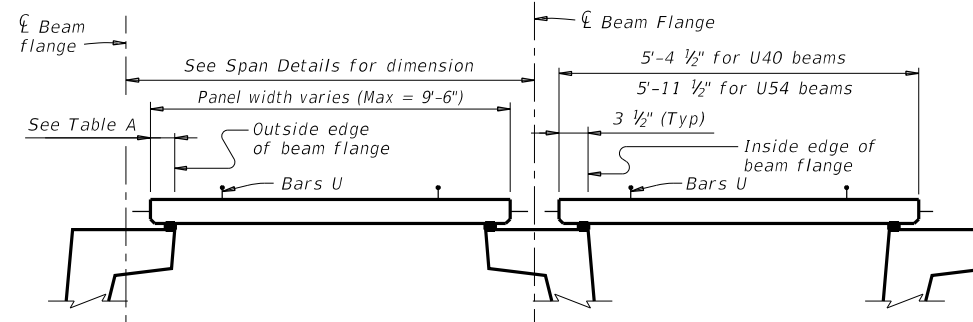


**WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL**



**STEEL BEAMS**

**PRESTRESSED CONCRETE BEAMS OR GIRDERS**  
 Typ unless noted otherwise



**PRESTRESSED CONCRETE U-BEAMS**

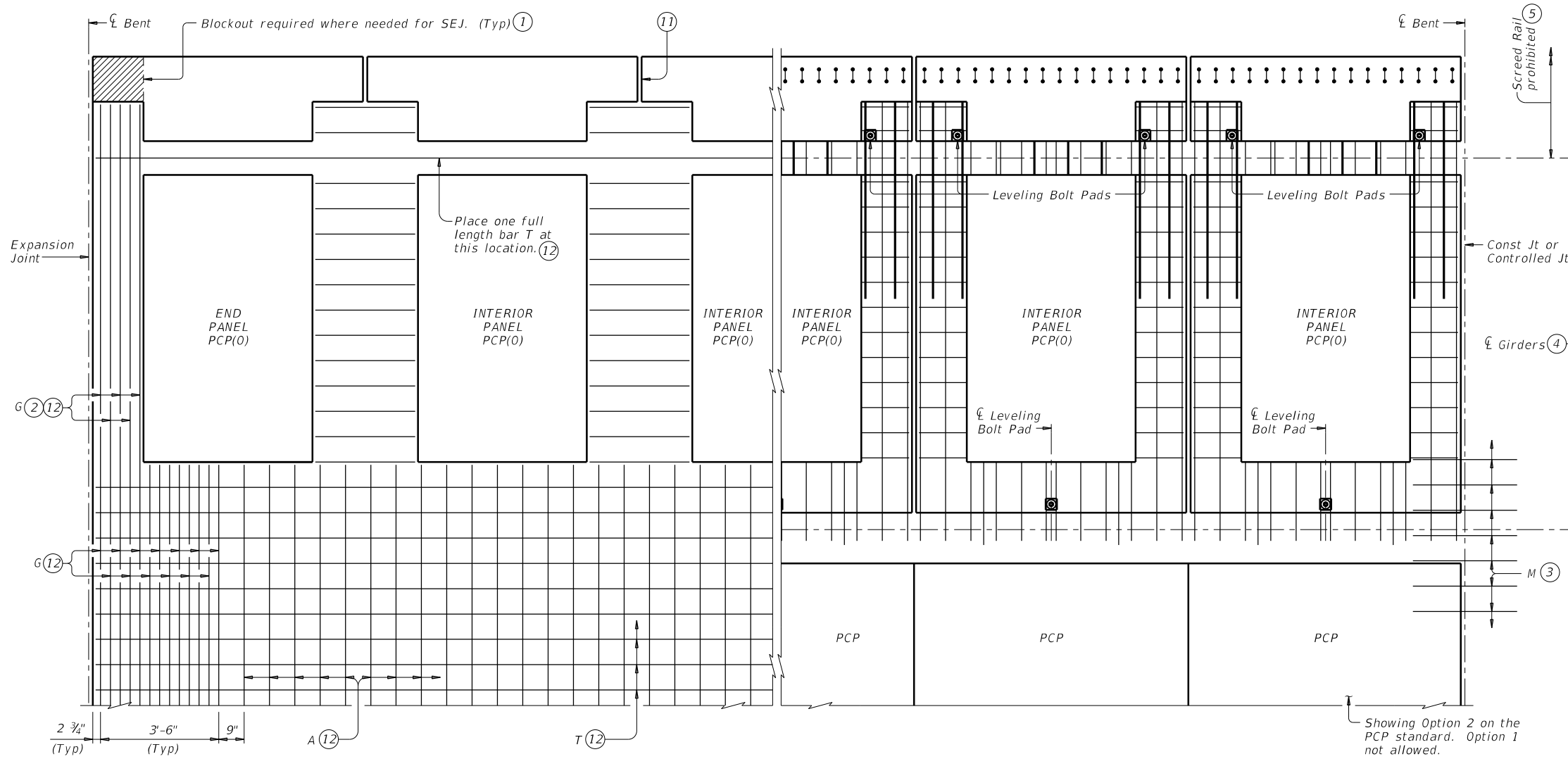
**TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH**

HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>PRESTRESSED CONCRETE PANEL FABRICATION DETAILS</b>			
<b>PCP-FAB</b>			
FILE: pcpside2-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT April 2019	CONF: 0902	SECT: 90	JOB: 132
REVISIONS:			HIGHWAY: CS
	DIST: FTW	COUNTY: TARRANT	SHEET NO: 86

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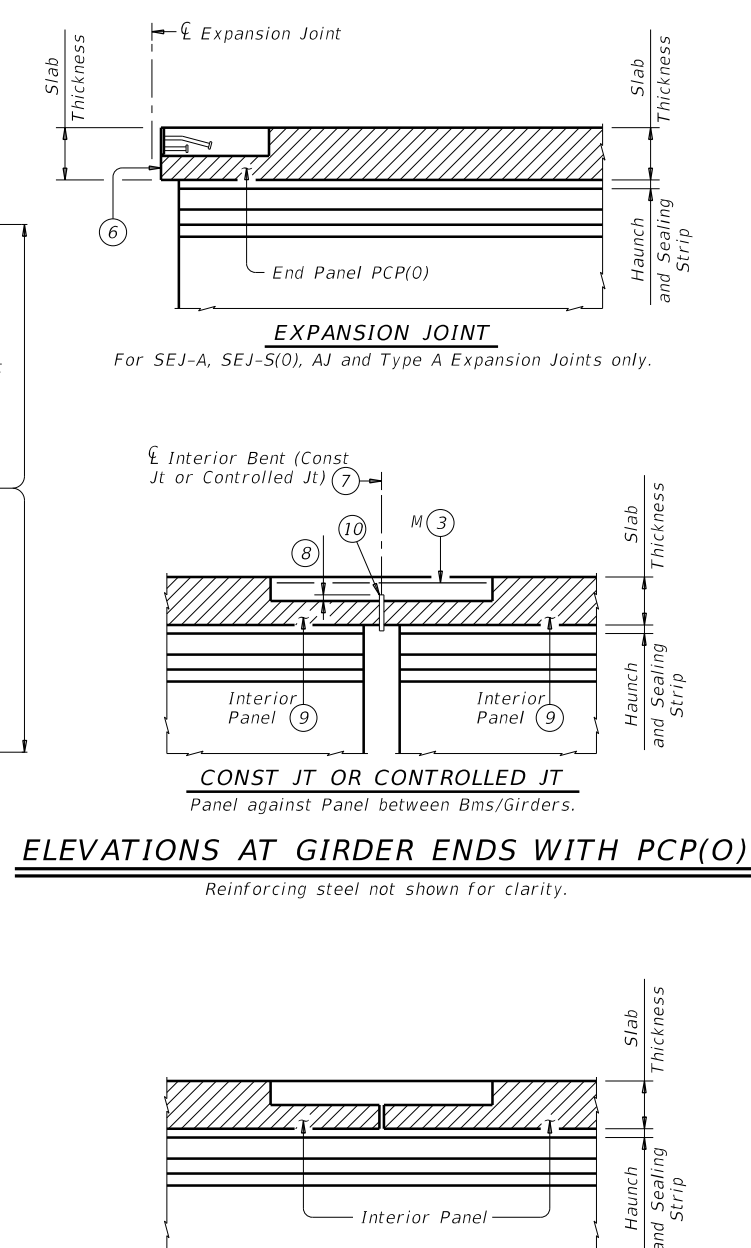
SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

SHOWING PCP(O) EXPOSED REINFORCING STEEL

**PANEL LAYOUT**

PCP(O) shown with gaps between panels for clarity. The gap cannot be considered as a panel fabrication tolerance.

- ① 1'-4" x 1'-6" x 4 1/2" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
- ② When blockout is required, extend bars G into blockout.
- ③ Place additional bars M 2'-11" in length on top of bars A and between every bar T. Center bars M at center of bent. Located at bents with construction joints or controlled joints only. Bars M may replace additional (#4) bars 5'-0" in length as shown on PCP standard in Option 2 ~ Elevations At Beam Ends. Option 1 not allowed.
- ④ It is recommended to profile every 4 ft by surveying each girder under PCP(O) for proper grading of panels.
- ⑤ Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
- ⑥ Place end panel PCP(O) within 1/2" of expansion joint opening. Do not encroach on required expansion joint opening.
- ⑦ Top Plastic Joint Former at Controlled Joints (Stress Cap, Zip Strip, Stress Lock, etc.) is not required with these Details.
- ⑧ 0" Min, 3/4" Max, support as necessary.
- ⑨ Place panel within 1/2" of 3/4" thick board.
- ⑩ 3/4" thick wood/timber board, leave in place. Place straight, within 1/4" of Centerline of Bent, across bridge width and end board at exterior flange edge of fascia girders. Do not extend into overhang.
- ⑪ Seal top of panel only, with a Class 4 sealant prior to rail construction. Typical between panels. Do not seal at Expansion Joints.
- ⑫ 1 1/2" End Cover. (Typ)



EXPANSION JOINT  
 For SEJ-A, SEJ-S(0), AJ and Type A Expansion Joints only.

CONST JT OR CONTROLLED JT  
 Panel against Panel between Bms/Girders.

ELEVATIONS AT GIRDER ENDS WITH PCP(O)  
 Reinforcing steel not shown for clarity.

ELEVATION BETWEEN PCP(O)  
 The gap cannot be considered as a panel fabrication tolerance. Reinforcing steel not shown for clarity.

HL93 LOADING SHEET 1 OF 2

**Texas Department of Transportation** Bridge Division

## PRECAST CONCRETE PANELS FOR OVERHANGS

### PCP(O)

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
DIST	COUNTY		SHEET NO.	
FTW	TARRANT		87	

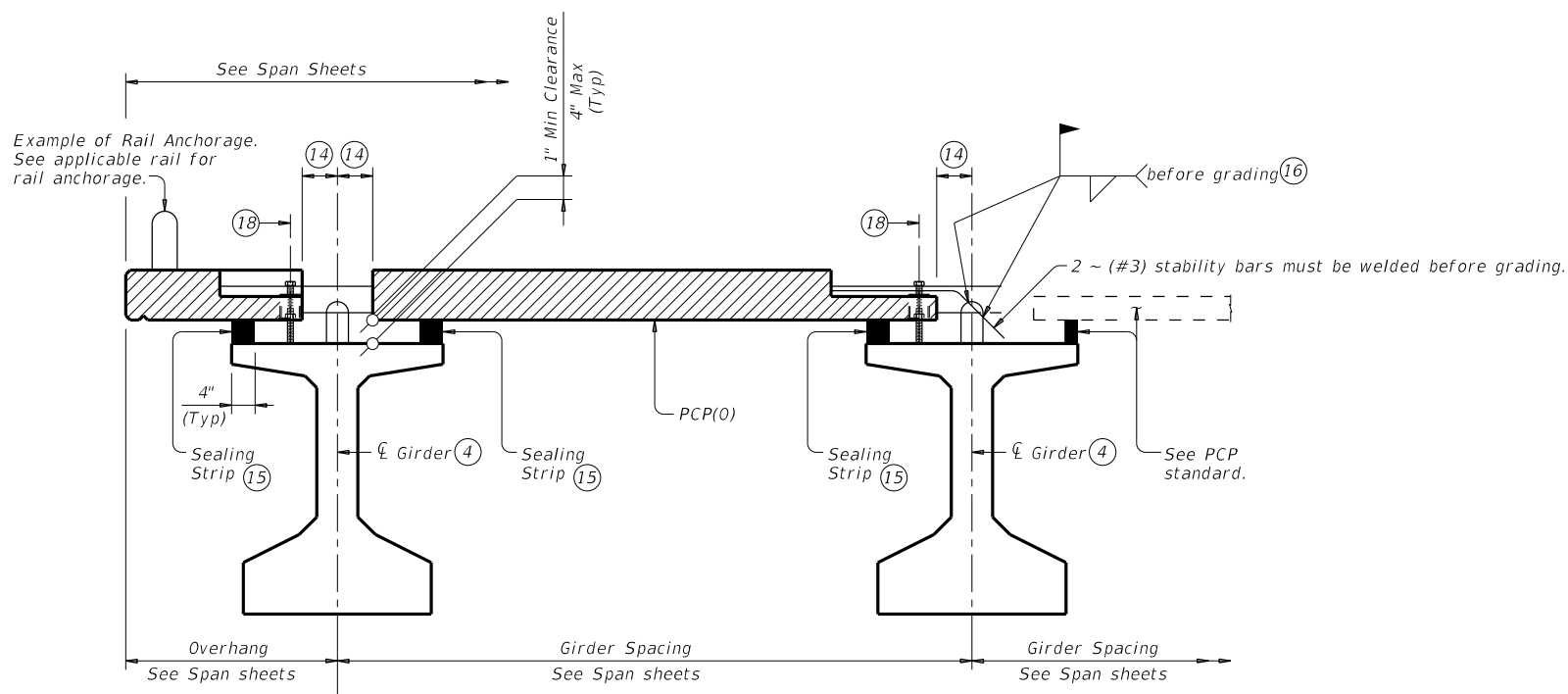
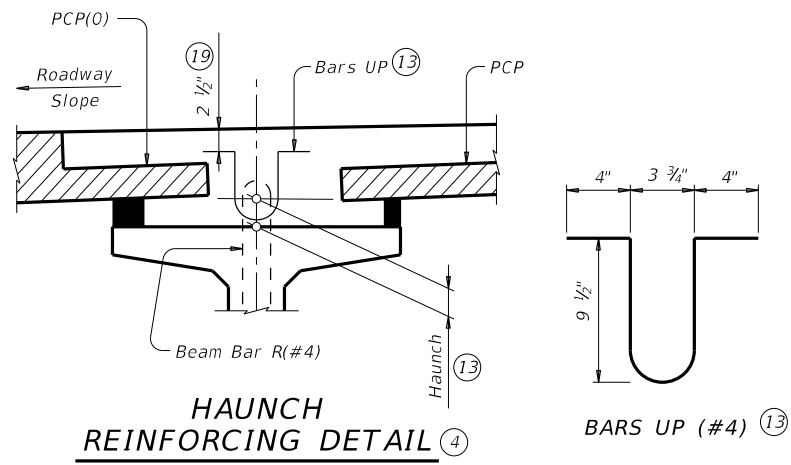


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BAR TABLE		
BAR	SIZE	MAX SPA (IN)
A (12)(17)	#4	9"
G (12)(17)	#4	3 1/2"
M	#4	9"
T (12)(17)	#4	9"

- ④ It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.
- ⑤ Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
- ⑫ 1 1/2" End Cover on bars. (Typ)
- ⑬ Space bars UP(#4) with girder bars R(#4) in all areas where measured haunch exceeds 3 1/2" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.
- ⑭ 6" plus or minus.
- ⑮ Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and compress to grade.
- ⑯ (#3) Panel bars F must be field bent and welded to the R bars in girder. Two bars F per panel.
- ⑰ Field placed bars that are allowed to be lapped. Reinforcing steel that protrudes from panels are not considered bars to be lapped. See "Material Notes" for applicable bar laps.
- ⑱ Leveling Bolt Pad. 1" Dia Coil Rod or 1" Dia Coil Bolt shown, are furnished by the contractor. After grading each PCP(0) panel with the 1" Dia coil rods or coil bolts, secure each panel in its final resting position (plastic shims, welding, etc) and remove all 1" Dia coil rods or coil bolts for the cast-in-place concrete. Coil rods/bolts may be left in place at contractor's option. If coil rods/bolts are left in place, coil rods/bolts must have at least 2 1/2" of cover to top of finish grade. Grading bolts are inadequate to carry all conceivable screed/construction loads. Panel support method must be calculated, location identified, and placed on shop drawings. Method chosen to support panels must be adequate for all construction loads. Panel support method must be placed/constructed after final grading and before screed rail placement.
- ⑲ Unless shown otherwise on Span Details.



**TYPICAL TRANSVERSE SECTION**  
 (Showing Girder Type Tx46)

**CONSTRUCTION NOTES:**  
 Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended.  
 Ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. Place sealing strips at girder flange edges so that adequate space is provided for the mortar to flow a minimum of 8" transversely under the panels as the slab concrete is placed.  
 Panel placement with Option 1 on the PCP standard is not allowed. It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.  
 To allow the proper amount of mortar to flow between girder and panel, maintain a minimum vertical opening of 1". Roadway cross-slope reduces the opening available for entry of the mortar. Sealing strips vary in thickness along girder are therefore required.  
 Seal the top panel with a Class 4 sealant as shown in the Panel Layout.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel in cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.  
 If the reinforcing steel is shown on the Span Details to be epoxy coated, then epoxy coat bars A, G, M, & T.  
 Provide bar laps, where required, as follows:  
 Uncoated ~ #4 = 1'-7"  
 Epoxy Coated ~ #4 = 2'-5"  
 Provide sealing strips comprised of one layer low density polyurethane (1.0 Lbs density) foam sealing strips or equivalent. Oversize the height of sealing strips by 2". Bond sealing strips to the girder with 3M Scotch® 4693 or equivalent adhesive compatible with sealing strips.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Specifications.  
 These details can be used as an option to construct the deck overhang when noted on the Span details and in conjunction with the PCP(0)-FAB, PCP and applicable Standard sheets.  
 These details are only applicable for Prestr Conc I-Girders.  
 Any additional reinforcement or concrete required on these details is subsidiary to the bid Item "Reinforced Concrete Slab".

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation Bridge Division

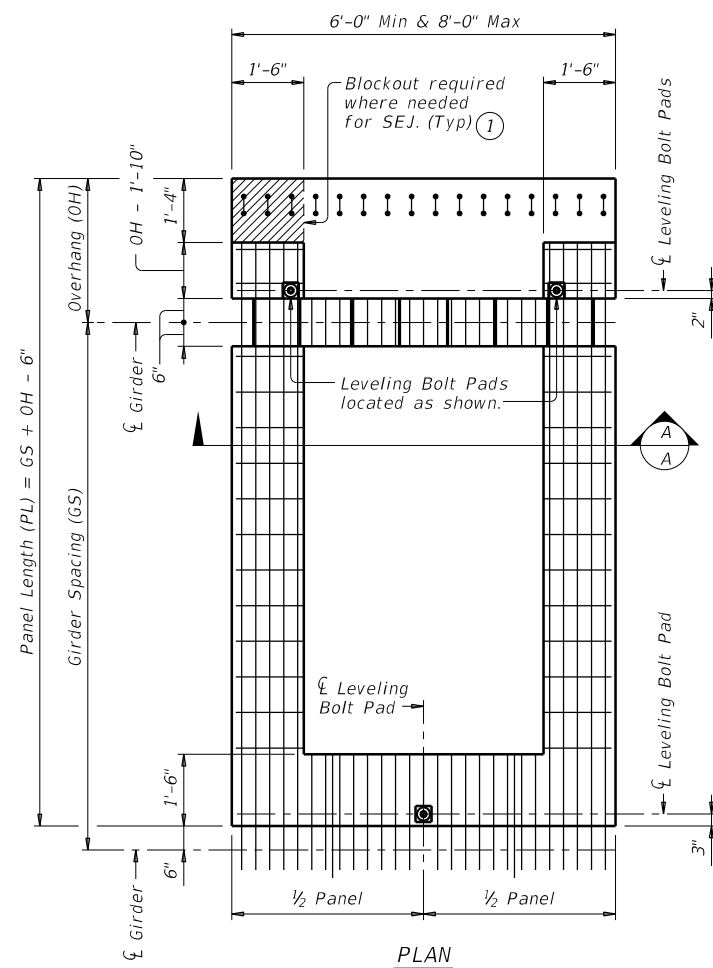
**PRECAST CONCRETE PANELS FOR OVERHANGS**

PCP(0)

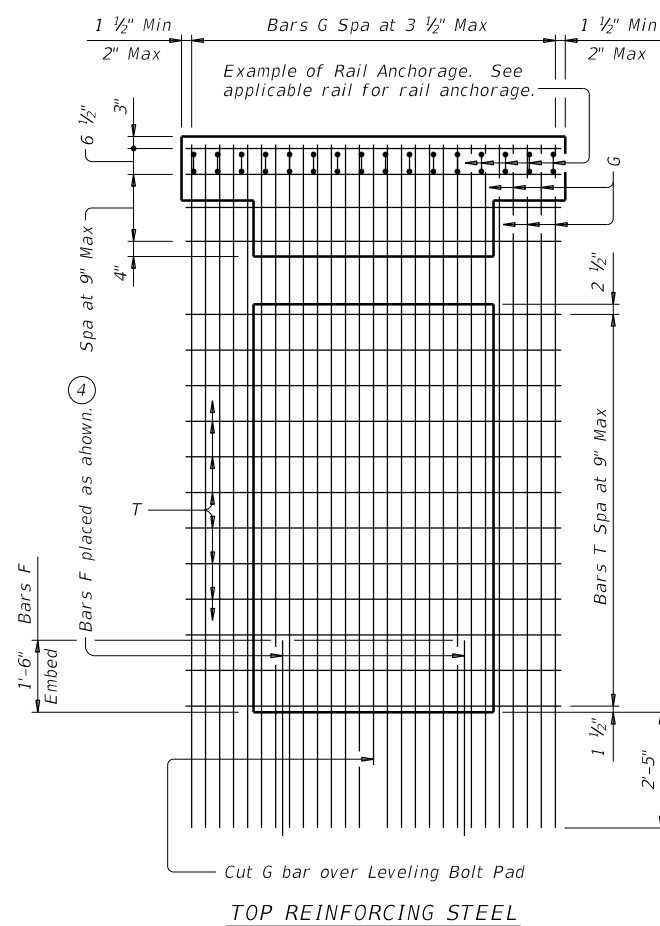
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FTW	TARRANT	88		

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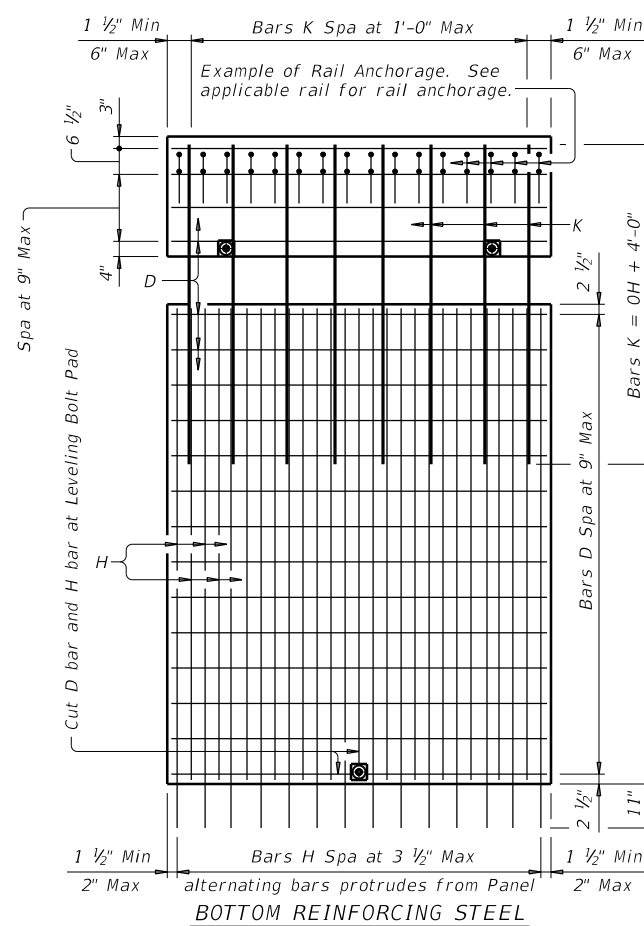


PLAN

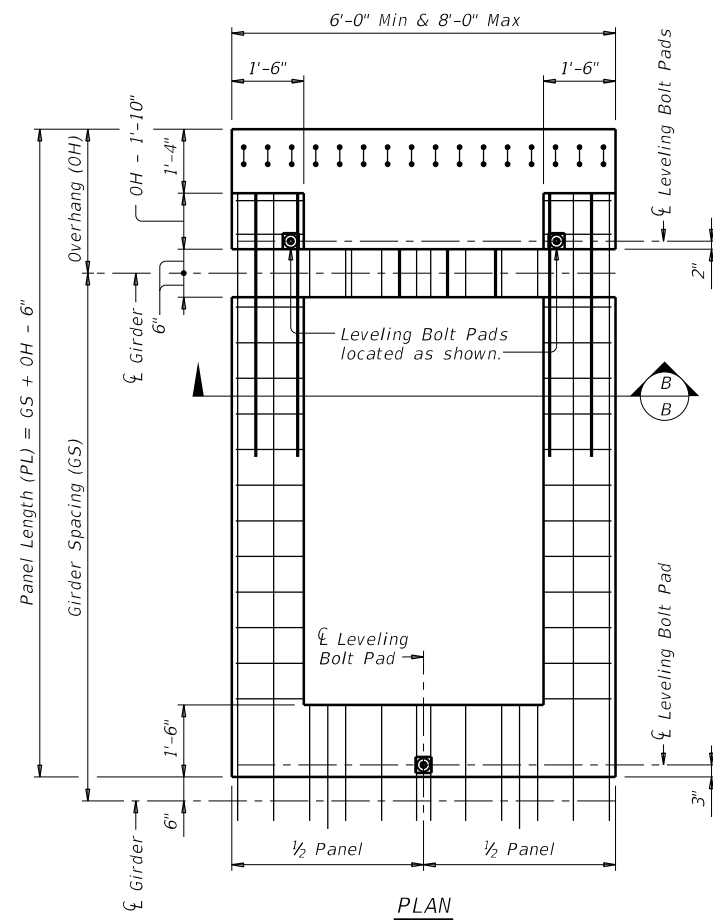


TOP REINFORCING STEEL

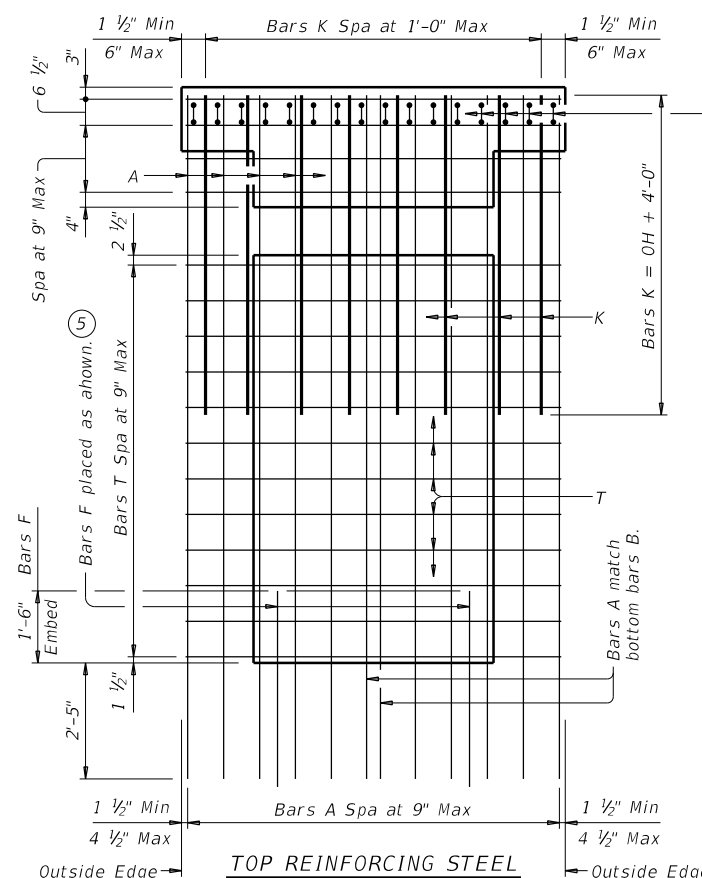
END PANEL



BOTTOM REINFORCING STEEL

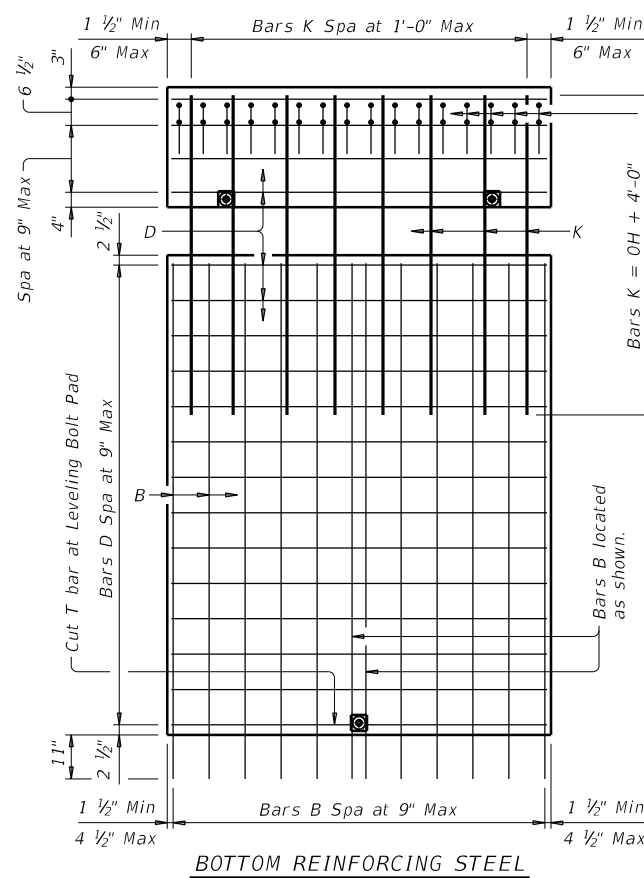


PLAN



TOP REINFORCING STEEL

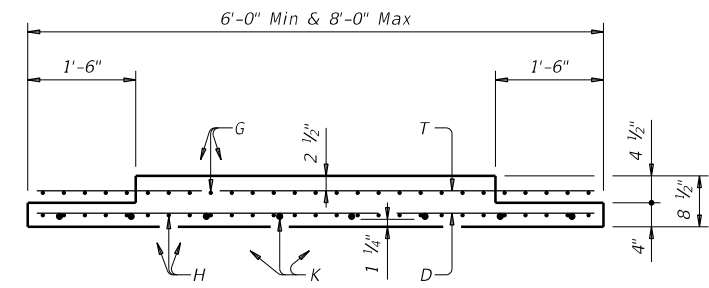
INTERIOR PANEL



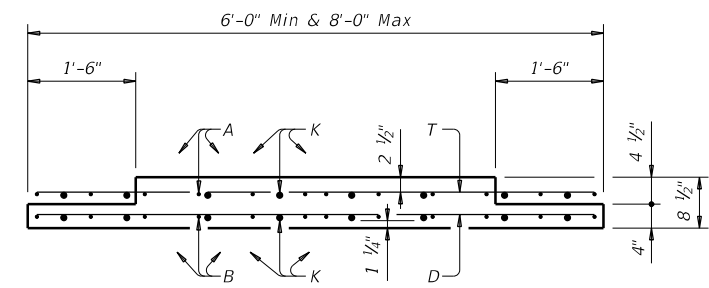
BOTTOM REINFORCING STEEL

BAR TABLE	
BAR	SIZE
A (2)	#4
B (2)	#4
D (2, 3)	#4
F (3)	#3
G (2)	#4
H (2)	#4
K (2, 3)	#8
T (2, 3)	#4

- ① 1'-4" x 1'-6" x 4 1/2" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
- ② 1 1/2" End Cover on bars. (Typ)
- ③ Bars that are not allowed to have lap splices.
- ④ Place F bars under bars T and against bars G.
- ⑤ Place F bars under bars T and between bars A.



SECTION A-A



SECTION B-B

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation Bridge Division

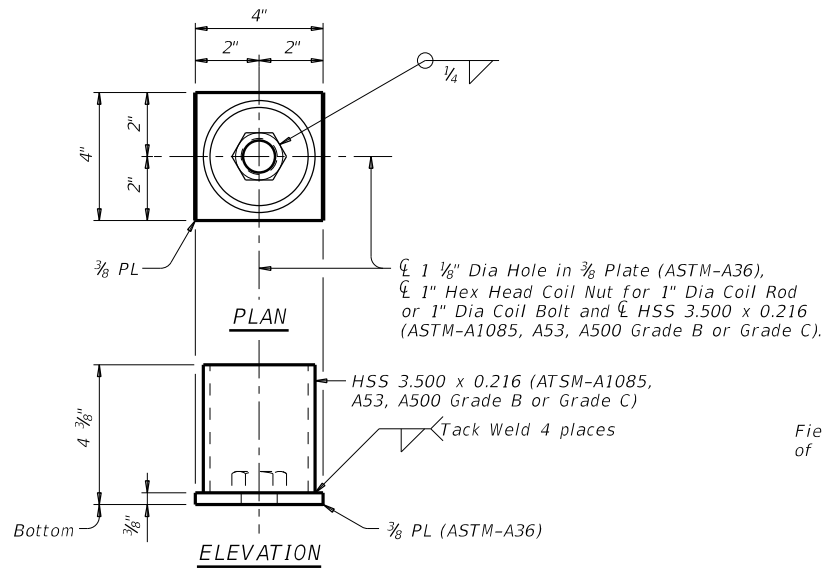
## PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

### PCP(O)-FAB

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REVISIONS	0902	90	132	CS
DIST	COUNTY		SHEET NO.	
FTW	TARRANT		89	

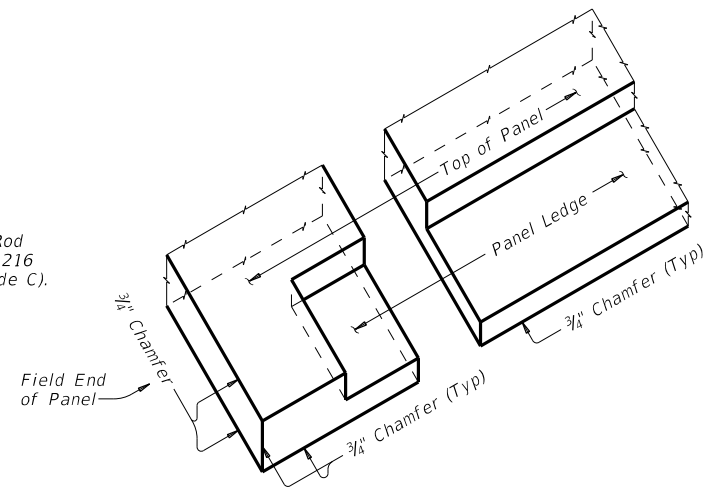
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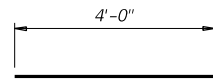
**LEVELING BOLT PAD DETAILS**

Galvanize if epoxy coated reinforcing steel is used in slab. Do not oil this assembly.

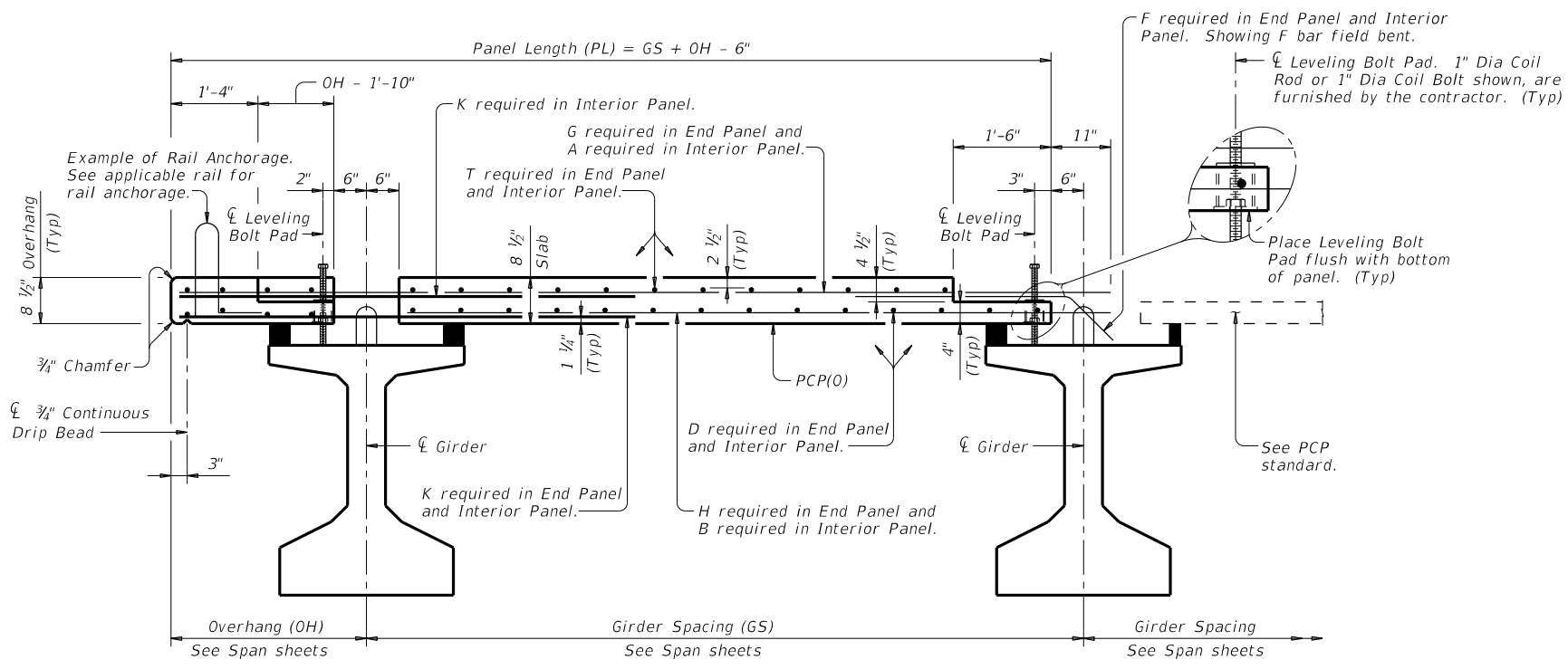


**ISOMETRIC VIEW AT CORNER OF PANEL**

Showing Typical Chamfers on Panel. Drip Bead and reinforcing steel not shown for clarity.



BARS F



**TYPICAL TRANSVERSE SECTION**

(Showing Girder Type Tx46)

**CONSTRUCTION/FABRICATION NOTES:**

Remove laitance from top panel surface.  
 Finish top surface area of panel with a broom finish.  
 Finish top ledge 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).  
 Provide 3/4" concrete chamfers as shown on these details.  
 Do not lap splice bars D, F, K & T. Bars A, B, G & H, may be spliced with only one lap splice allowed on each bar.  
 Panels must be fabricated by a fabricator meeting the requirements of DMS 7300 for Multi-Project Nonstressed Member Fabrication Plant.

**MATERIAL NOTES:**

Provide Class H concrete (f'c=4000 psi) in panels. Provide Class H (HPC) concrete for panels if required elsewhere in plans. Maximum large aggregate size is 1".  
 Provide material as shown on this standard for the Leveling Bolt Pad.  
 Provide Grade 60 conventional reinforcing steel.  
 Provide epoxy coated reinforcement for bars A, B, D, G, H, K & T if slab reinforcement is epoxy coated.  
 An equal area and spacing of deformed Welded Wire Reinforcement (WWR) ASTM-A1064 may be substituted for bars A, B, D, G, H & T, unless otherwise noted. Bars F and K can not be replaced with WWR.  
 Galvanize leveling bolt pad assembly if epoxy-coated reinforcing steel is used in slab.

**GENERAL NOTES:**

Designed according to AASHTO LRFD Specifications. These details are only applicable for Prestr Conc I-Girders.  
 Any additional reinforcement, lifting devices or epoxy coated reinforcement required on these details are subsidiary to the bid Item "Reinforced Concrete Slab".  
 See railing details for rail anchorage in panel overhang. 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.  
 Submit stable lifting methods and devices to the Engineer for approval.  
 Shop drawings for the fabrication of panels will require the Engineer's approval.

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



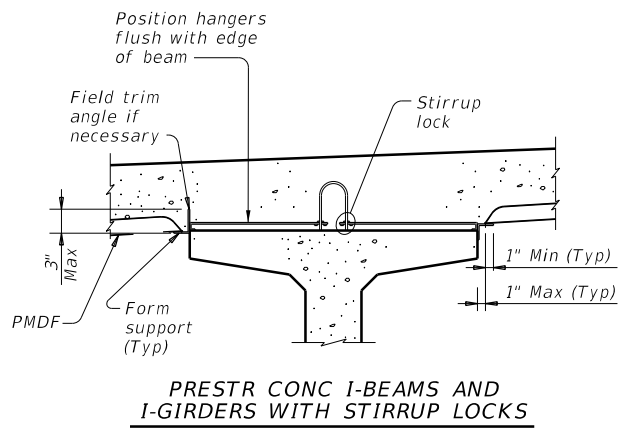
**PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS**

**PCP(O)-FAB**

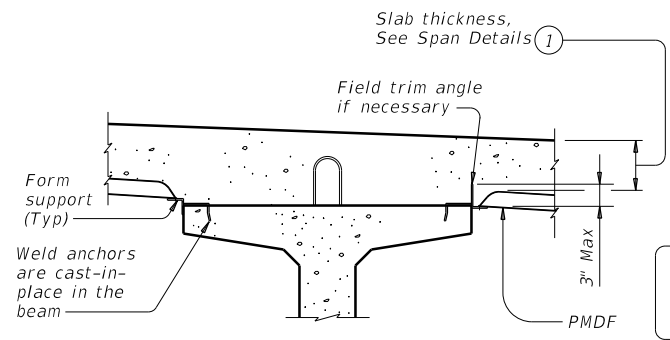
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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
DIST	COUNTY		SHEET NO.	
FTW	TARRANT		90	

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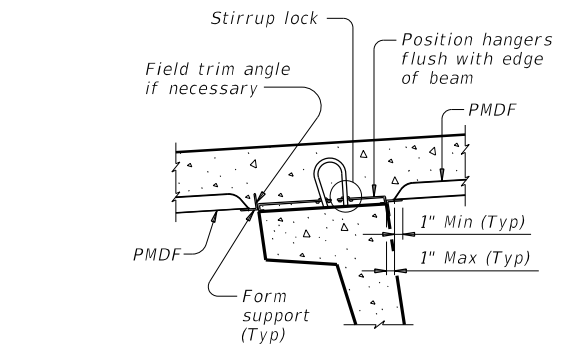
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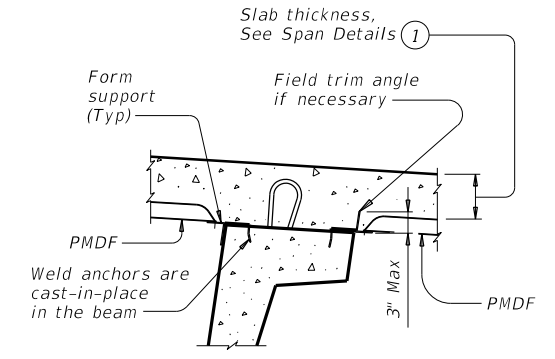
**PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS**



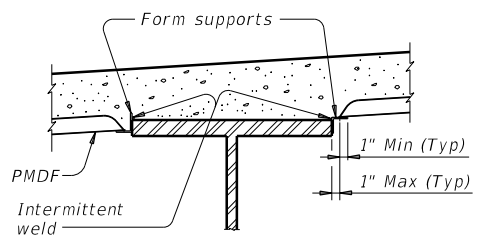
**PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS**



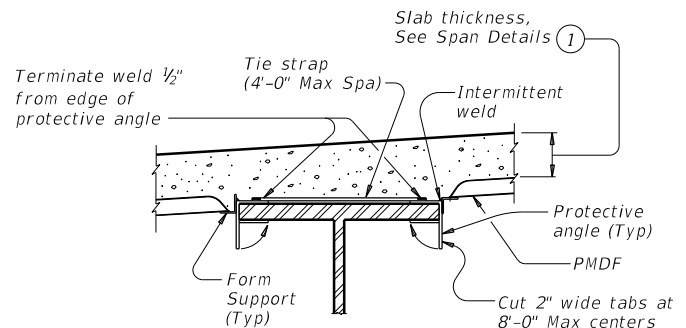
**U-BEAMS WITH STIRRUP LOCKS**



**U-BEAMS WITH WELD ANCHORS**

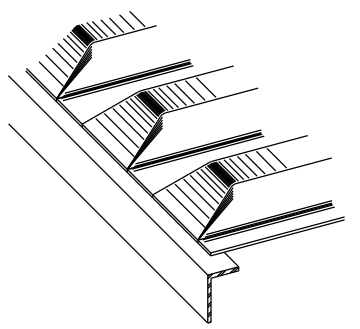


**STEEL BEAMS AT COMPRESSION FLANGES**

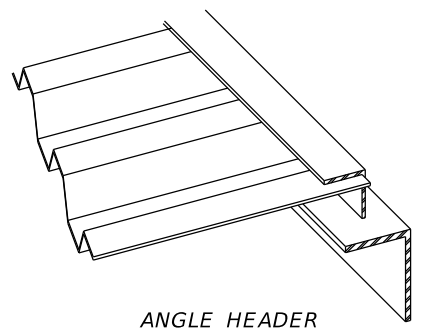


**STEEL BEAMS AT TENSION FLANGES**

**TYPICAL TRANSVERSE SECTIONS**



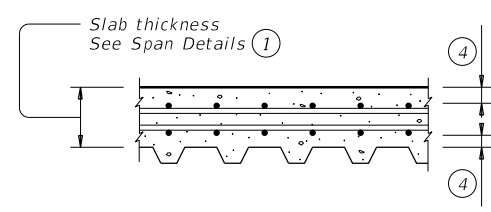
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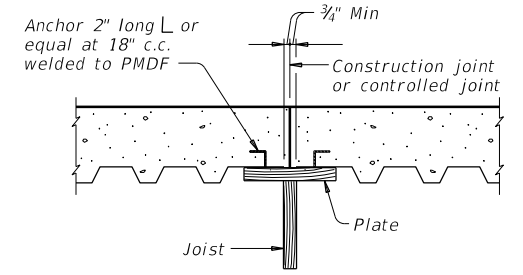
**ANGLE HEADER**

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

**TYPES OF END CLOSURES**



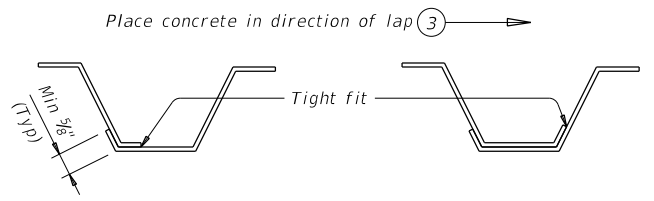
**TYP LONGITUDINAL SLAB SECTION**



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".

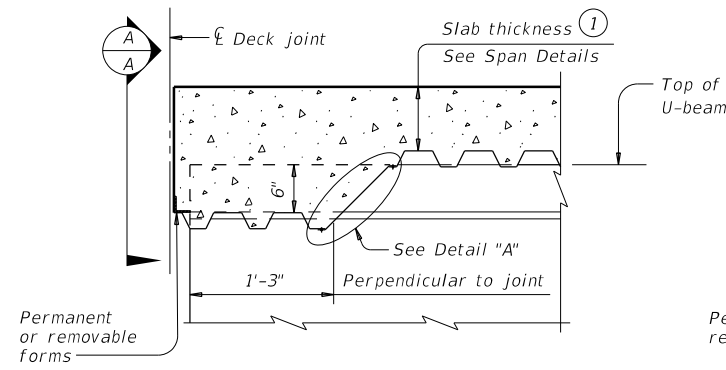
**CONSTRUCTION NOTES:**

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.

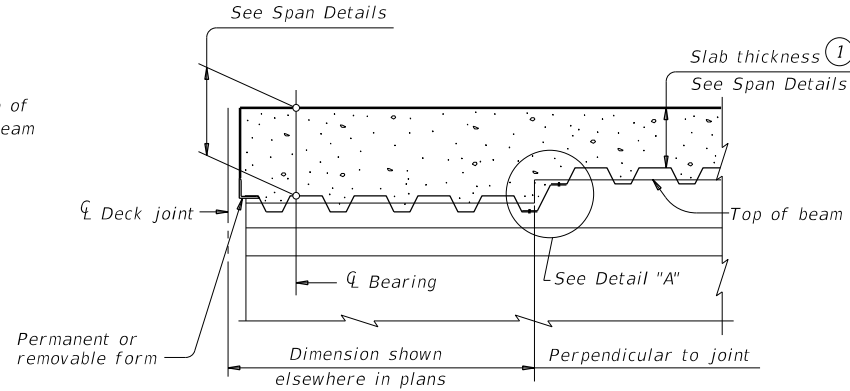
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<b>PERMANENT METAL DECK FORMS</b>			
<b>PMDF</b>			
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©TxDOT April 2019	CONF	SECT	JOB
REVISIONS	0902	90	132
02-20: Modified box note by adding steel beams/girders and subsidiary	DIST	COUNTY	SHEET NO.
12-21: Updated max deflection for RR.	FTW	TARRANT	91

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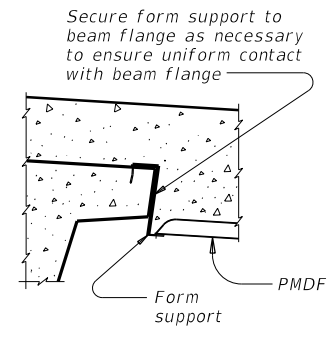
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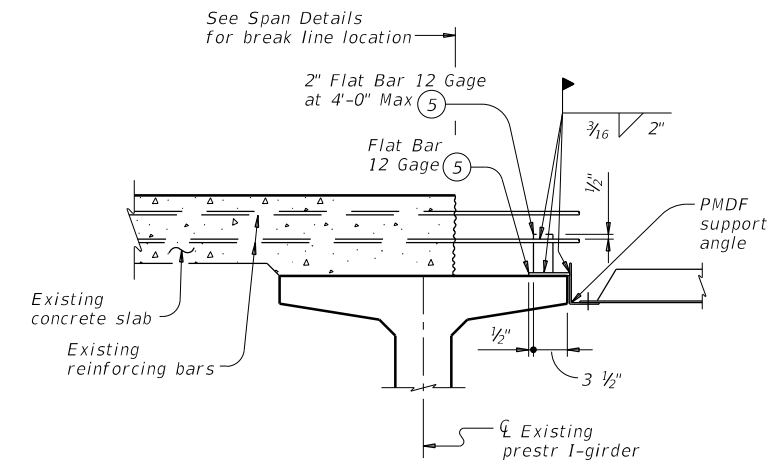
**AT THICKENED SLAB END FOR U-BEAMS**



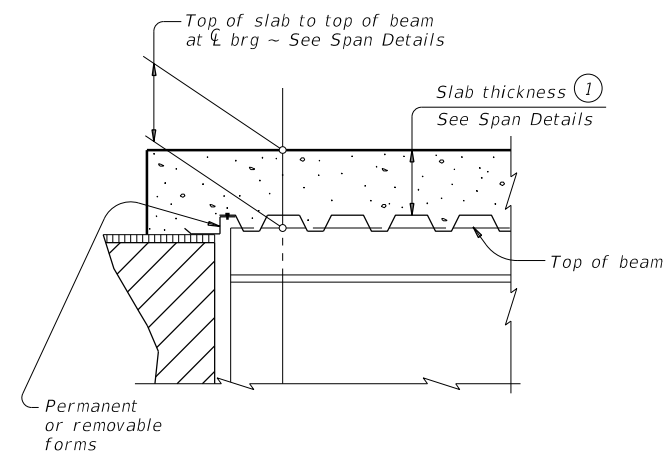
**AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS**  
 Showing I-beam block-out. No block-out for I-girders or steel beams.



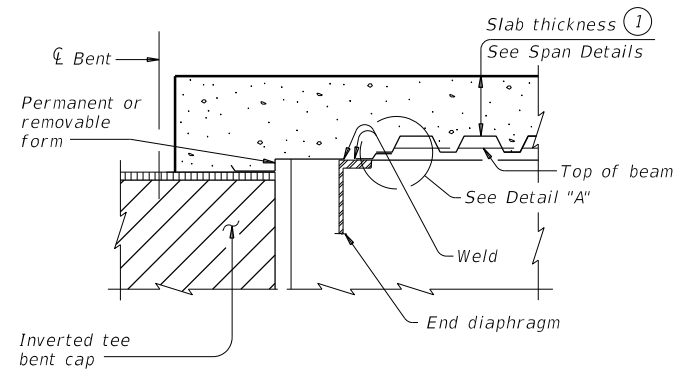
**SECTION A-A**



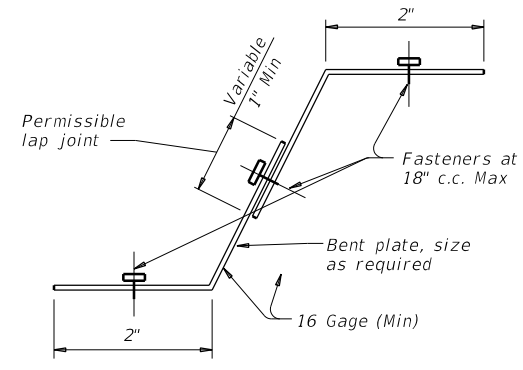
**SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS**



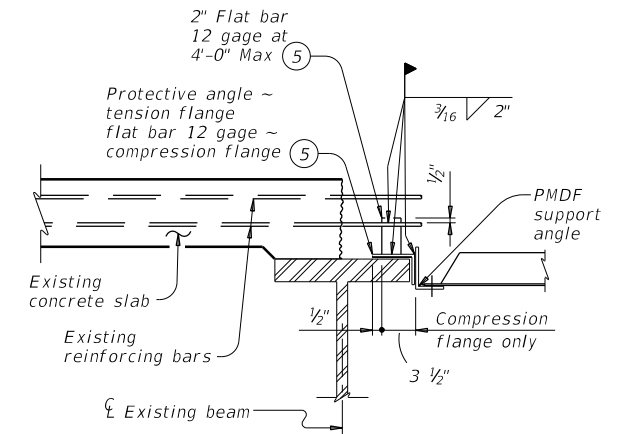
**AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END**



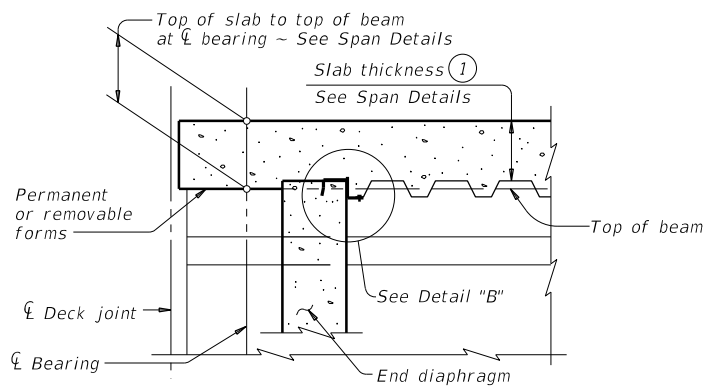
**AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END**



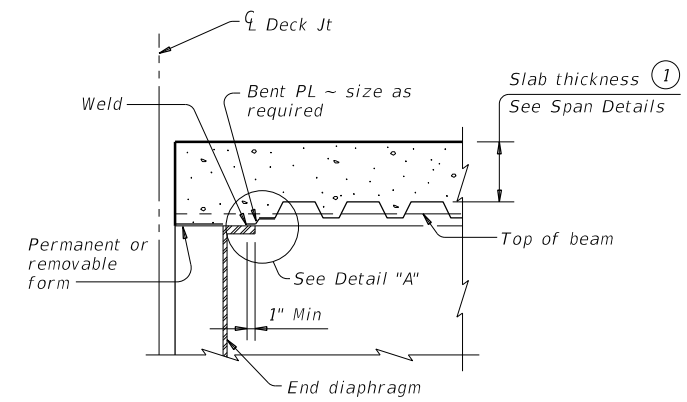
**DETAIL "A"**



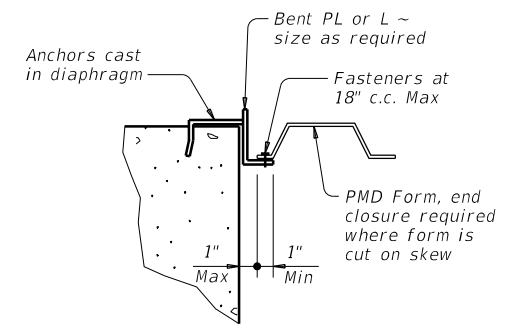
**SHOWING STEEL BEAMS**



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



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



**DETAIL "B"**

- (1) Slab thickness minus 3/8" if corrugations match reinforcing bars
- (5) Minimum yield stress of 12 gage bars shall be 40 ksi

**DETAILS AT ENDS OF BEAMS**

**WIDENING DETAILS**

SHEET 2 OF 2

		<b>Bridge Division Standard</b>	
<b>PERMANENT METAL DECK FORMS</b>			
<b>PMDF</b>			
FILE: pmdfst1-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT April 2019	CONT	SECT	HIGHWAY
REVISIONS	0902	90	132
02-20: Modified box note by adding steel beams/girders and subsidiary	DIST	COUNTY	SHEET NO.
12-21: Updated max deflection for RR.	FTW	TARRANT	92

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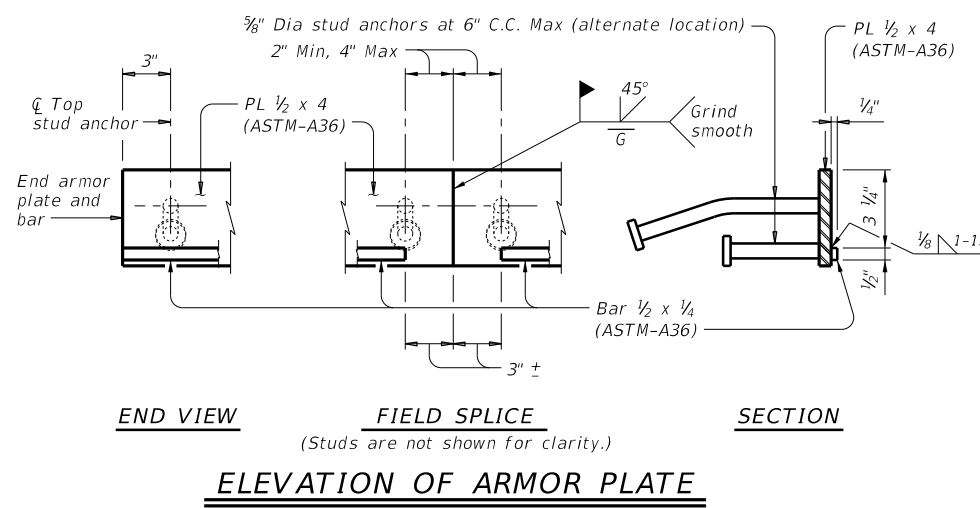
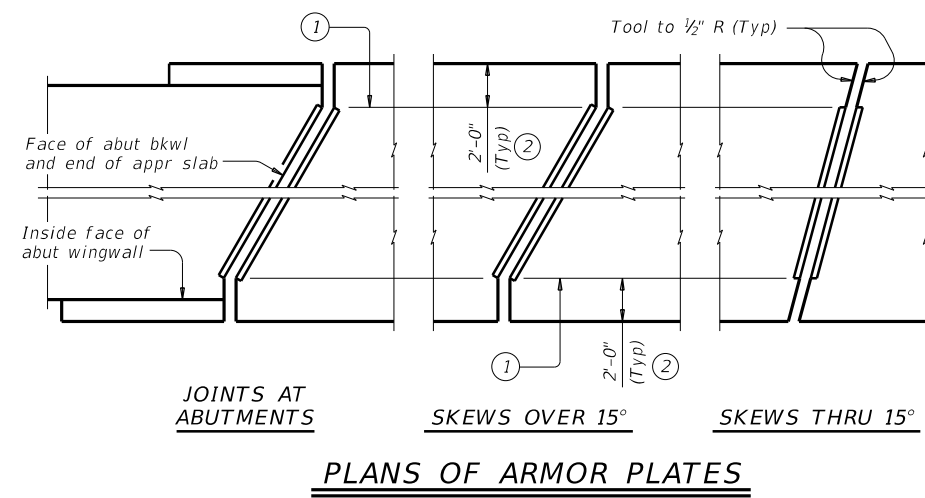
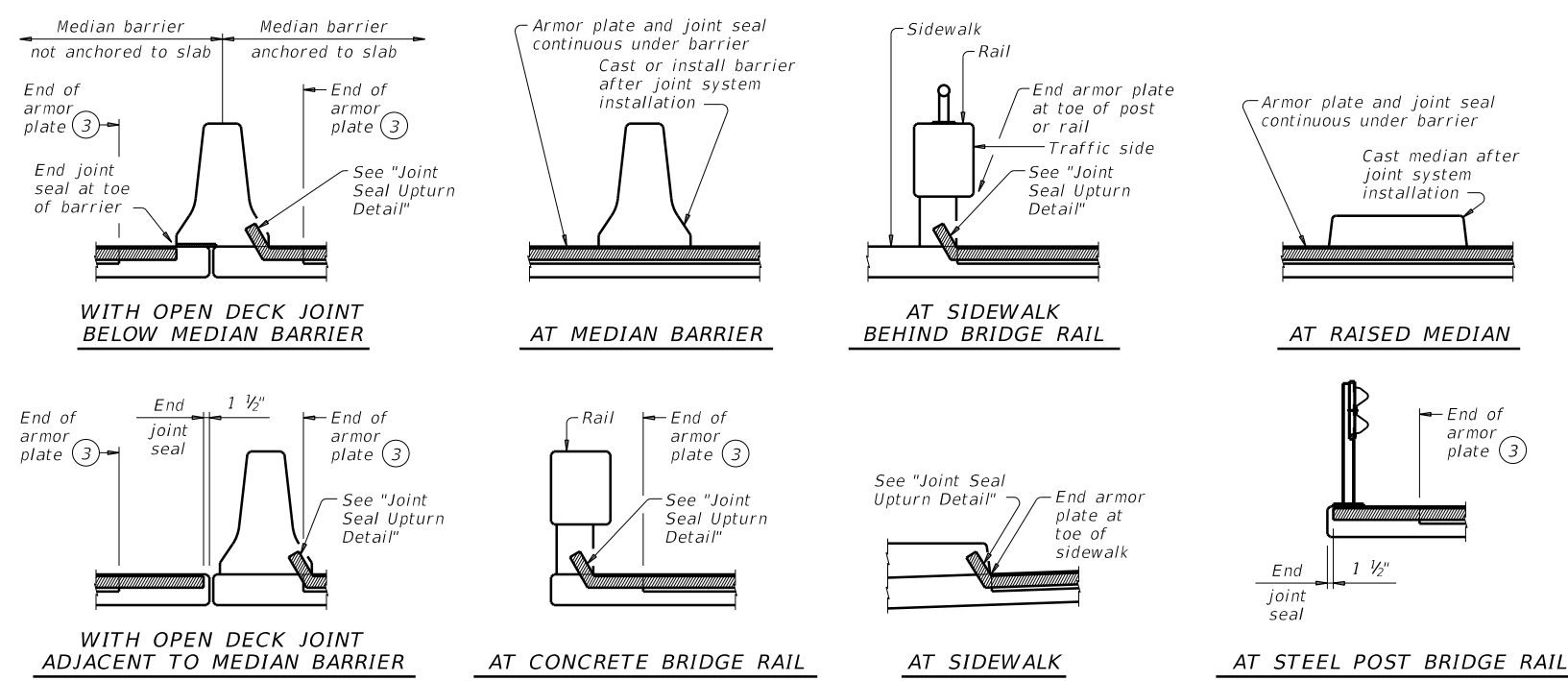


TABLE OF SEALED EXPANSION JOINT INFORMATION			
MANUFACTURER	STEEL SECTION (7)	STRIP SEAL	
		4" JOINT	
		Seal Type	Joint Opening (8)
D.S. Brown	As shown	V-400	2 1/4"
R.J. Watson	As shown	SF-400	2 1/2"
SSI	As shown	SSS-400	2 1/2"
Watson Bowman Acme	As shown	SPS-400	2"

REDUCED LONGITUDINAL MOVEMENT RANGE	
SKEW (deg)	JOINT SIZE
	4"
0	4.0"
15	4.0"
30	3.5"
45	2.8"

**DESIGN NOTES:**  
 Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations. For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

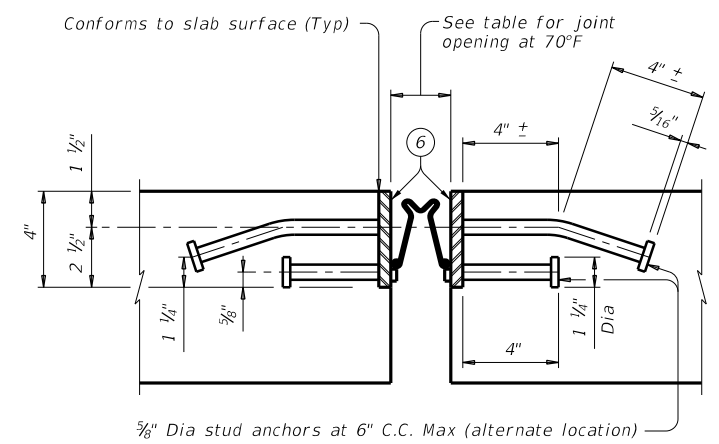
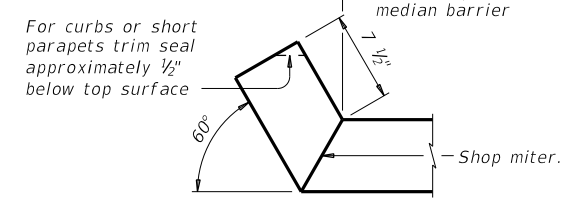
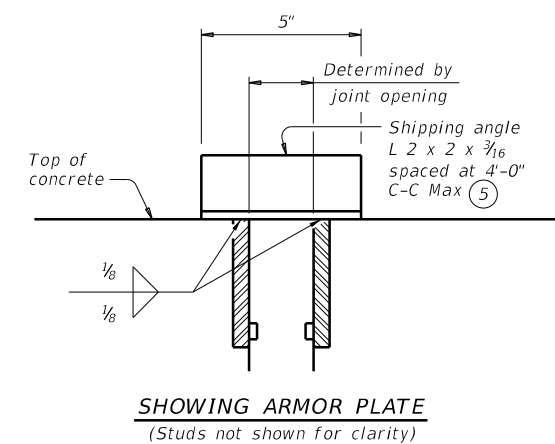


- At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
- Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
- See "Plans of Armor Plates".
- Other conditions affecting the joint profile should be noted elsewhere.
- Align shipping angle perpendicular to joint.
- Coat with Manufacturer's supplied epoxy primer above bar before installing sealant.
- Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.
- These openings are also the recommended minimum installation openings.

**FABRICATION NOTES:**  
 Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.  
 The seal must be continuous and included in the price bid for sealed expansion joint.  
 Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged 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.  
 Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.  
 Paint the entire steel section 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 Item 446.4.7.3 and 446.4.7.4.  
 Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

**CONSTRUCTION NOTES:**  
 Secure the sealed expansion joint in position and place to the 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 sealed expansion joint.  
 Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.  
 Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.  
 Splice and install seal in accordance with the Manufacturer's directions and with the adhesive provided by the Manufacturer.  
 Splice in joint seal may be performed in the field.

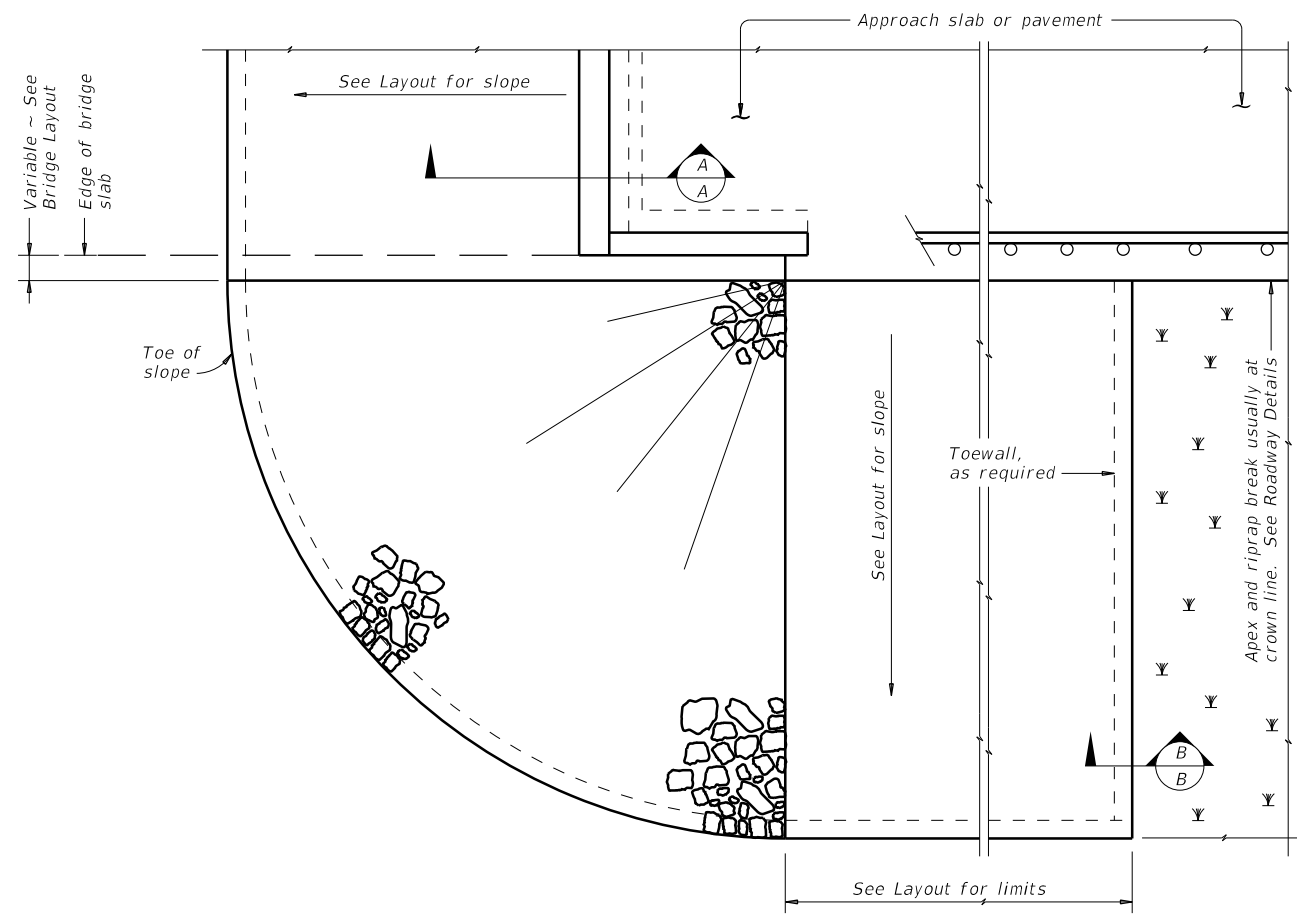
**GENERAL NOTES:**  
 Provide sealed expansion joints in the size and at locations shown on the plans.  
 Minimum slab and overhang thickness required for the use of SEJ-B is 6 1/2".



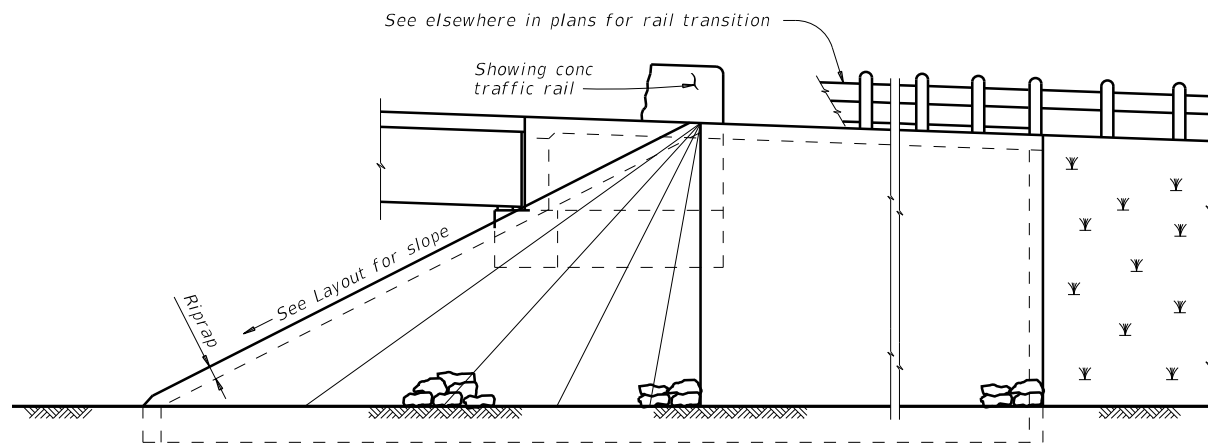
		<b>Bridge Division Standard</b>	
<b>SEALED EXPANSION JOINT TYPE B WITHOUT OVERLAY</b>			
<b>SEJ-B</b>			
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©TxDOT April 2019	CONTRACT: 0902	SECTION: 90	JOB: 132
REVISIONS			HIGHWAY: CS
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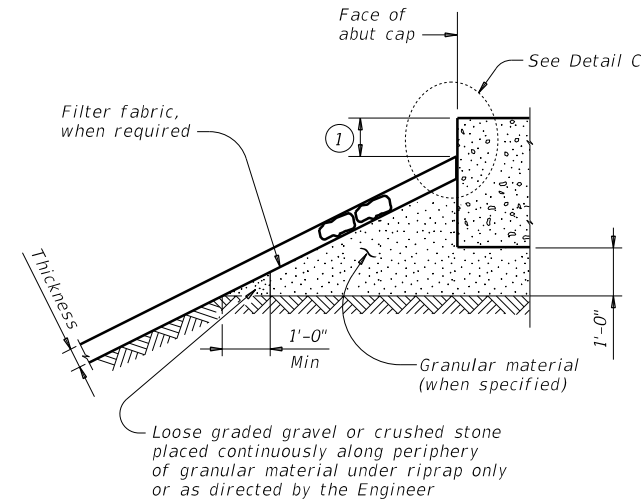
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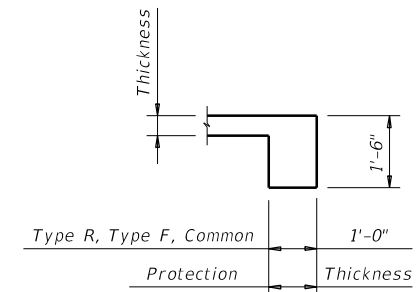
**PLAN**



**ELEVATION**



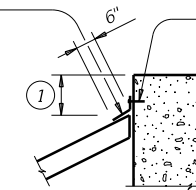
**SECTION A-A AT CAP**



**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".

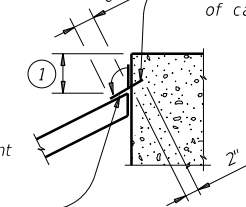
8"X 18 Gage galvanized flashing full length of cap



**CAP OPTION A**

Nail flashing to cap or wingwall and seal with joint sealer

8"X 18 Gage galvanized flashing full length of cap



**CAP OPTION B**

**DETAIL C**

Plug ends and seal joint along ends of cap and side of wingwalls with joint sealer

**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.

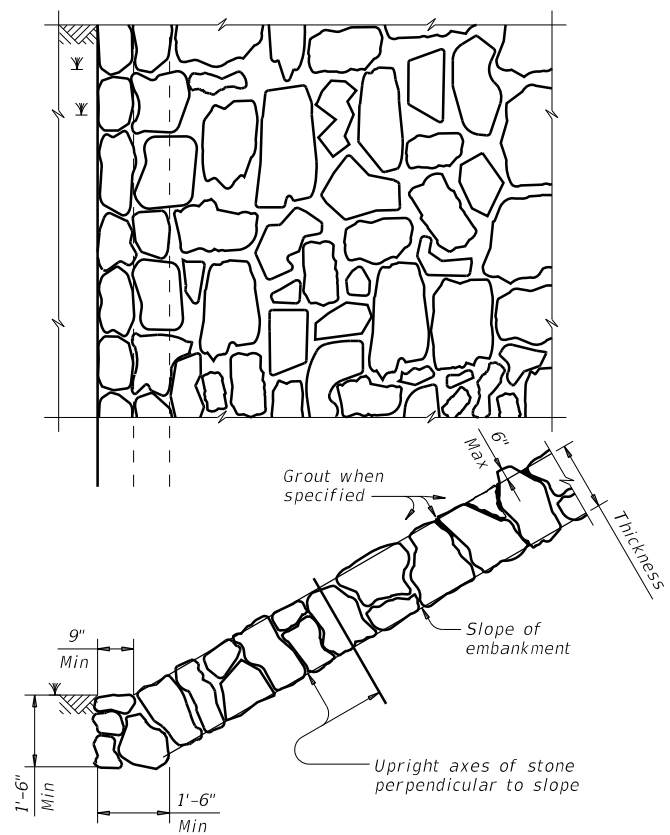
① Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

SHEET 1 OF 2

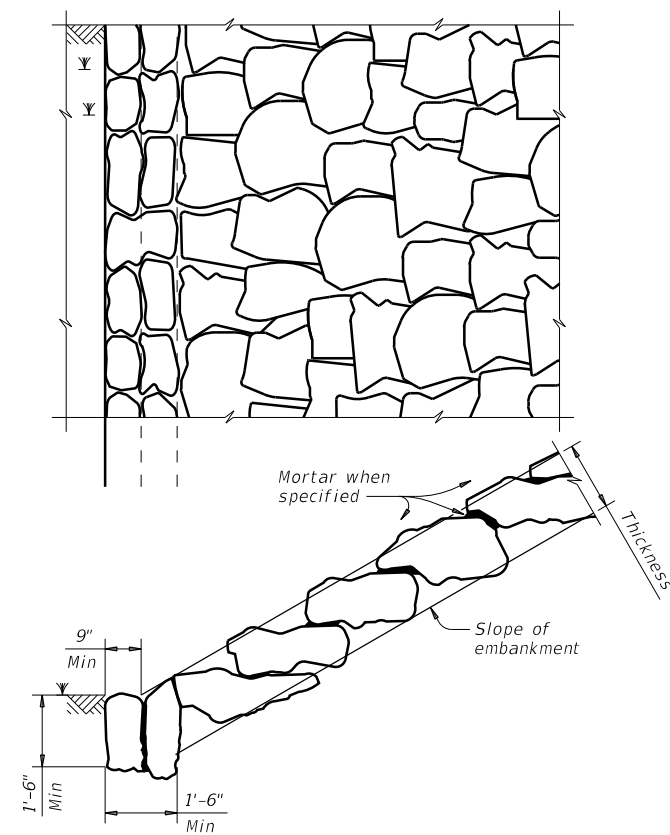
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<h2>STONE RIPRAP</h2>					
<h3>SRR</h3>					
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0902	90	132	CS	
	DIST	COUNTY	SHEET NO.		
	FTW	TARRANT	94		

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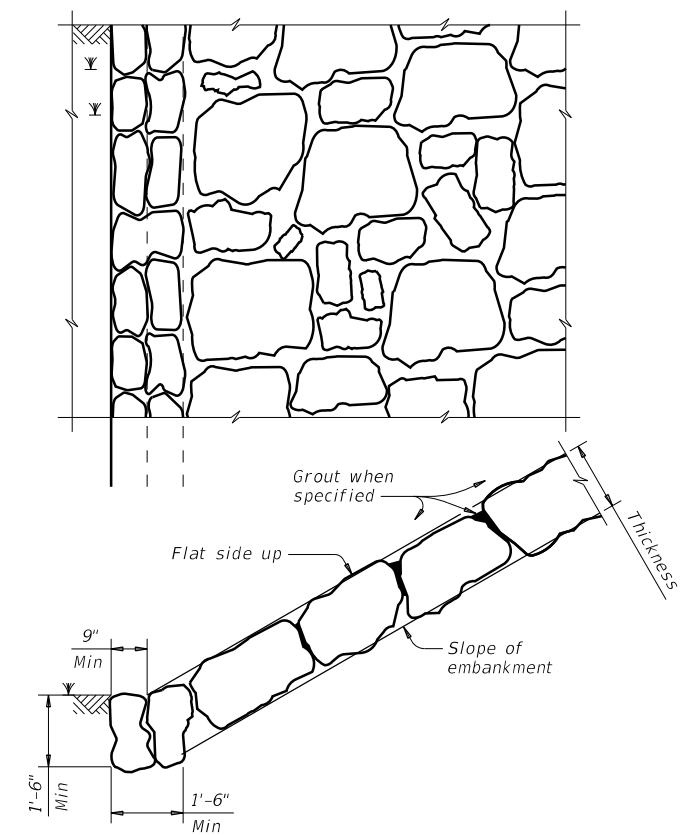
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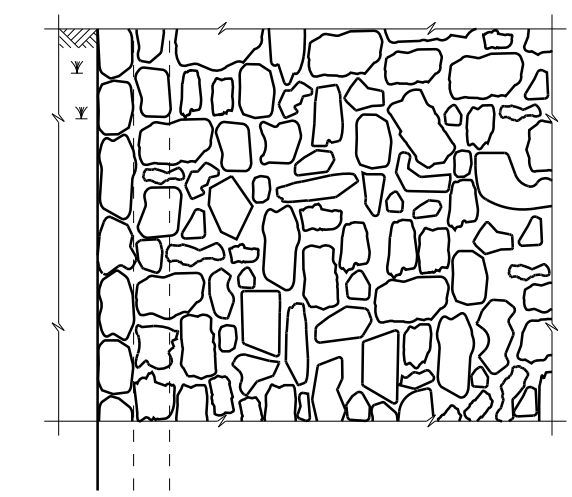
**FIGURE 1 ~ TYPE R STONE RIPRAP**  
 dry or grouted



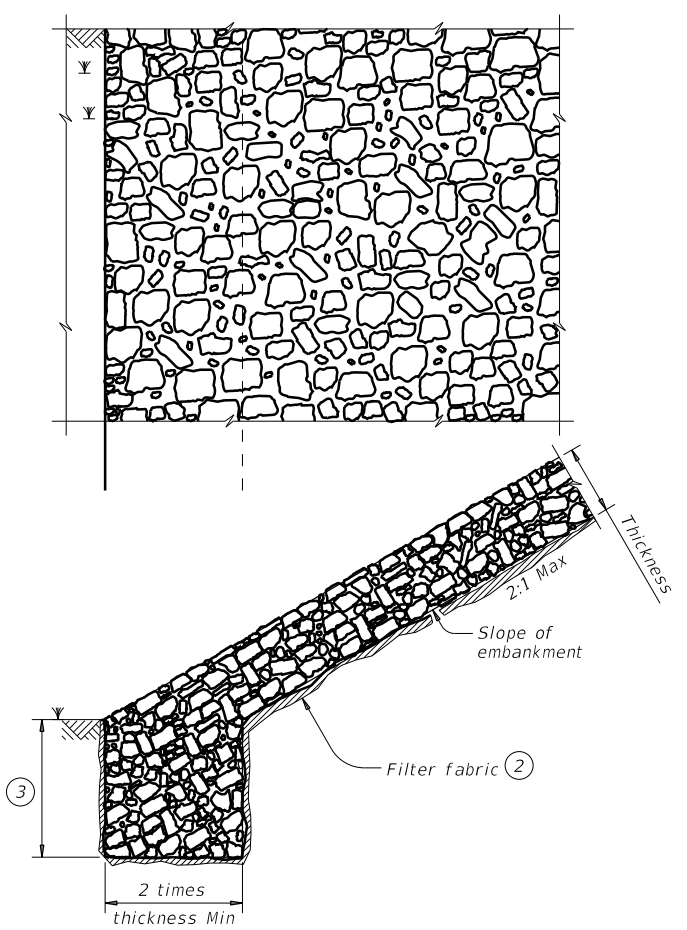
**FIGURE 2 ~ TYPE F STONE RIPRAP**  
 dry or mortared



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

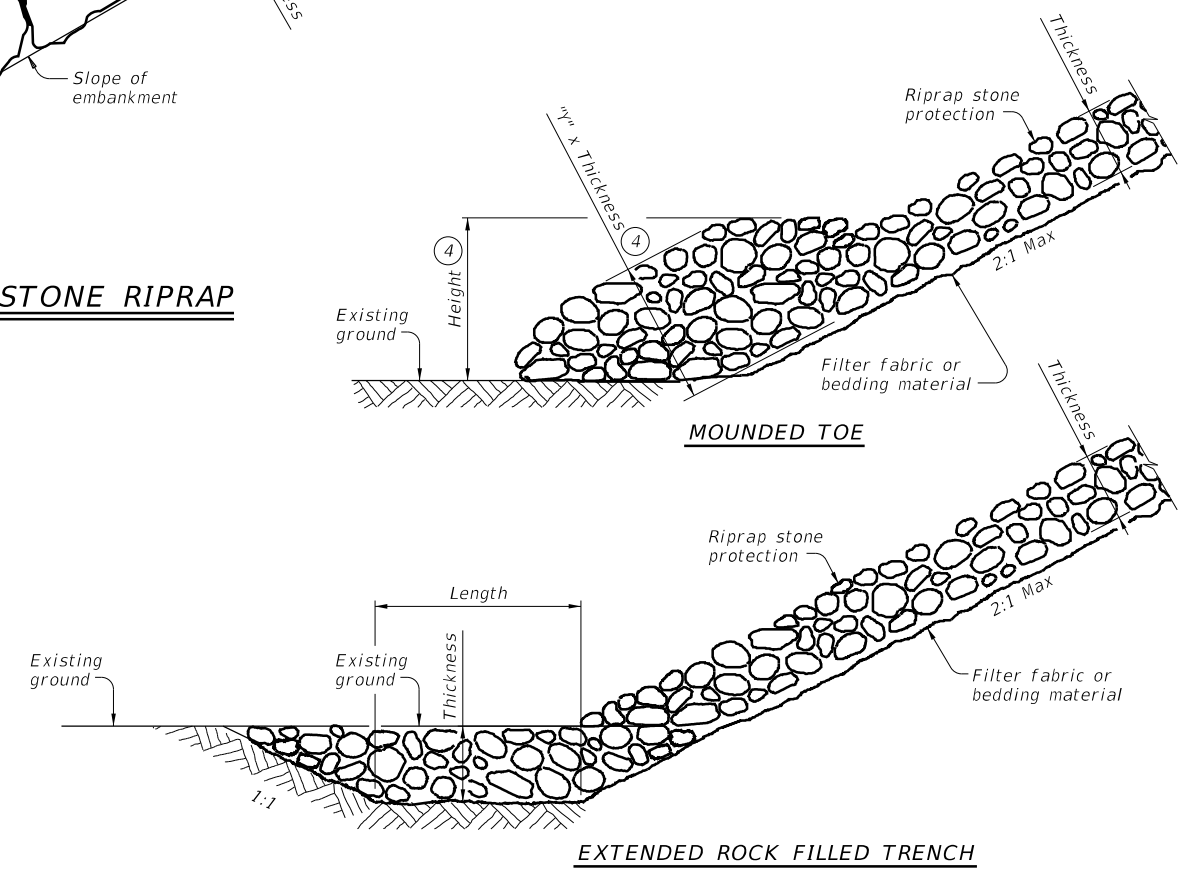


**FIGURE 4 ~ COMMON STONE RIPRAP**  
 dry or grouted



**FIGURE 5 ~ PROTECTION STONE RIPRAP**

- 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**

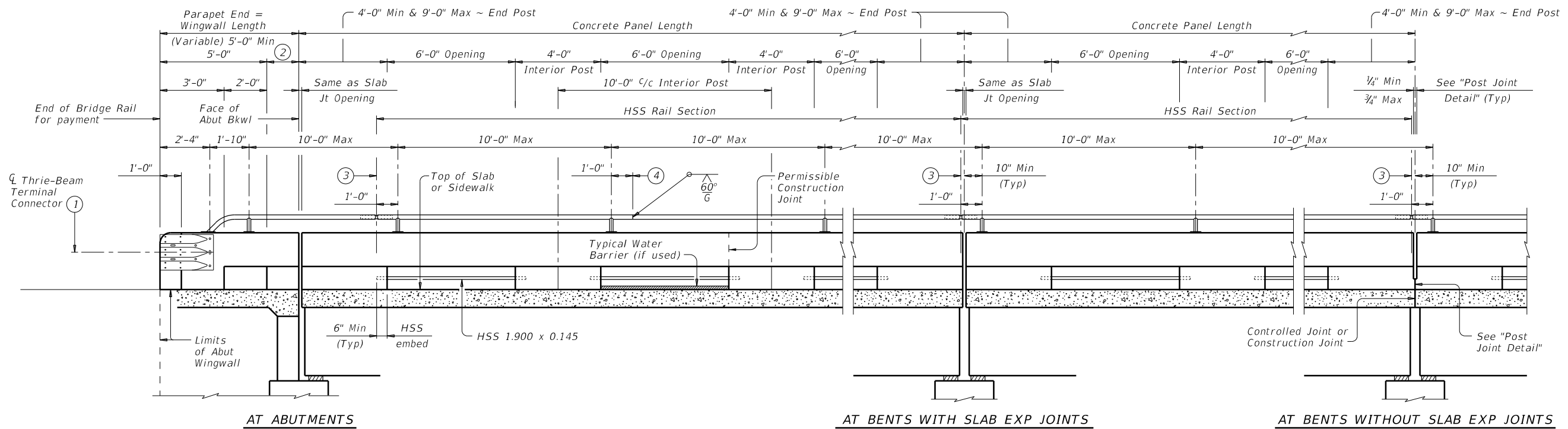
SHEET 2 OF 2

		<b>Bridge Division Standard</b>	
<h2>STONE RIPRAP</h2>			
<h3>SRR</h3>			
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH
©TxDOT April 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	0902 90	132	CS
DIST	COUNTY	SHEET NO.	
FTW	TARRANT	95	

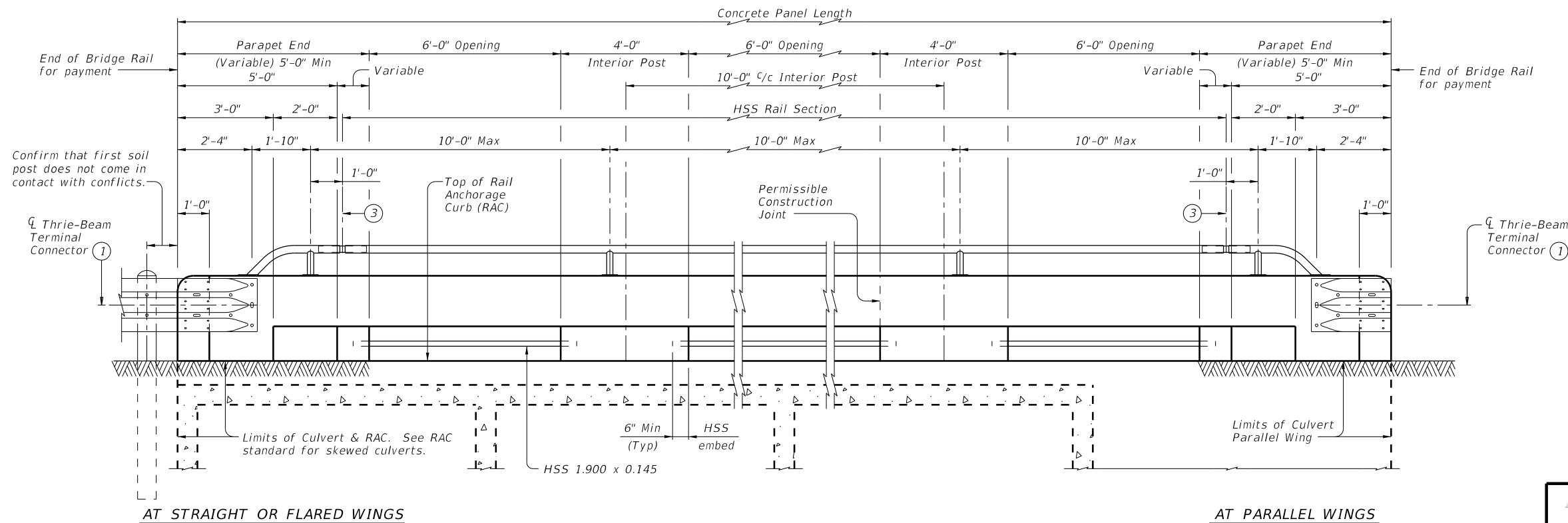


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**ROADWAY ELEVATION OF RAIL ON BRIDGE**  
 (Showing without raised sidewalk)



**ROADWAY ELEVATION OF RAIL ON BOX CULVERTS**

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

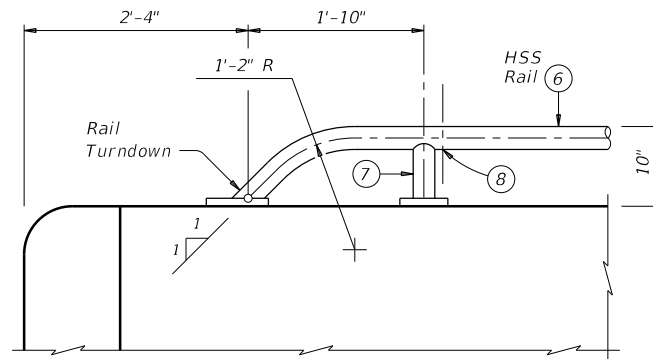
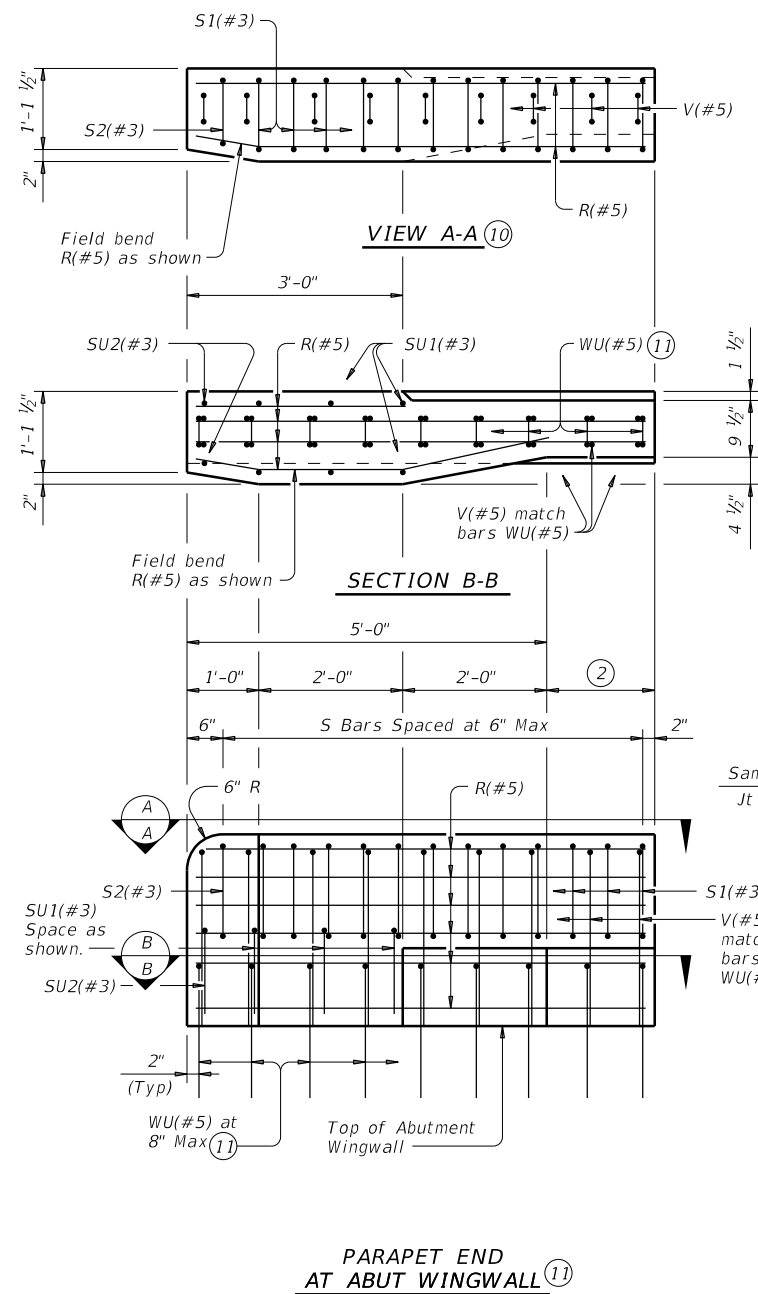
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③  $\perp$  Splice Jt or Exp Jt
- ④ One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

SHEET 1 OF 4

		<b>Bridge Division Standard</b>	
<h2>COMBINATION RAIL</h2>			
<h3>TYPE C223</h3>			
FILE: r1std019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT	SECT	HIGHWAY
REVISIONS	0902	90	132
DIST	COUNTY	SHEET NO.	
FTW	TARRANT	96	

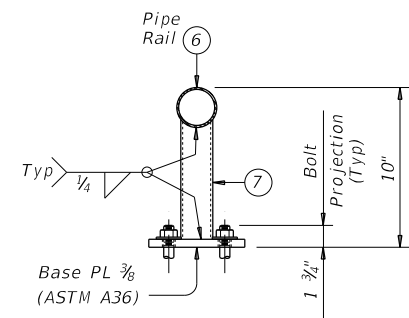
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DATE: 1/25/2023 5:49:05 PM  
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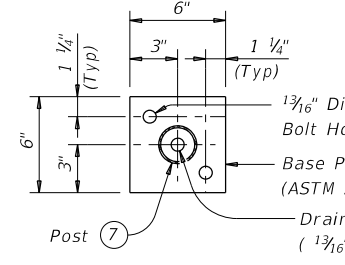


Note that at least two anchor points (as shown) are required for the Bridge Rail on the Abutment Wingwall. Longer Wingwalls may require more than two Rail anchorages.

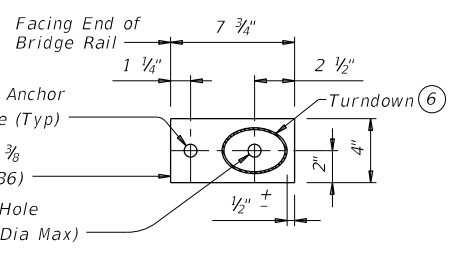
**HSS RAIL TERMINAL DETAIL**



**TRANSVERSE SECTION**

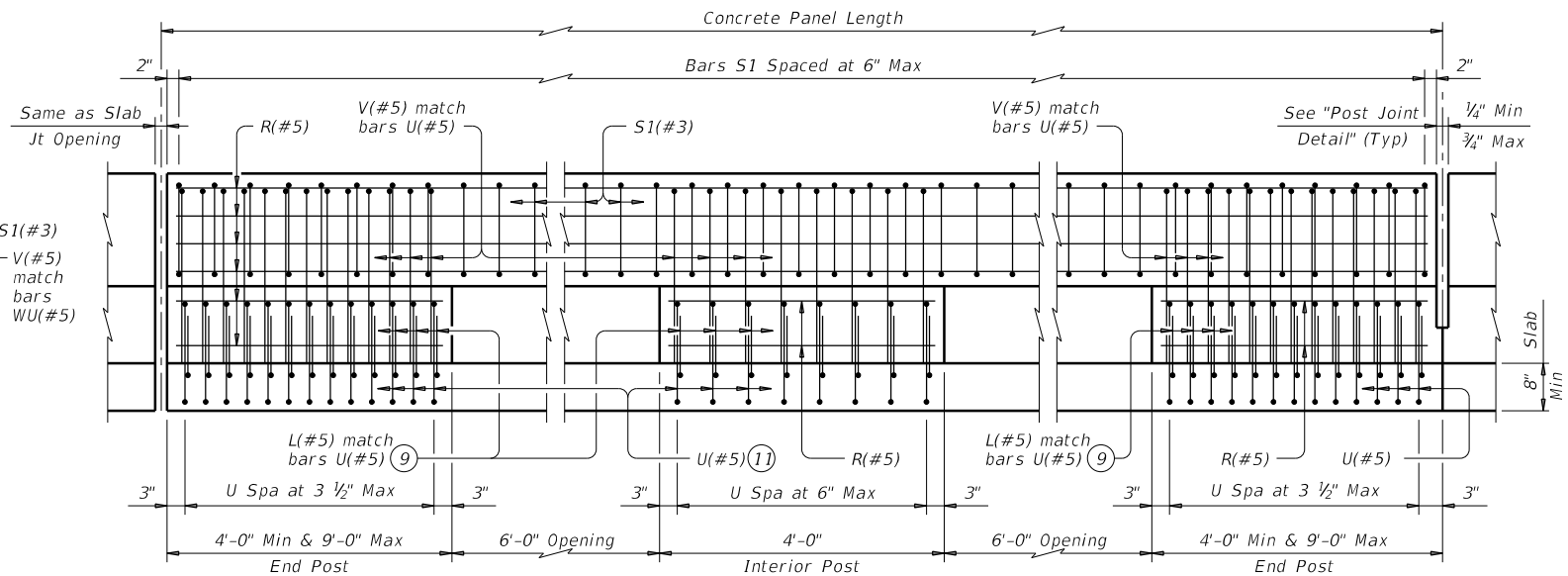


**POST BASE PLATE PLAN**



**RAIL TURNDOWN BASE PLATE PLAN**

**HSS RAIL DETAILS**

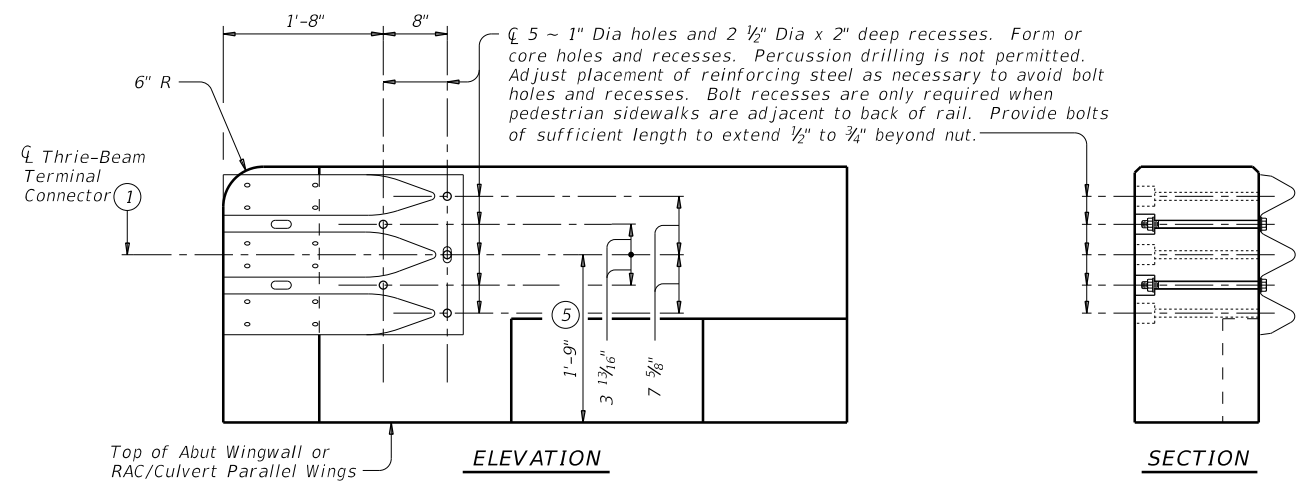


**AT BENTS WITH SLAB EXP JOINTS**      **AT 4' INTERIOR POST**      **AT BENTS WITHOUT SLAB EXP JOINTS**

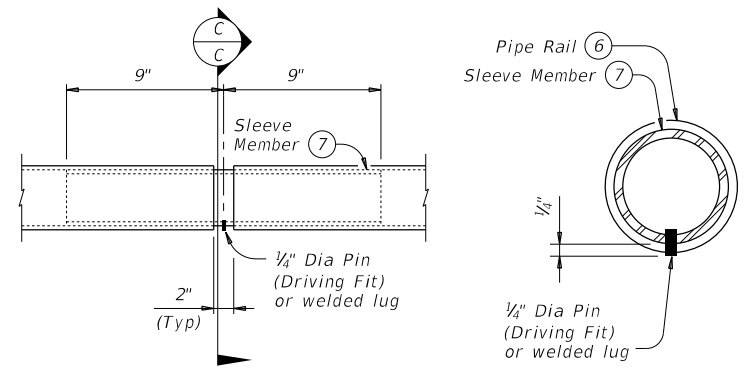
**ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT**

Showing rail on slab and without raised sidewalk. Rail on box culvert similar. HSS not shown for clarity.

- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ⑤ Increase 2" for structures with overlay.
- ⑥ HSS 2.875 x 0.203
- ⑦ HSS 2.375 x 0.154
- ⑧ 3/8" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts ~ Typ)
- ⑨ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑩ Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
- ⑪ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.



**TERMINAL CONNECTION DETAILS**



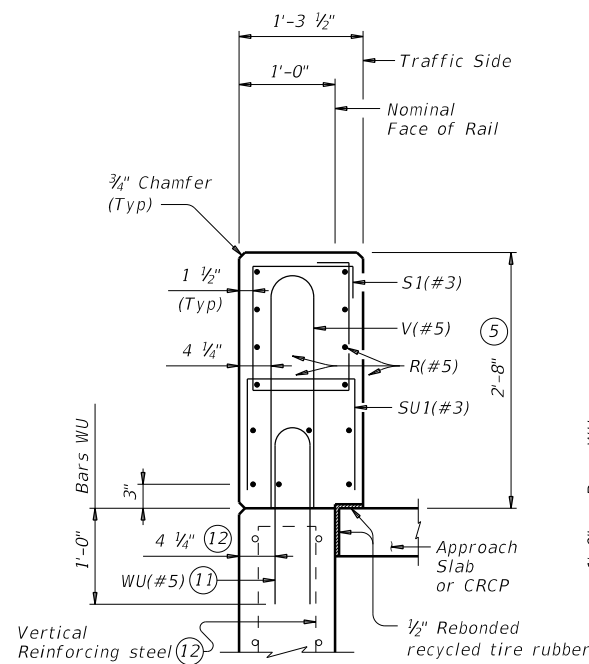
**PIPE SPLICE DETAILS**

SHEET 2 OF 4

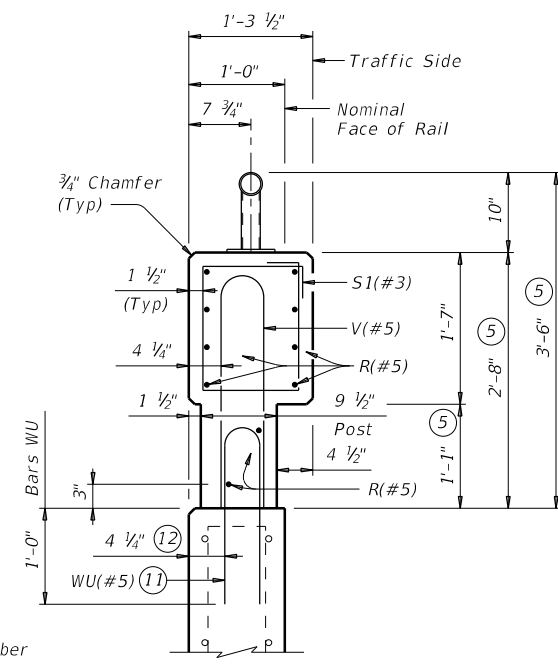
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<h2>TYPE C223</h2>			
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REV: 0902	SECT: 90	JOB: 132	HIGHWAY: CS
DIST: FTW	COUNTY: TARRANT	SHEET NO. 97	

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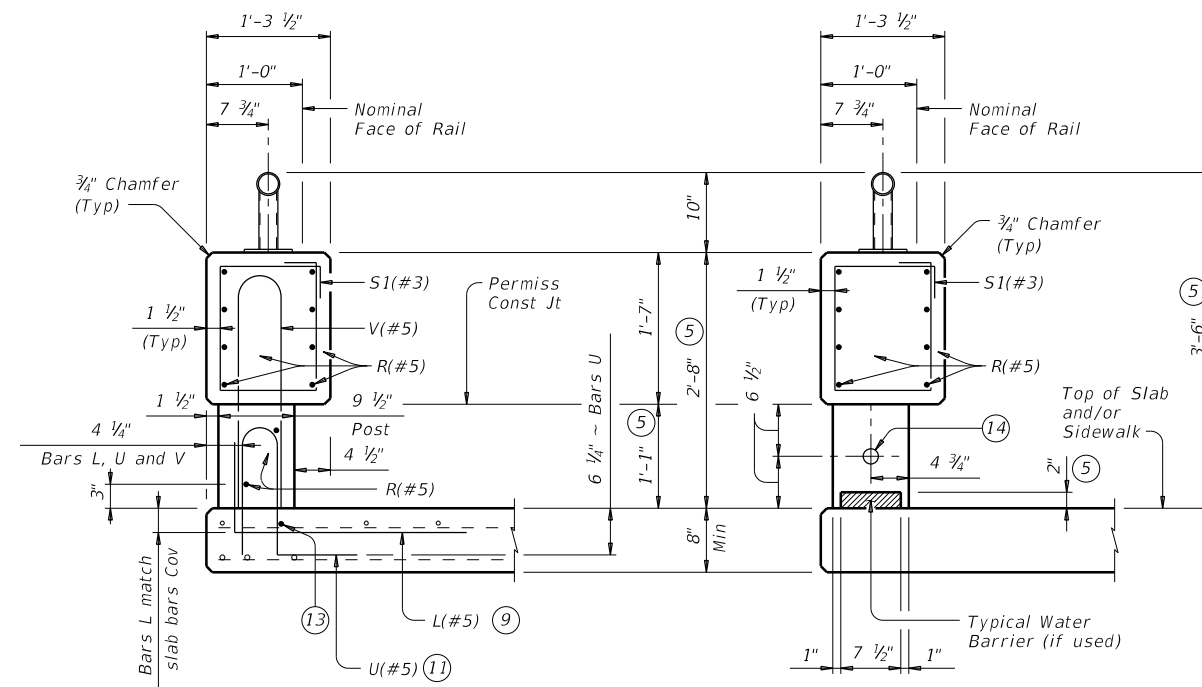
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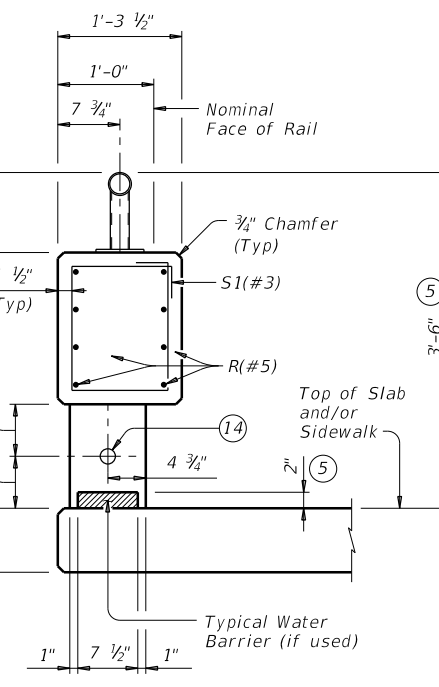
**SECTION D-D  
ON ABUTMENT WINGWALLS  
OR CIP RETAINING WALLS**



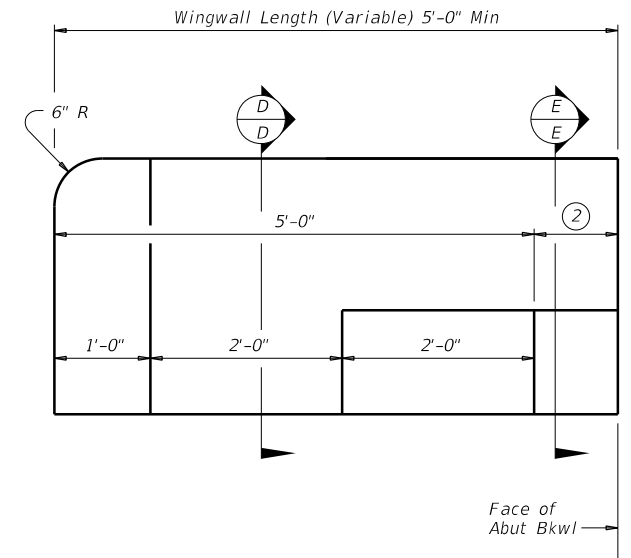
**SECTION E-E  
ON ABUTMENT WINGWALLS  
OR CIP RETAINING WALLS**



**AT POST  
ON BRIDGE SLAB**



**AT OPENING  
ON BRIDGE SLAB**

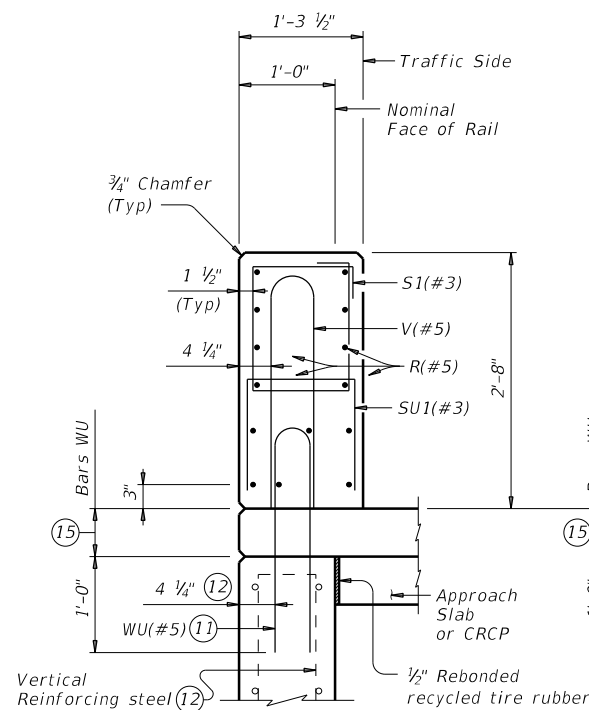


**ELEVATION AT  
ABUTMENT WINGWALL**

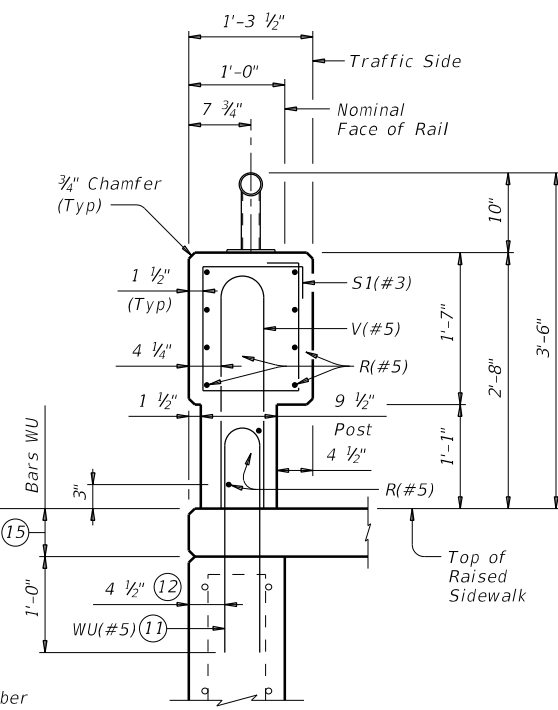
Box culvert parallel wings or rail anchorage curb similar.  
 HSS rail not shown for clarity.

**SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK**

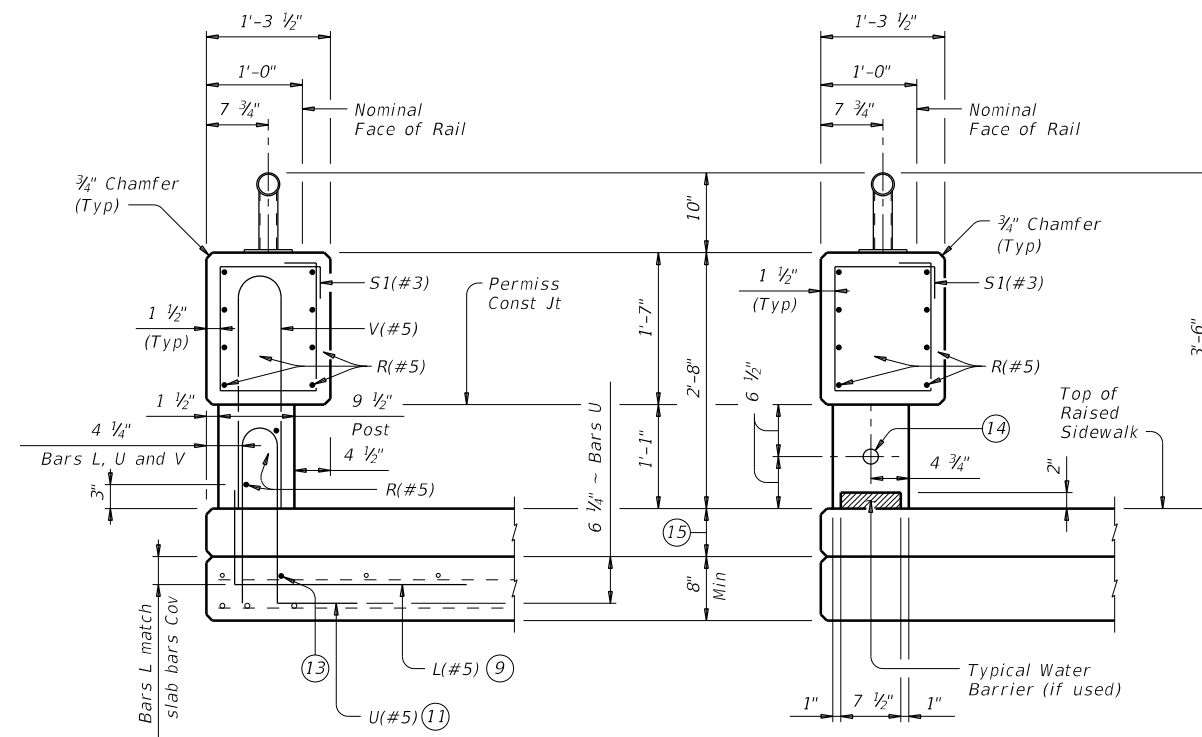
Sections on box culvert similar.



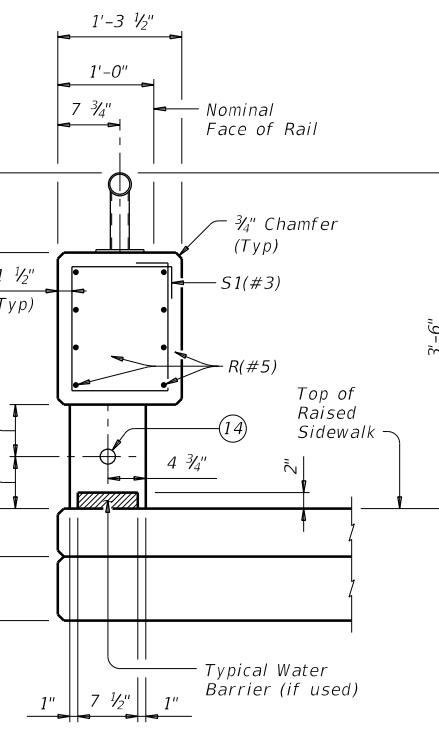
**SECTION D-D  
ON ABUTMENT WINGWALLS  
OR CIP RETAINING WALLS**



**SECTION E-E  
ON ABUTMENT WINGWALLS  
OR CIP RETAINING WALLS**



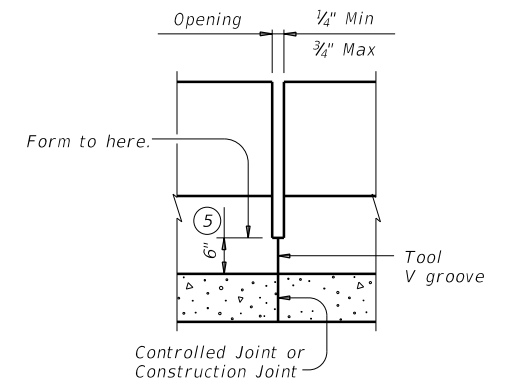
**AT POST  
ON BRIDGE SLAB**



**AT OPENING  
ON BRIDGE SLAB**

**SECTIONS THRU RAIL WITH RAISED SIDEWALK**

Sections on box culvert similar.



**POST JOINT DETAIL**

(Showing without raised sidewalk)  
 Provide at all interior bents without slab expansion joints.

- ② Wingwall Length minus 5'-0" (Varies)
- ⑤ Increase 2" for structures with overlay.
- ⑨ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑪ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.
- ⑫ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.
- ⑬ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑭ HSS 1.900 x 0.145
- ⑮ Raised Sidewalk.

SHEET 3 OF 4



**COMBINATION RAIL**

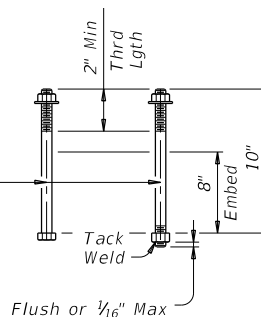
**TYPE C223**

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
DIST	COUNTY	SHEET NO.		
FTW	TARRANT	98		

### RAIL DATA FOR HORIZONTAL CURVES

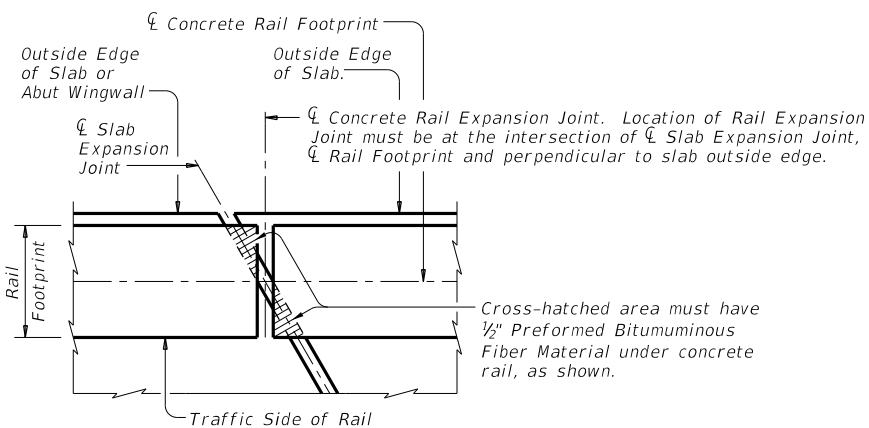
	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
HSS Rail	Over 2800'	29'-0"	Straight rail sections
	Over 1400' thru 2800'	14'-6"	To required radius or to chords shown
	Over 700' thru 1400'	7'-3"	
	Thru 700'	Zero	To required radius

Ⓞ 5/8" Dia hex head anchor bolt or threaded rod (ASTM A307 Gr A) with one hardened steel washer (ASTM F436) placed under each hex nut (ASTM A563). One additional hex nut must be furnished and tack welded for each threaded rod.



### CAST-IN-PLACE ANCHOR BOLT OPTIONS ⑩

- ⑤ Increase 2" for structures with overlay.
- ⑩ See "Material Notes" for anchor bolt information.
- ⑰ For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.
- ⑱ At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 1/4" above the roadway/sidewalk surface without overlay.



### PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

### CONSTRUCTION NOTES:

Face of rail, posts and parapet must be vertical transversely unless otherwise approved by the Engineer. HSS rail posts and opening end faces must be perpendicular to top of adjacent concrete parapet grade. Use epoxy mortar under HSS rail post base plates if gaps larger than 1/16" exist.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

HSS rail sections must not include less than two posts, and no more than four (except at Abutments).

Round or chamfer exposed edges of HSS rail and HSS rail posts to approximately 1/16" by grinding.

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.

At the Contractor's option anchor bolts may be cast with the parapet. See "Material Notes". Chamfer all exposed corners.

### MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

Provide ASTM A1085, A500 Gr B or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise.

Anchor bolts must be 5/8" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 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".

Optional cast-in-place anchor bolts must be 5/8" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ASTM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

Provide bar laps, where required, as follows: Uncoated or galvanized ~ #5 = 2'-0" Epoxy coated ~ #5 = 3'-0"

### GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

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

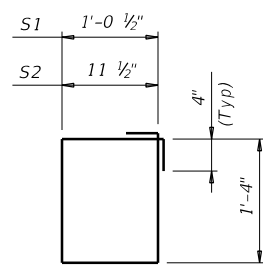
Rail anchorage details shown on this standard may require modification for select structure types.

See appropriate details elsewhere in plans for these modifications.

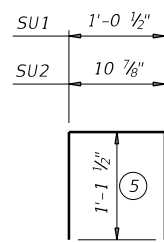
Submit erection drawings showing panel lengths, HSS rail post spacing, and anchor bolt setting to the Engineer for approval.

Average weight of railing with no overlay:  
370 plf total  
358 plf (Conc)  
12 plf (Steel)

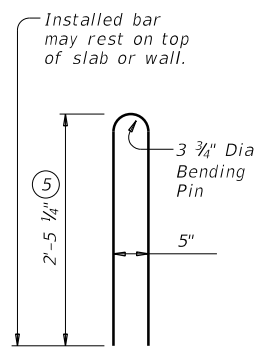
Cover dimensions are clear dimensions, unless noted otherwise.  
Reinforcing bar dimensions shown are out-to-out of bar.



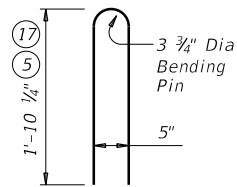
BARS S (#3)



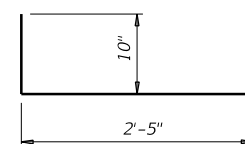
BARS SU (#3)



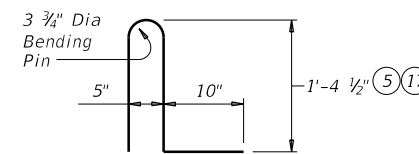
BARS V (#5) ⑱



BARS WU (#5)



BARS L (#5)



BARS U (#5) ⑱

## COMBINATION RAIL

### TYPE C223

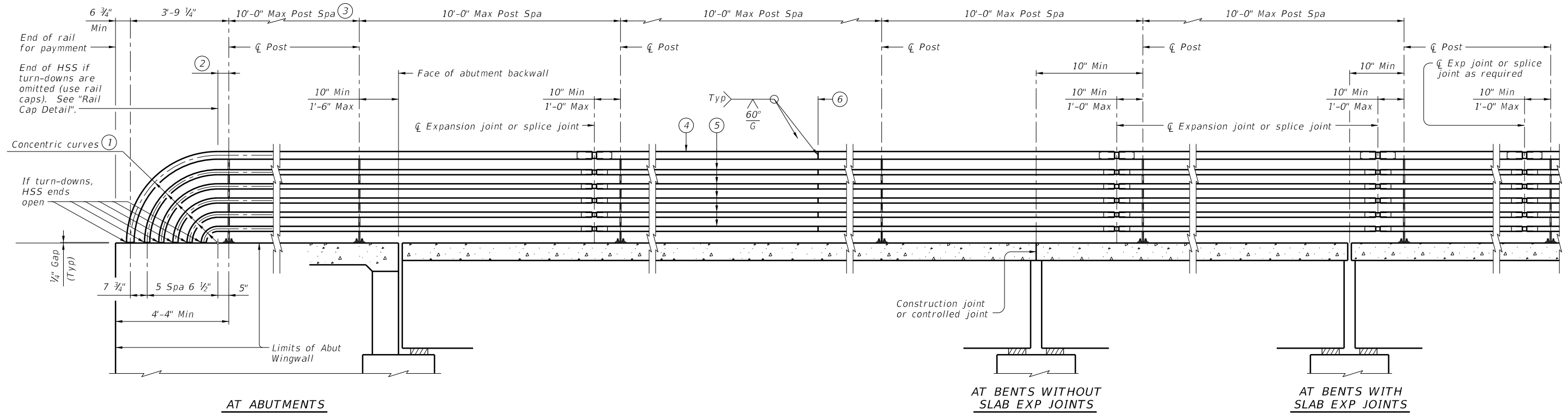
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September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
DIST	COUNTY		SHEET NO.	
FTW	TARRANT		99	

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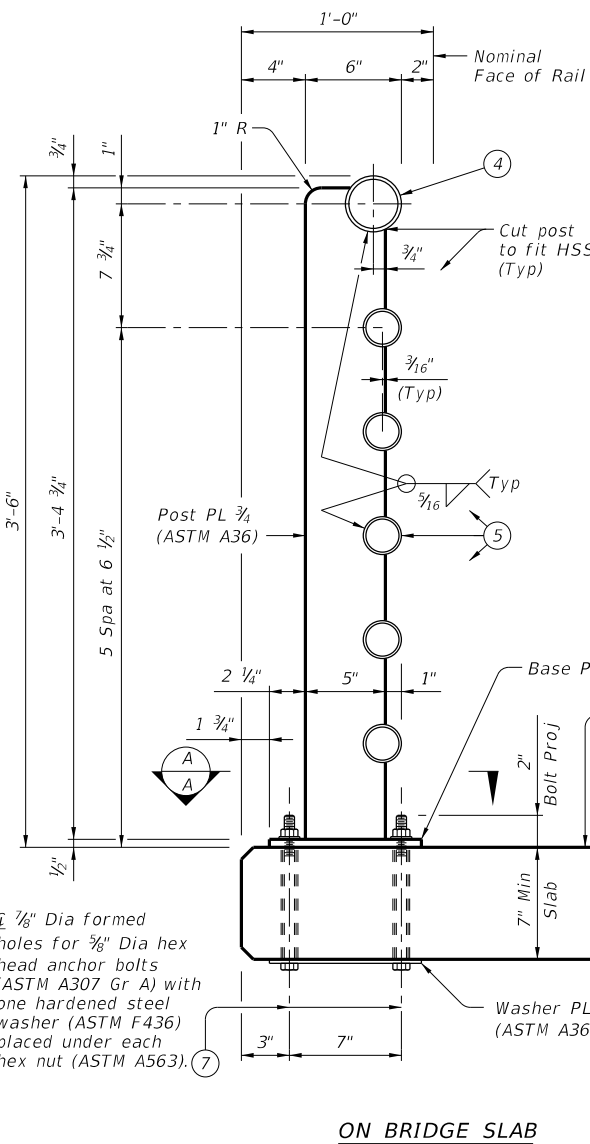
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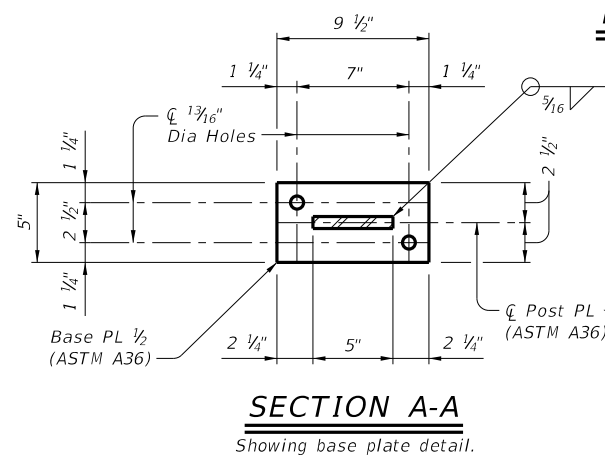
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**ROADWAY ELEVATION OF RAIL**

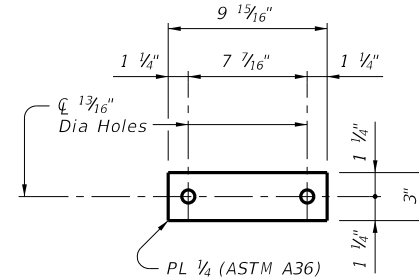


**ON BRIDGE SLAB**

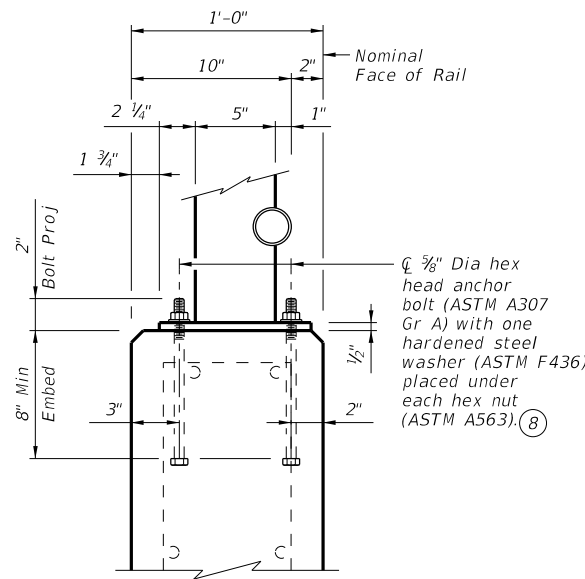


**SECTION A-A**

Showing base plate detail.

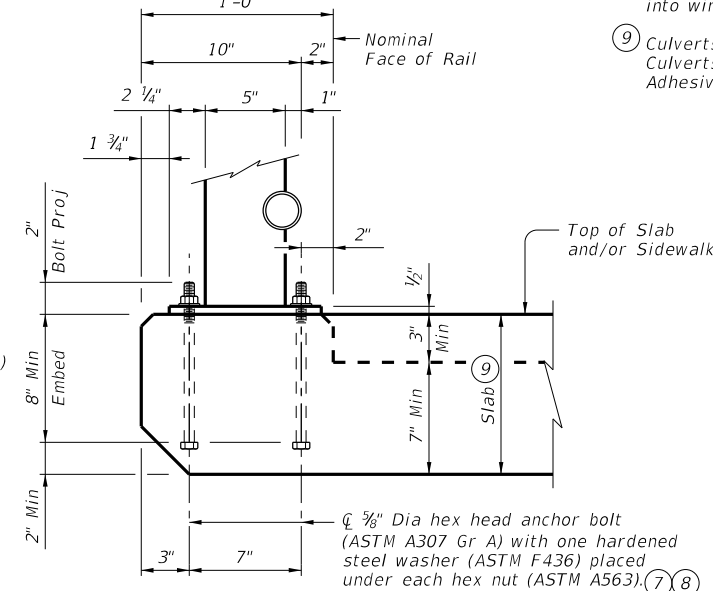


**WASHER PLATE DETAIL**



**ON ABUTMENT WINGWALLS  
 OR CIP RETAINING WALLS**

**SECTIONS THRU RAIL**



**ON CULVERTS WITH OR WITHOUT CURBS**

Used with 1'-0" Min thick parallel wings on culverts.

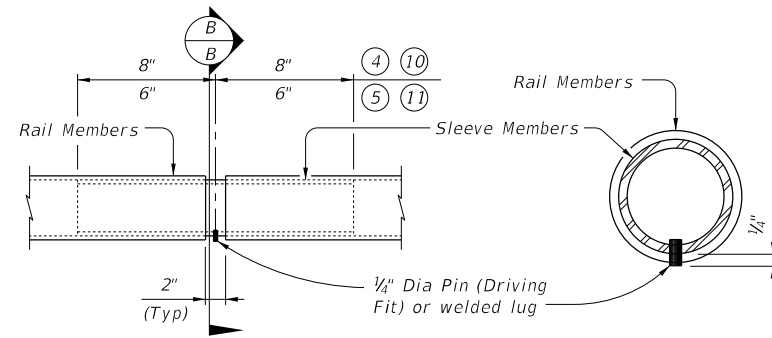
- ① Portion of railing with turn-downs to be used or omitted as indicated on Bridge Layout.
- ② 10" Min ~ 1'-6" Max if turn-downs are omitted.
- ③ Min of 2 posts required on wingwall.
- ④ HSS 3.500 x 0.216 (Rail Member)
- ⑤ HSS 2.375 x 0.154 (Rail Member)
- ⑥ One shop splice per panel is permitted (with minimum 85 percent penetration). The weld may be square groove or single vee groove. Grind smooth.
- ⑦ At Contractor's option, adhesive anchors may be used. Adhesive anchors must be 5/8" Dia ASTM A307 Grade A fully threaded rods. Minimum adhesive anchor embedment depth is 5" into slabs or culverts without curbs. See "Material Notes" for adhesive anchor requirements.
- ⑧ At Contractor's option, adhesive anchors may be used. Adhesive anchors must be 5/8" Dia ASTM A307 Grade A fully threaded rods. Minimum adhesive anchor embedment depth is 7" into wingwalls or culverts with curbs. See "Material Notes" for adhesive anchor requirements.
- ⑨ Culverts without curbs for cast-in-place anchor bolts require a 10" Min slab thickness. Culverts with curbs for cast-in-place anchor bolts require a curb plus slab thickness of 10" Min. Adhesive anchors may be used with a 7" Min slab thickness or culverts with curbs.

SHEET 1 OF 2

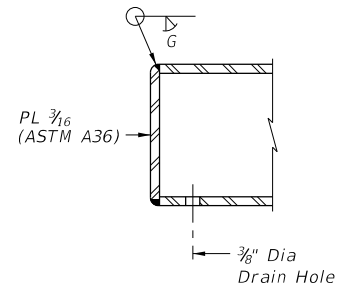
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©TxDOT September 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	0902 90	132	CS
DIST	COUNTY	SHEET NO.	
FTW	TARRANT	100	

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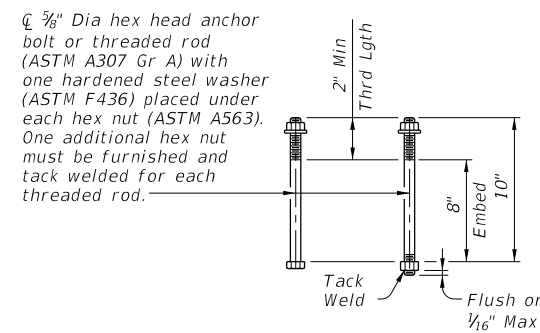
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AT SPLICES OR EXP JTS SECTION B-B  
**PIPE SPLICE DETAIL**



**RAIL CAP DETAIL**



**CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS**

- ④ HSS 3.500 x 0.216 (Rail Member)
- ⑤ HSS 2.375 x 0.154 (Rail Member)
- ⑩ HSS 2.875 x 0.203 (Sleeve Member)
- ⑪ HSS 1.900 x 0.145 (Sleeve Member)

**CONSTRUCTION NOTES:**

Panel lengths of railing must be attached to a minimum of three posts except at abutment wingwalls.  
 At the Contractor's option anchor bolts may be an adhesive anchorage 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.  
 Face of rail and posts must be vertical transversely unless otherwise approved. Posts must be perpendicular to adjacent roadway grade. Use Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.  
 For curved railing applications, fabricate the HSS rail to the radius when the radius is 600' or less. Submit shop drawings for approval when tubes are required to be fabricated to a radius. Shop drawings must be submitted to the Engineer for approval.  
 Round or chamfer all exposed edges of steel components 1/16" by grinding prior to galvanizing.

**MATERIAL NOTES:**

Provide ASTM A500 Gr B, A1085 or A53 Gr B for all HSS.  
 Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.  
 Anchor bolts must be 3/8" Dia ASTM A307 Gr A with one hardened steel washer (ASTM F436) placed under each hex nut or ASTM A307 Gr A threaded rods with one tack welded hex nut each and with one hex nut with one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements.  
 Optional adhesive anchorage system must be 3/8" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436). Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into slab, wingwalls, or culvert curbs using a Type III, Class C, D, E, or F anchor adhesive. Anchor adhesive chosen must be able to achieve a nominal bond strength in tension, Na, of a single anchor of 10 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".

**GENERAL NOTES:**

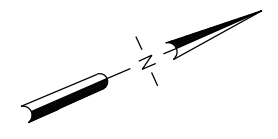
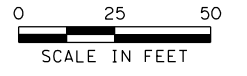
Designed according to AASHTO LRFD Specifications.  
 Do not use this railing on bridges with expansion joints providing more than 5" movement.  
 Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.  
 For all rails, submit erection drawings showing section lengths, splice locations, rail post spacing and anchor bolt setting for approval. Average weight of railing is 30 plf.

SHEET 2 OF 2

		<b>Bridge Division Standard</b>	
<h1>PEDESTRIAN RAIL</h1>			
<h2>TYPE PR11</h2>			
FILE: r1std028-19.dgn	DN: TAR	CK: TBE	DW: JTR
CON: September 2019	SECT: 0902	JOB: 132	HIGHWAY: CS
DIST: FTW	COUNTY: TARRANT	SHEET NO. 101	

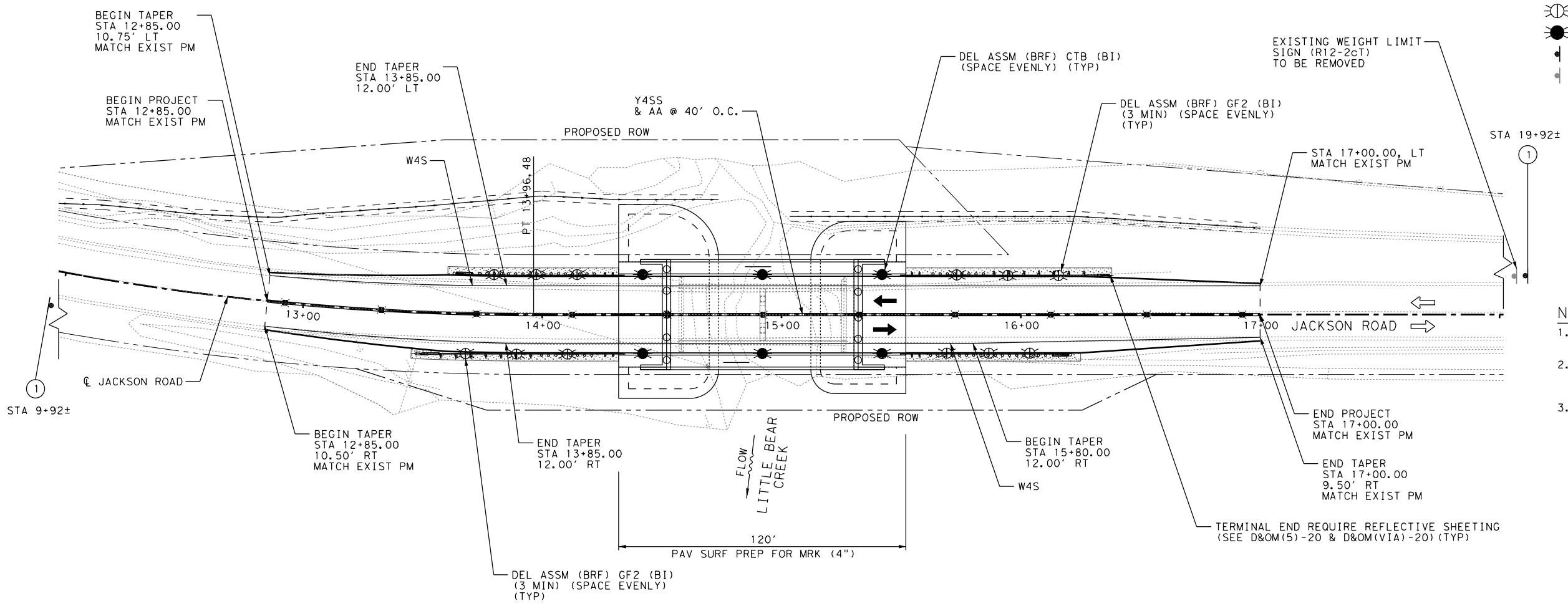
TIME: 5:49:38 PM  
DATE: 1/25/2023

①  
BRIDGE MAY ICE IN COLD WEATHER  
W8-13gT  
36" X 36"



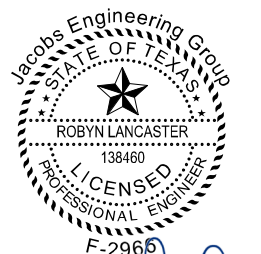
**LEGEND**

- W4S REFL PAV MRK TY II (W)4" (SLD)
- Y4SS REFL PAV MRK TY II (Y)4" (SLD)
- AA REFLECTIVE PAVEMENT MARKER TY II-A-A
- DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
- DEL ASSM (D-SW) SZ 1 (BRF) CTB (BI)
- ⊕ PROPOSED SMALL SIGN & SIGN NUMBER
- ⊖ EXISTING SMALL SIGN



**NOTES:**

1. REFER TO STANDARDS FOR ADDITIONAL DETAILS.
2. ADDITIONAL PAY ITEMS FOR REFL PAV MRK TY II INCLUDE PAV SURF PREP FOR MRK AND PAVEMENT SEALER.
3. ADDITIONAL PAY ITEMS FOR REFL PAV MRKR INCLUDE PAV SURF PREP FOR MRK.



*[Signature]*  
2/17/2023

**Jacobs**  
1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966

**Texas Department of Transportation**  
© 2023

**JACKSON POOL**  
**SIGNING AND PAVEMENT MARKINGS**

SCALE: 1"=50' (H) SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	102
GRAPHICS	CONTROL	SECTION	JOB	
MBT	0902	90	132	
CHECK	PKC			

FILE: ... \TRAFFIC \132RSPM01.sht





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DATE: 1/25/2023 5:50:07 PM  
 FILE: ...\\jackson\_rd\132dom1-20.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 BRFL = 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 (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				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 unit (Type 2 only) Y = 1-Size 3 reflector unit (Type 2 only) Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only) L = Left Side (Type 3 Object Marker only) R = Right Side (Type 3 Object Marker only) C = Center (Type 3 Object Marker only) 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.	
DEVICE	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

Traffic Safety Division Standard

### DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

## D & OM(1)-20

FILE: dom1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	FTW	TARRANT	104	

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 FILE: ...\\Jackson\_Rd\132dom2-20.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	GF 1
	EMBEDDED	SURFACE MOUNT	STEEL	PLASTIC	GF 2
<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>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>DELINATOR &amp; OBJECT MARKER INSTALLATION</b>					
<b>D &amp; OM(2) - 20</b>					
FILE: dom2-20.dgn		DN: TxDOT		CK: TxDOT	
© TxDOT August 2004		CONT SECT		JOB HIGHWAY	
REVISIONS		0902 90		132 CS	
10-09 3-15		DIST COUNTY		SHEET NO.	
4-10 7-20		FTW TARRANT		105	
20B					

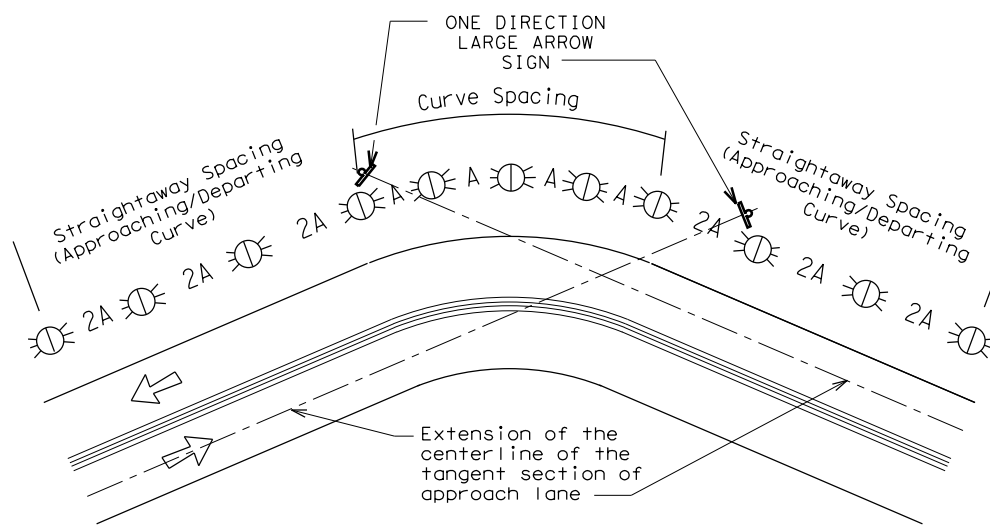
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### MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

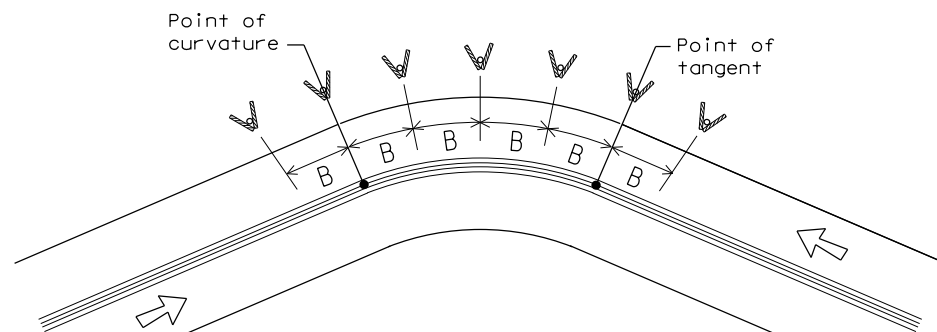
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**NOTE**

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

### SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



**NOTE**

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

### DELINEATOR AND CHEVRON SPACING

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

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

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

### DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

**NOTES**

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

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

**Texas Department of Transportation**  
Traffic Safety Division Standard

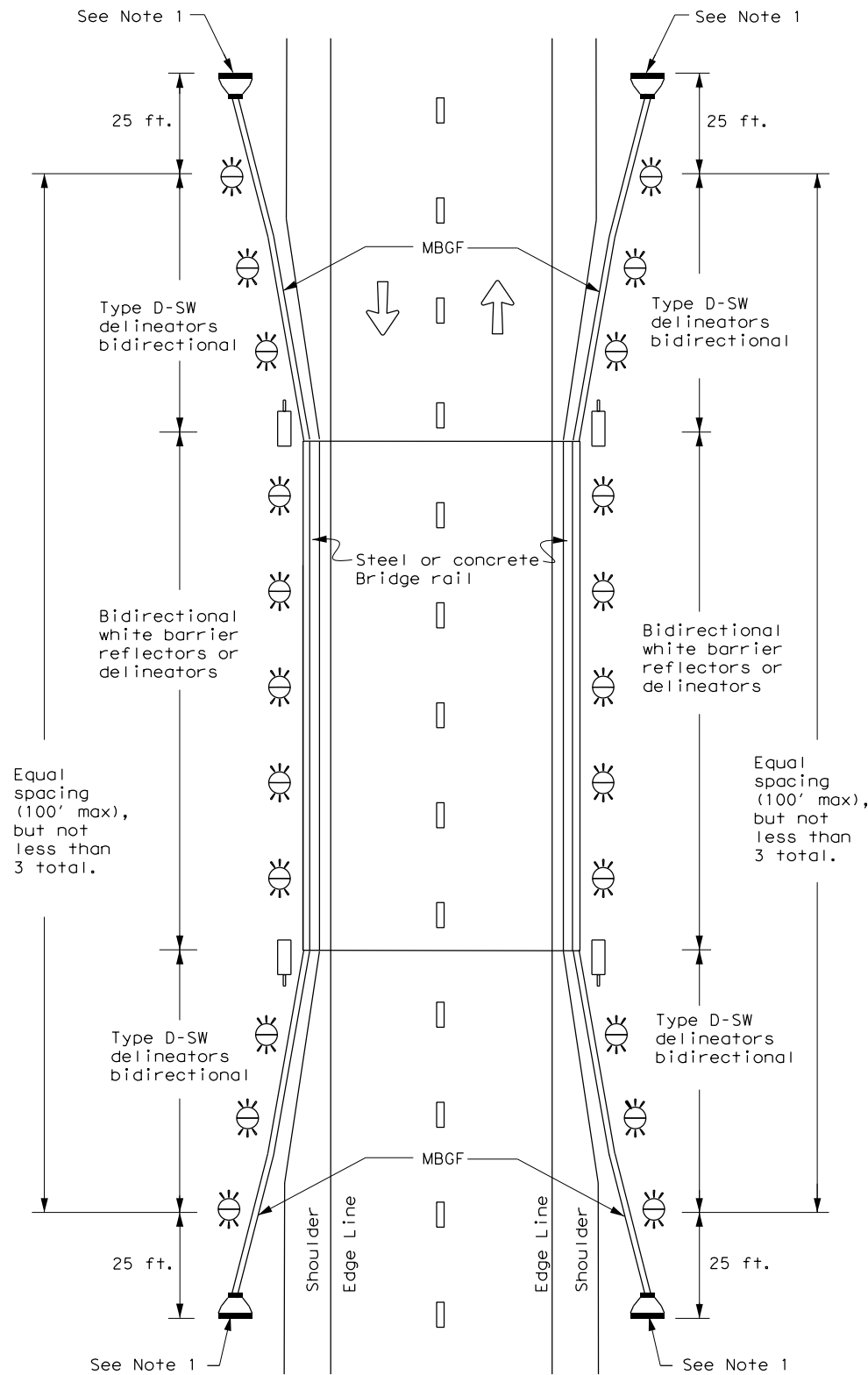
## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

### D & OM(3)-20

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© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	FTW	TARRANT	<b>106</b>	

20C

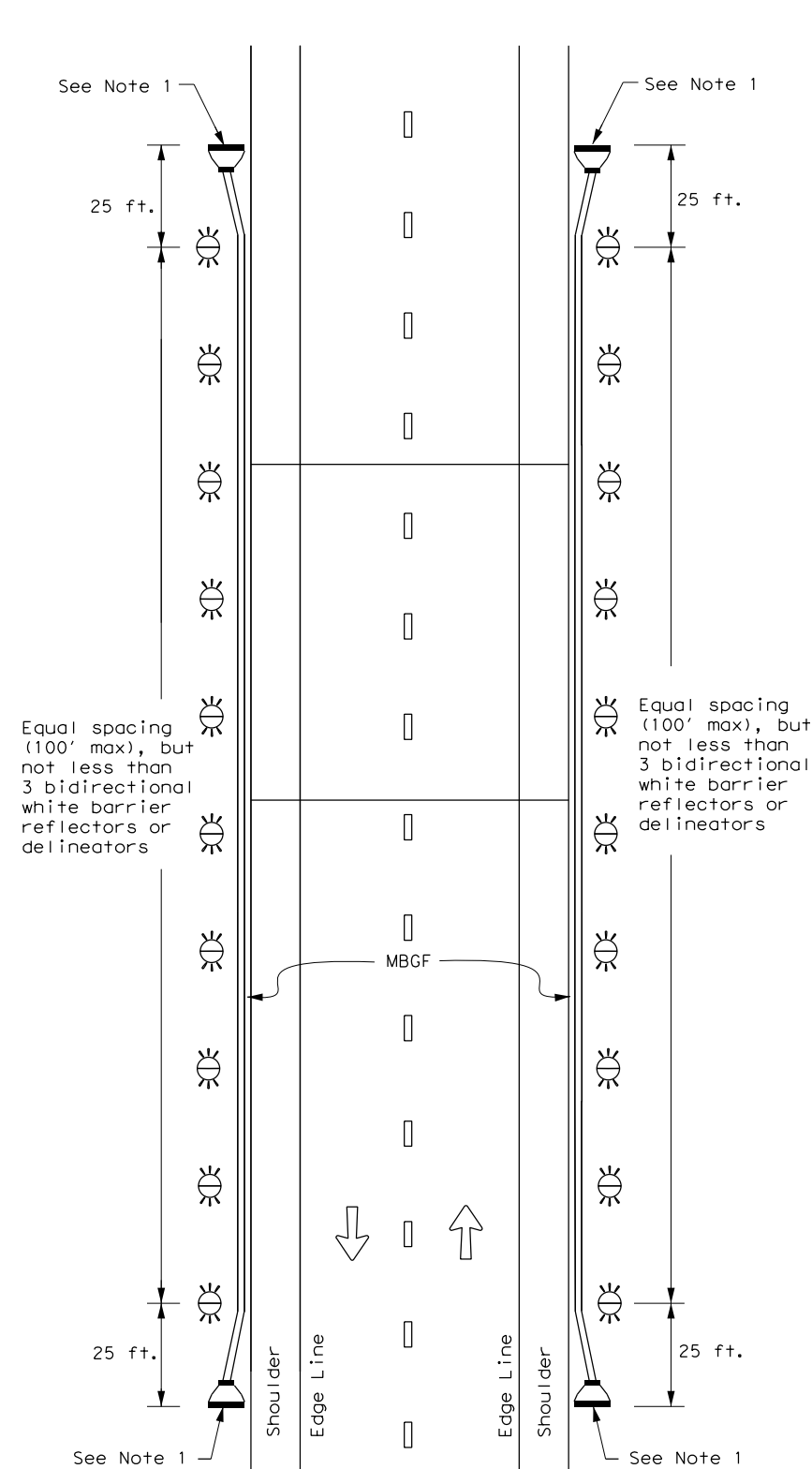
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**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.

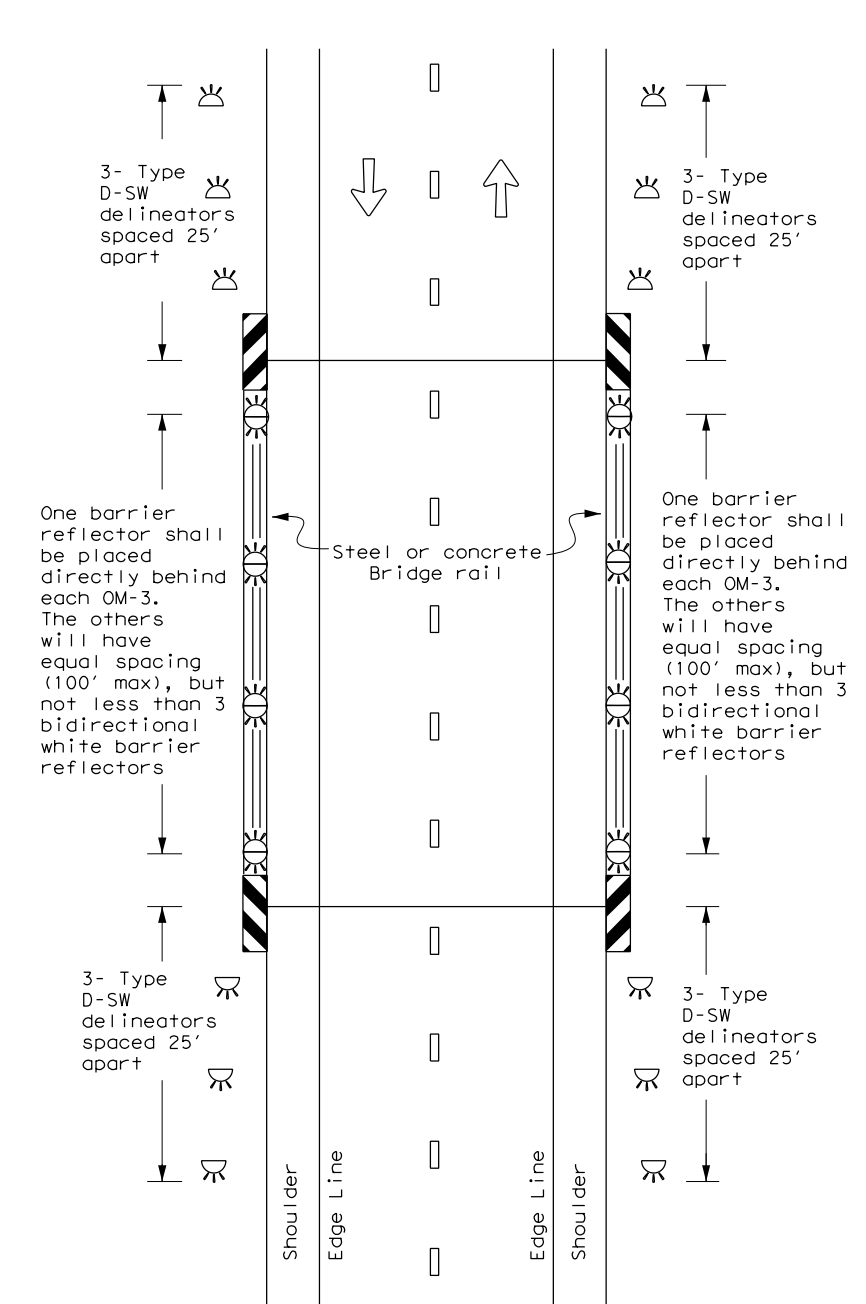
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**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**

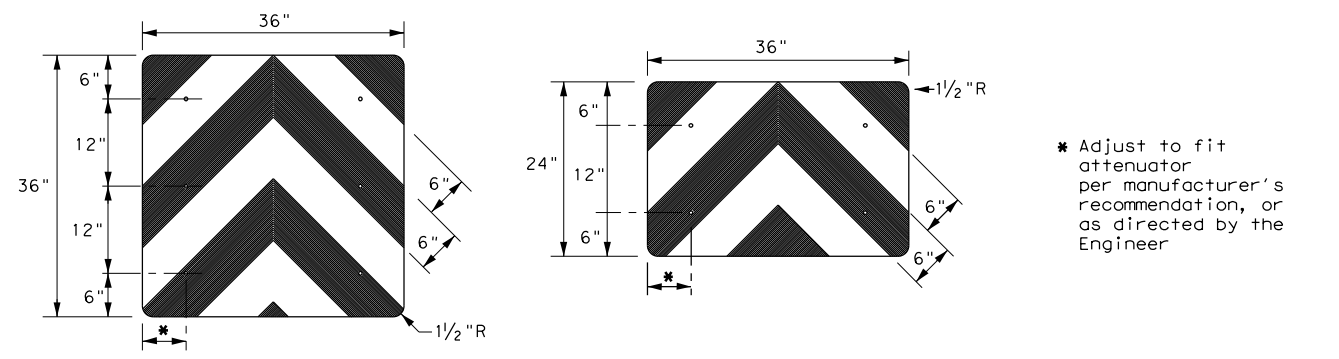
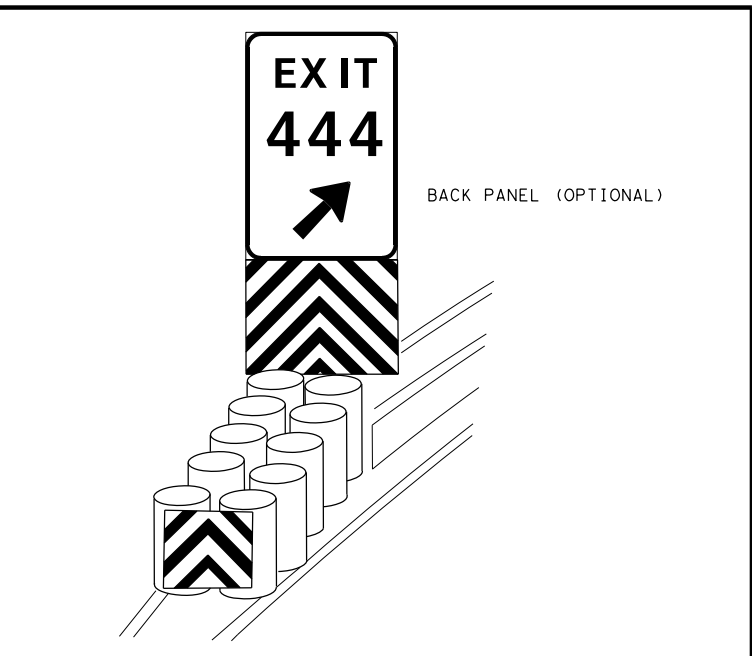
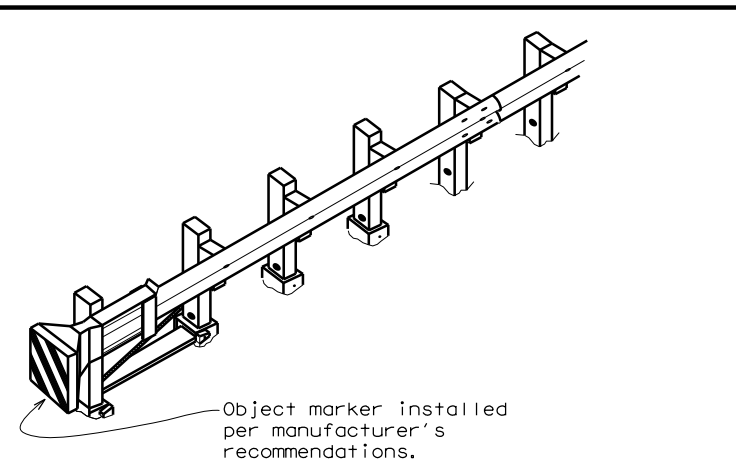
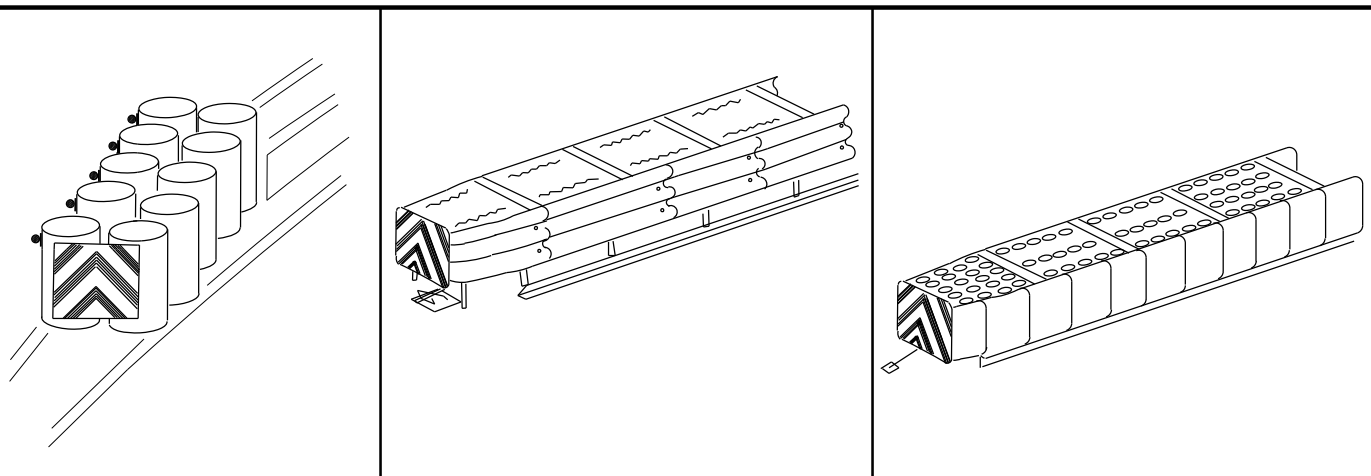
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© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
7-20	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	<b>107</b>	

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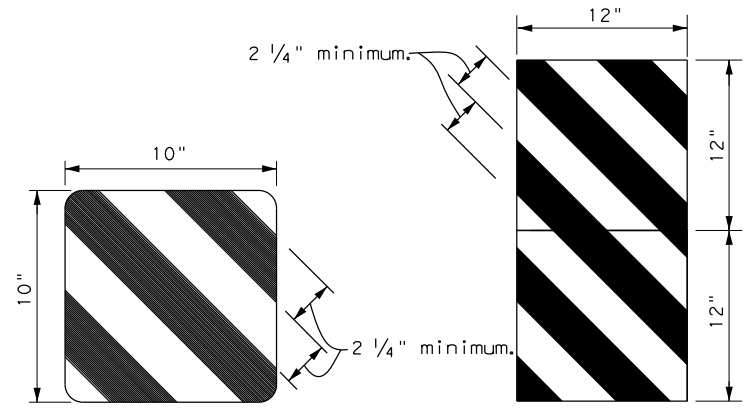
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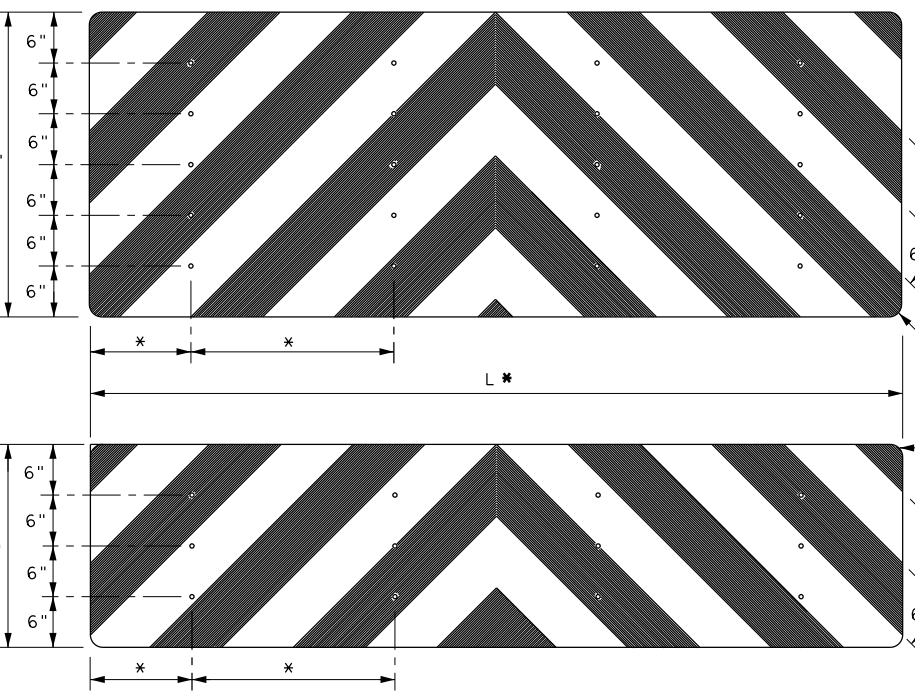
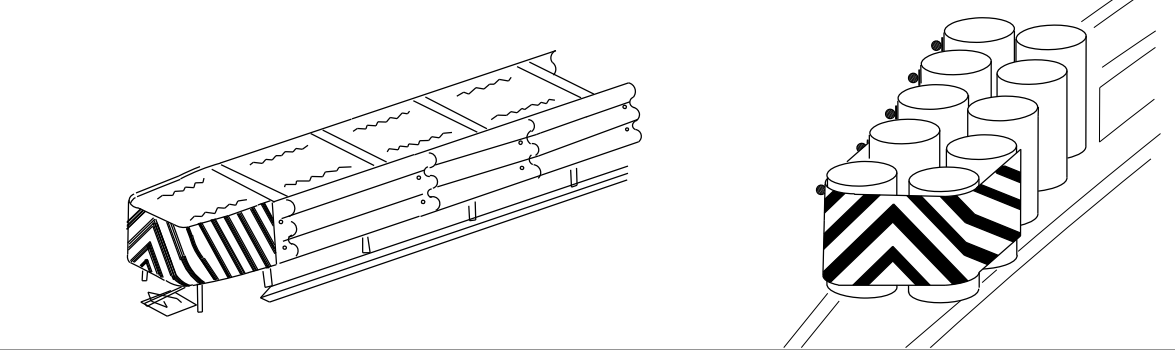
DATE: 1/25/2023 5:50:49 PM  
 FILE: ... \Jackson\_Rd\132domv ia-20.dgn



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



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



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

**NOTES**

- 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.
- 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.
- 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".
- 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.
- Object Marker at nose of attenuator is subsidiary to the attenuator.
- See D & OM (1-4) for required barrier reflectors.

<b>DELINEATOR &amp; OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS</b> <b>D &amp; OM(VIA) -20</b>			
FILE: domv ia20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT
© TXDOT December 1989	CONT	SECT	JOB
REVISIONS		0902	90
4-92 8-04	DIST	COUNTY	SHEET NO.
8-95 3-15	FTW	TARRANT	108
4-98 7-20			

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## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

### Post Type

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

### Number of Posts (1 or 2)

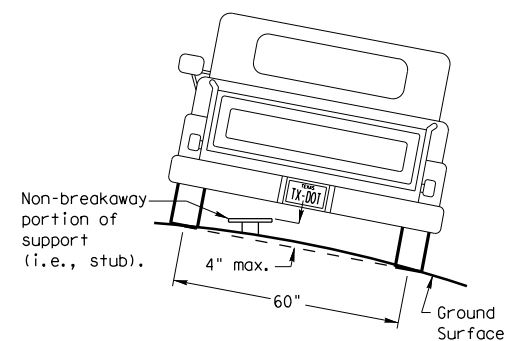
### Anchor Type

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

### Sign Mounting Designation

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

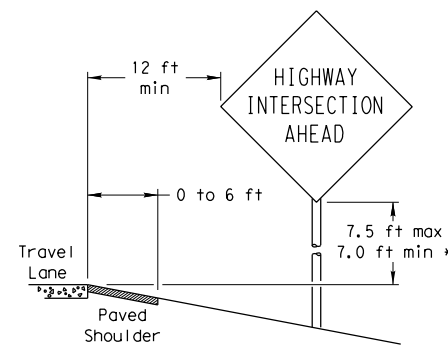
## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

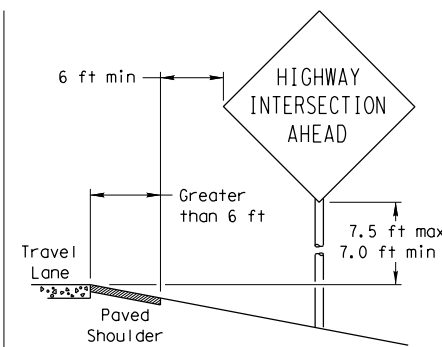
## SIGN LOCATION

### PAVED SHOULDERS



#### LESS THAN 6 FT. WIDE

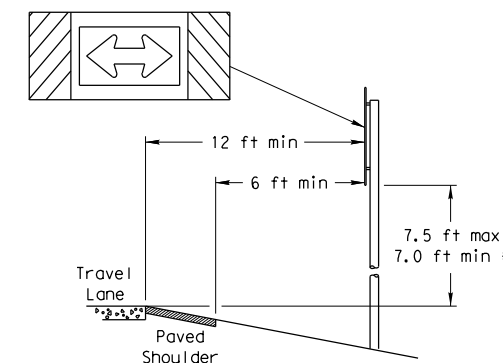
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



#### GREATER THAN 6 FT. WIDE

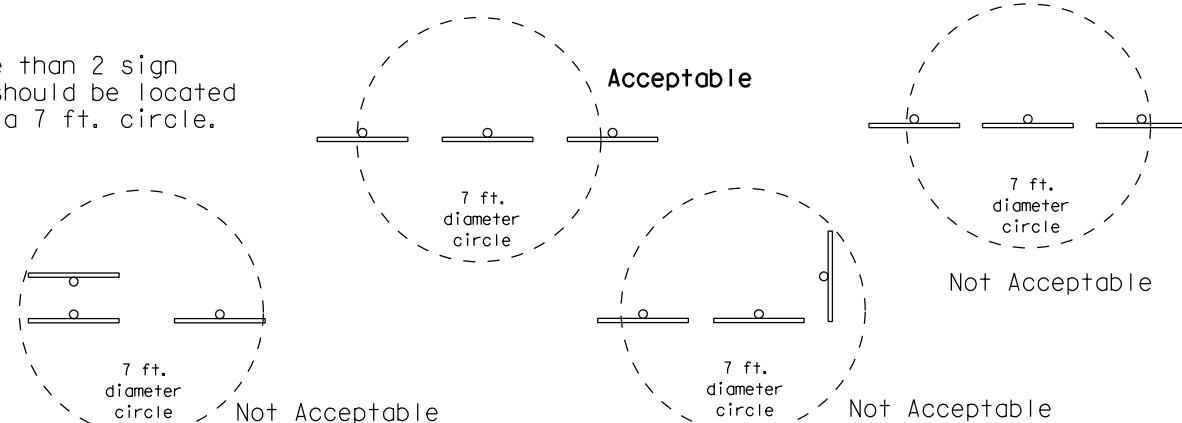
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

### T-INTERSECTION

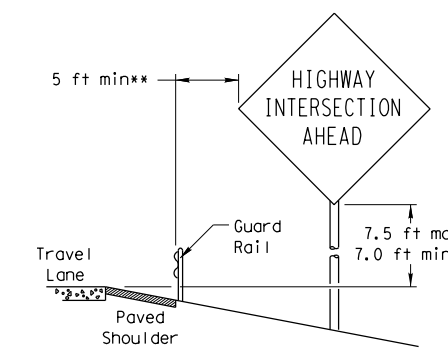


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

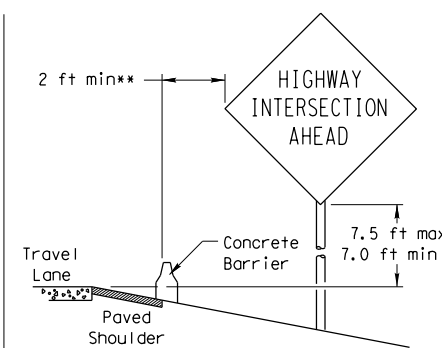
No more than 2 sign posts should be located within a 7 ft. circle.



### BEHIND BARRIER



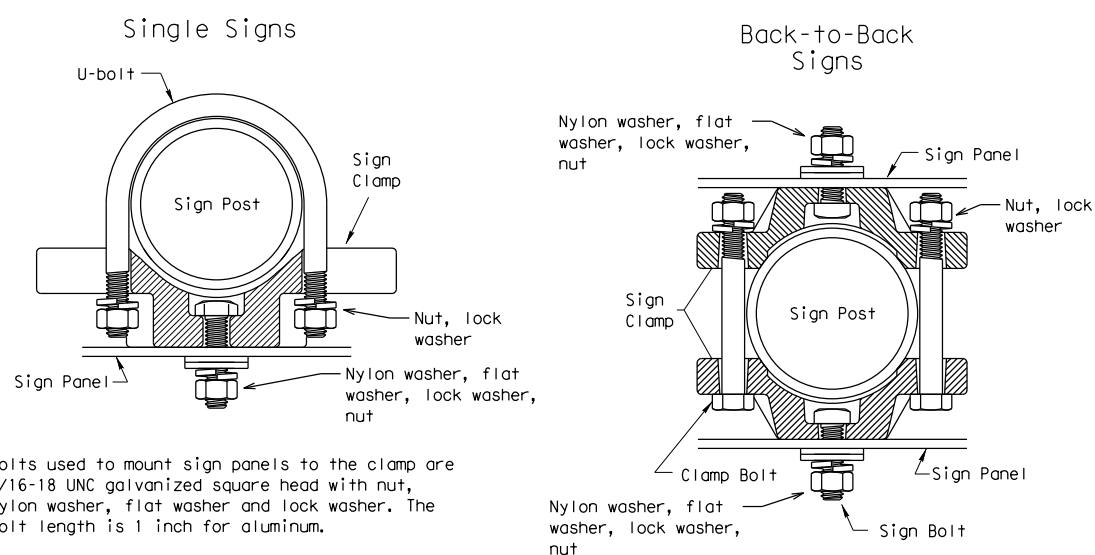
#### BEHIND GUARDRAIL



#### BEHIND CONCRETE BARRIER

\*\*Sign clearance based on distance required for proper guard rail or concrete barrier performance.

## TYPICAL SIGN ATTACHMENT DETAIL



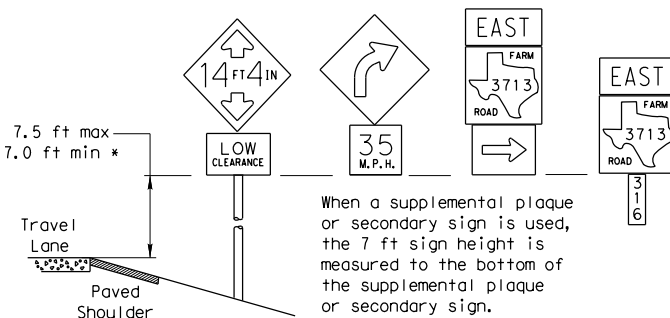
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

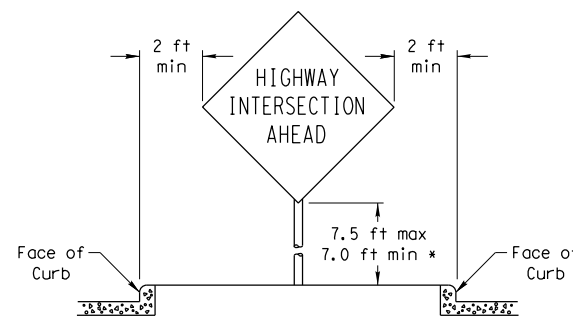
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

### SIGNS WITH PLAQUES

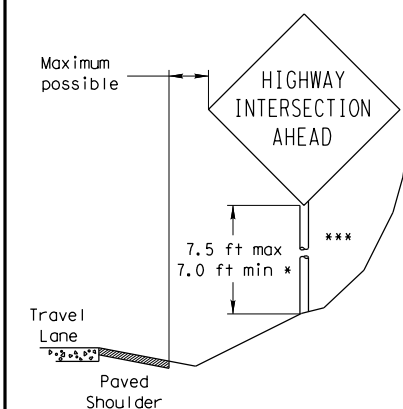


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

### CURB & GUTTER OR RAISED ISLAND



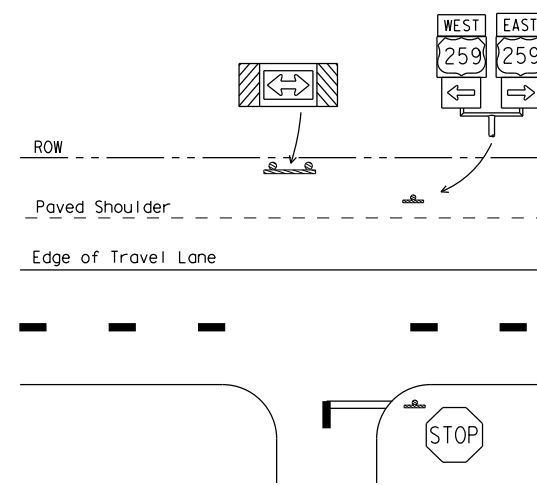
### RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



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

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

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



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

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

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

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

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

Texas Department of Transportation  
 Traffic Operations Division

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

SMD (GEN) -08

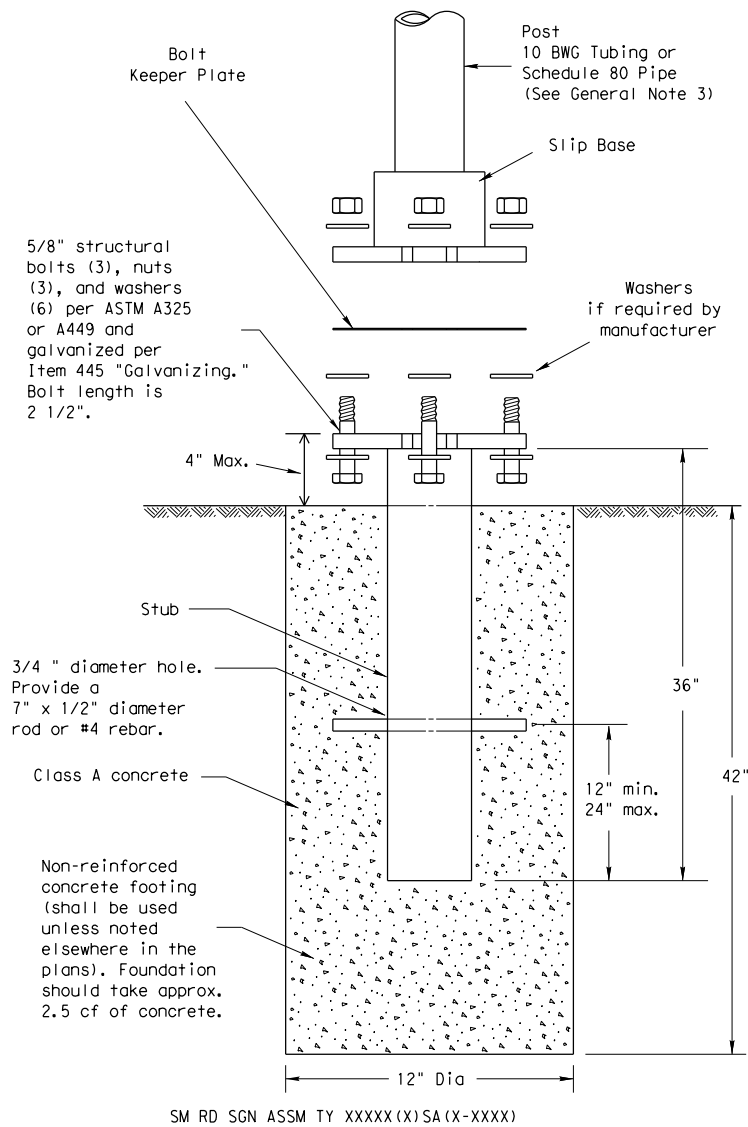
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9-08	REVISIONS	CON: 0902	SECT: 90	JOB: 132
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				SHEET NO.: 109

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# TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



## NOTE

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

## GENERAL NOTES:

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

## ASSEMBLY PROCEDURE

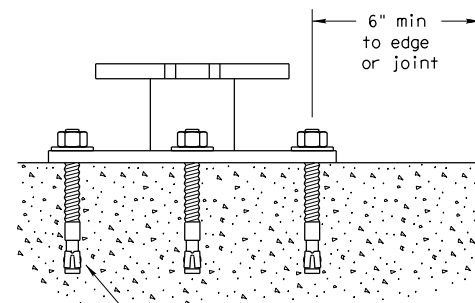
### Foundation

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

### Support

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

## CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

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

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



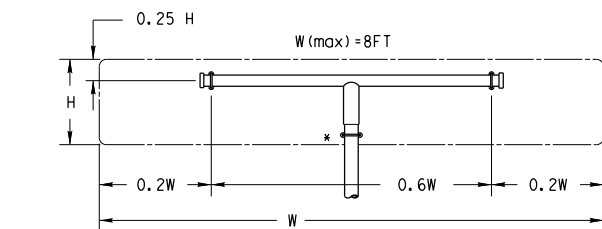
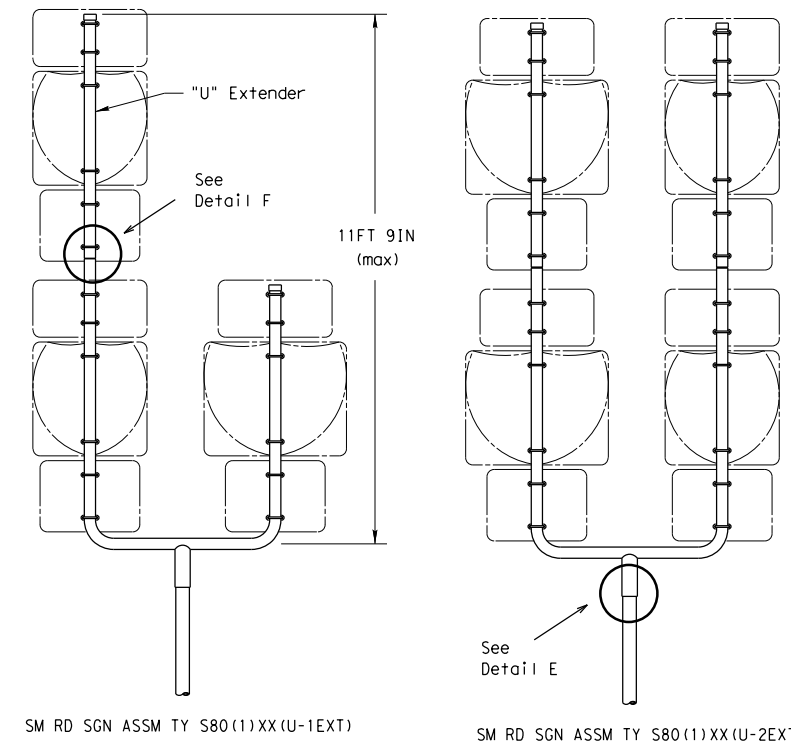
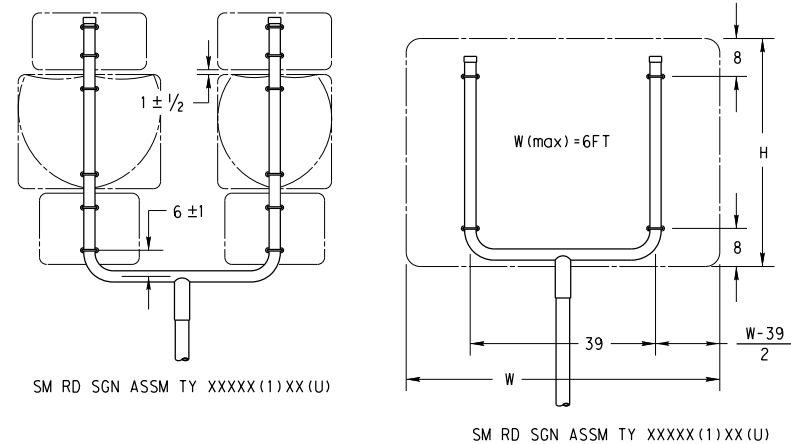
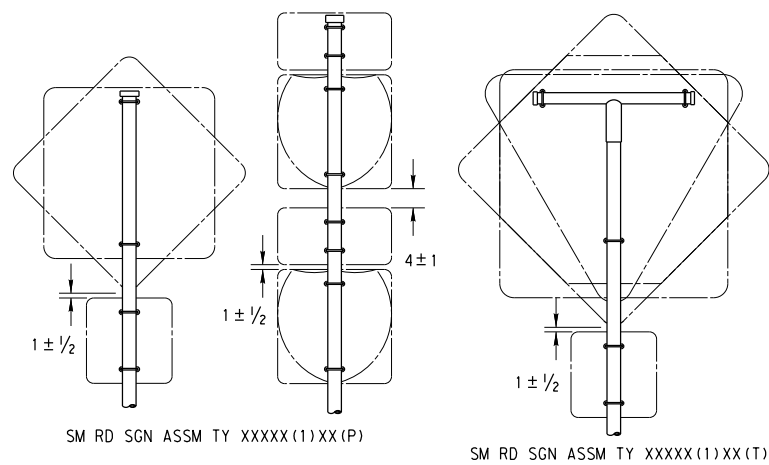
## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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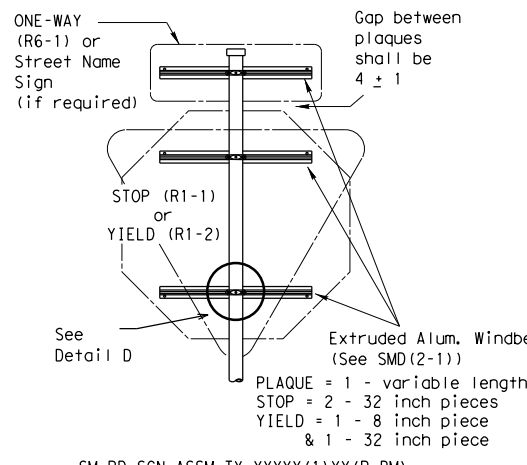
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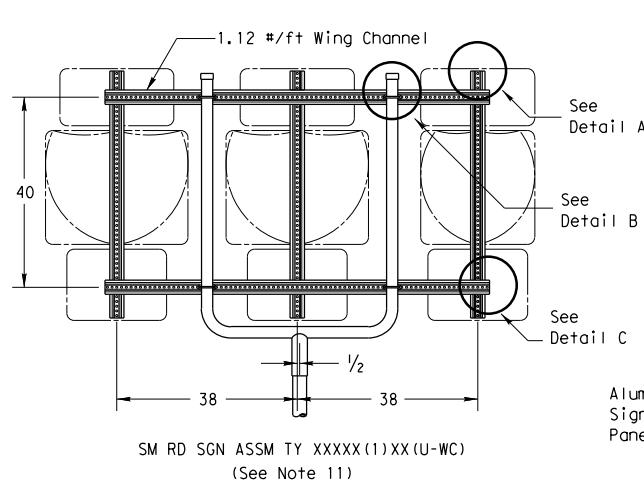


SM RD SGN ASSM TY XXXXX(1)XX(T)  
 (\* - See Note 12)

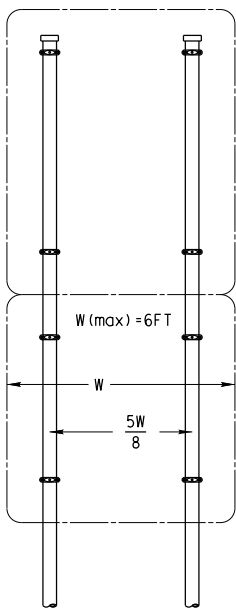
All dimensions are in english unless detailed otherwise.



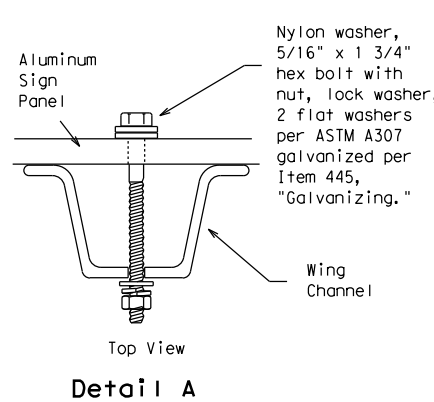
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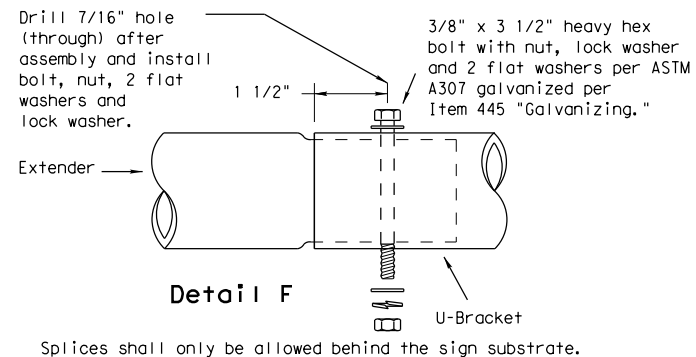
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 (See Note 11)



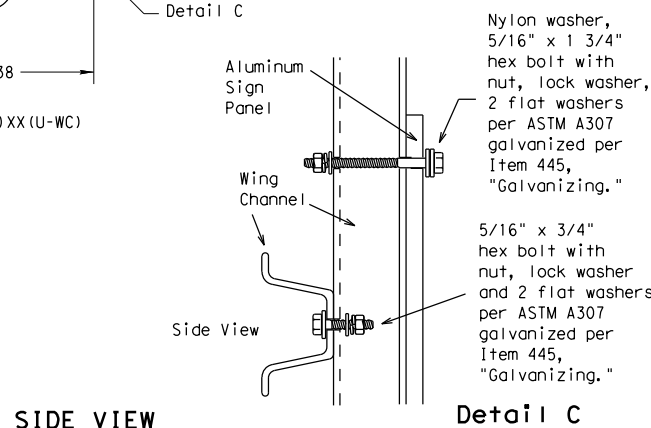
SM RD SGN ASSM TY XXXXX(2)XX(P)



Detail A

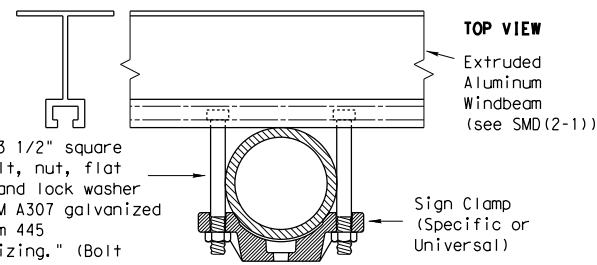


Splices shall only be allowed behind the sign substrate.



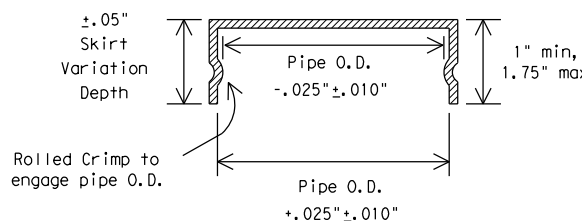
Detail C

SIDE VIEW

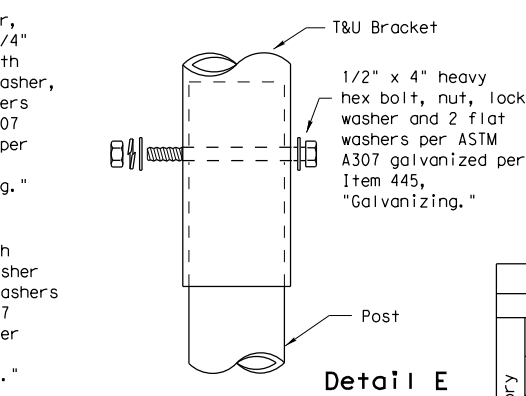


Detail D

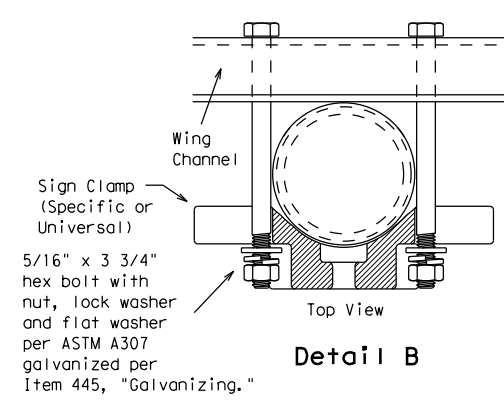
FRICION CAP DETAIL



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



Detail E



Detail B

GENERAL NOTES:

1. SIGN SUPPORT # OF POSTS MAX. SIGN AREA  

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

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



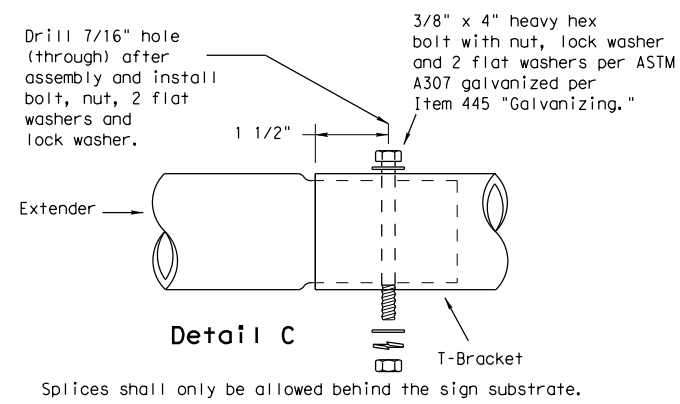
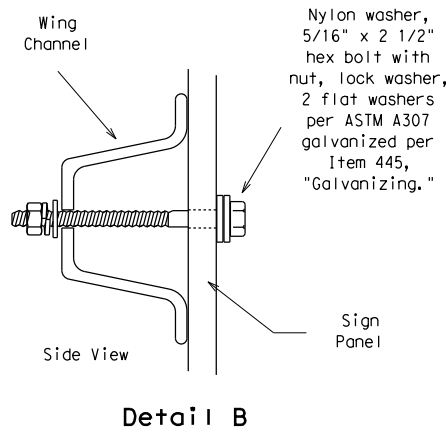
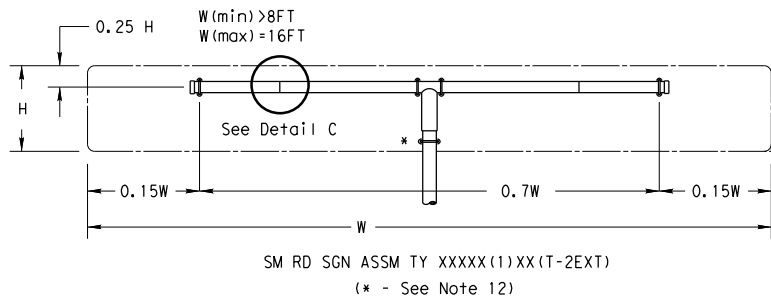
SIGN MOUNTING DETAILS  
 SMALL ROADSIDE SIGNS  
 TRIANGULAR SLIPBASE SYSTEM  
 SMD(SLIP-2) -08

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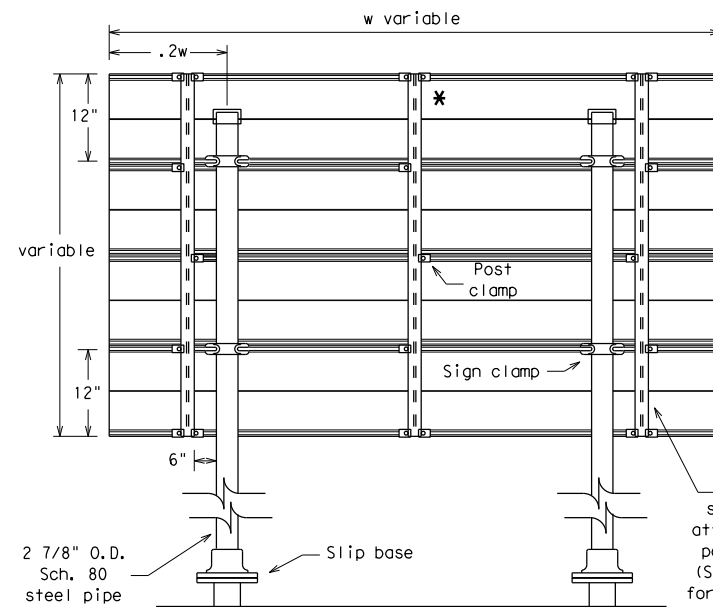
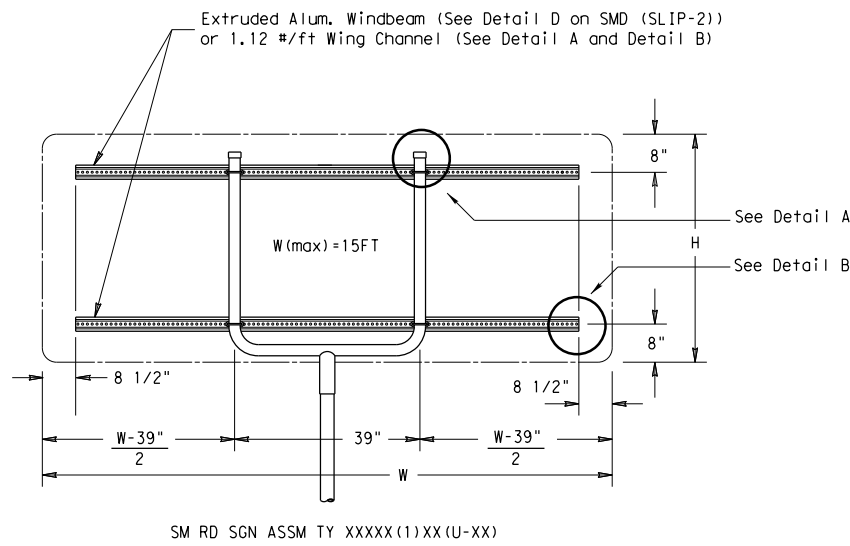
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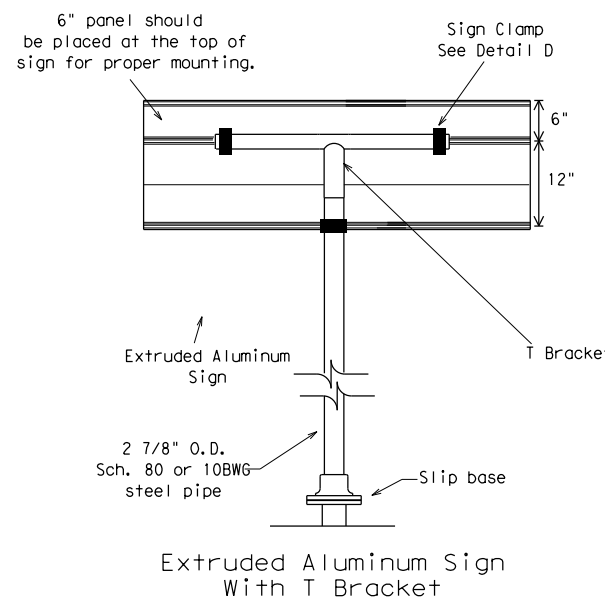
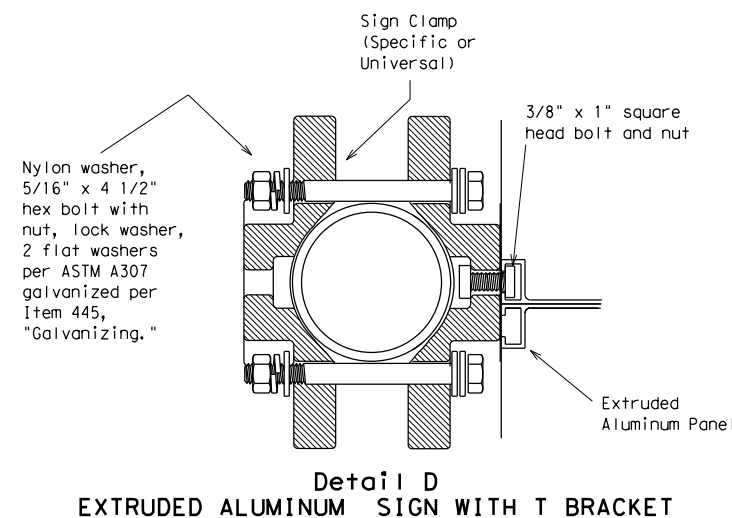
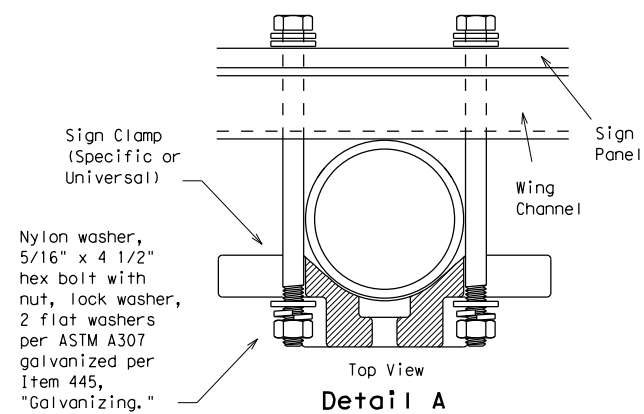
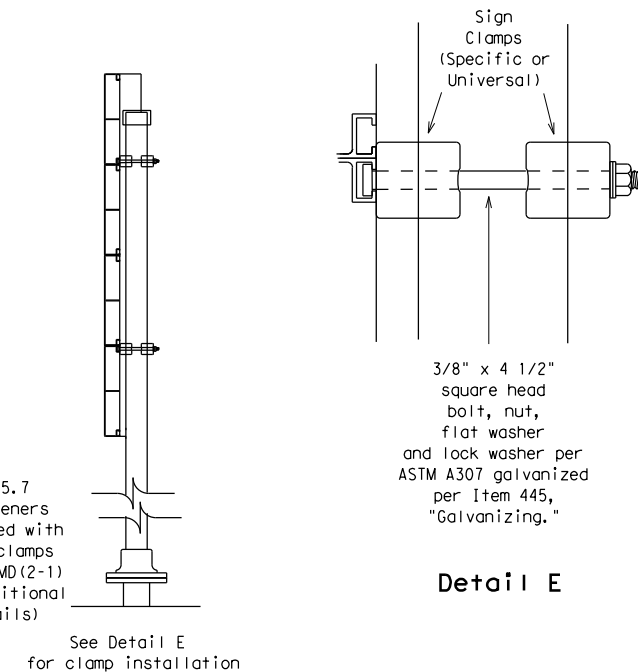


**GENERAL NOTES:**

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



\* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details  
 See Detail E for clamp installation

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

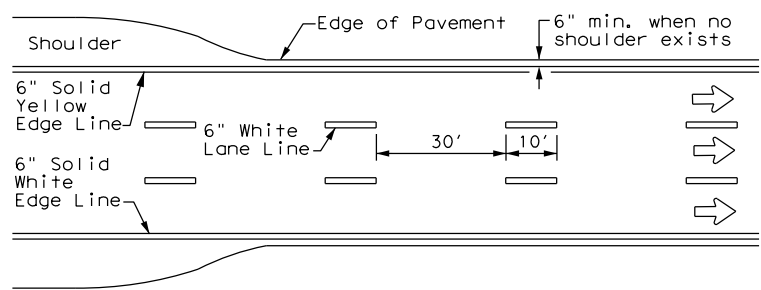


**SIGN MOUNTING DETAILS  
 SMALL ROADSIDE SIGNS  
 TRIANGULAR SLIPBASE SYSTEM  
 SMD(SLIP-3) -08**

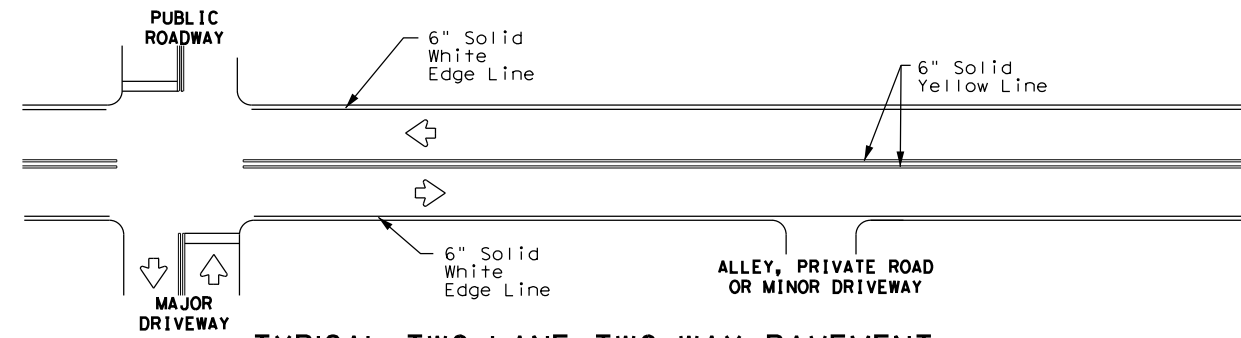
© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0902	90	132	CS
		DIST	COUNTY	SHEET NO.	
		FTW	TARRANT	112	

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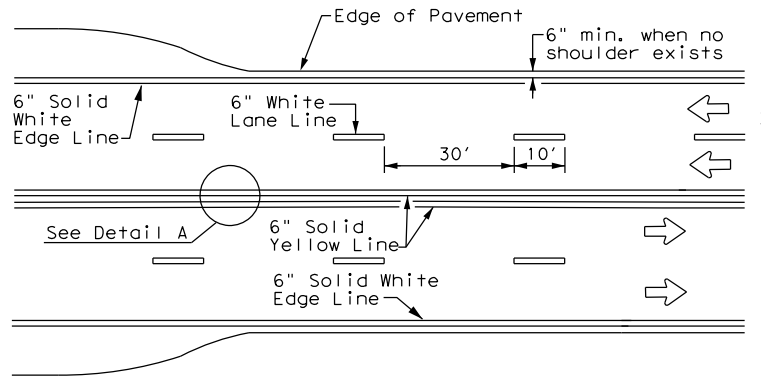
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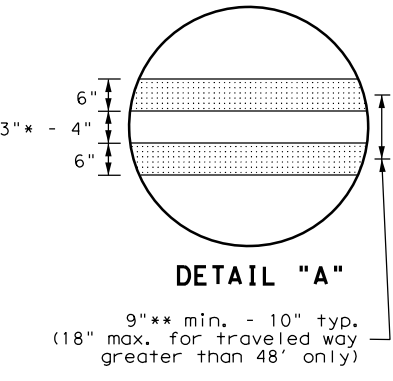
**EDGE LINE AND LANE LINES  
 ONE-WAY ROADWAY  
 WITH OR WITHOUT SHOULDERS**



**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
 MARKINGS THROUGH INTERSECTIONS**

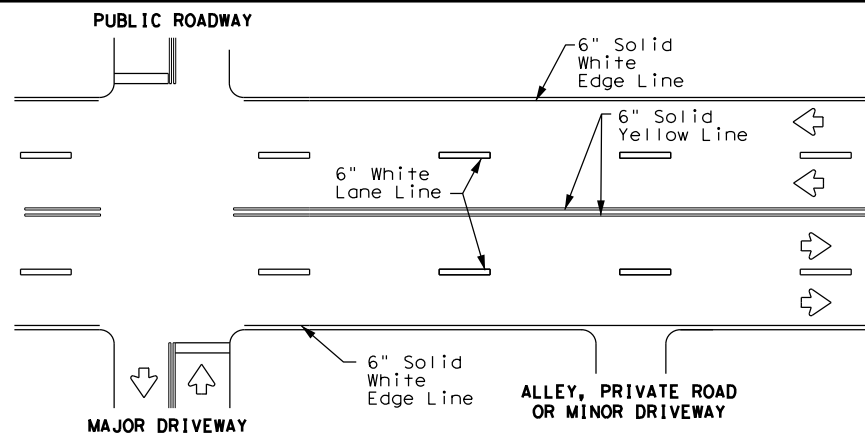


**CENTERLINE AND LANE LINES  
 FOUR LANE TWO-WAY ROADWAY  
 WITH OR WITHOUT SHOULDERS**

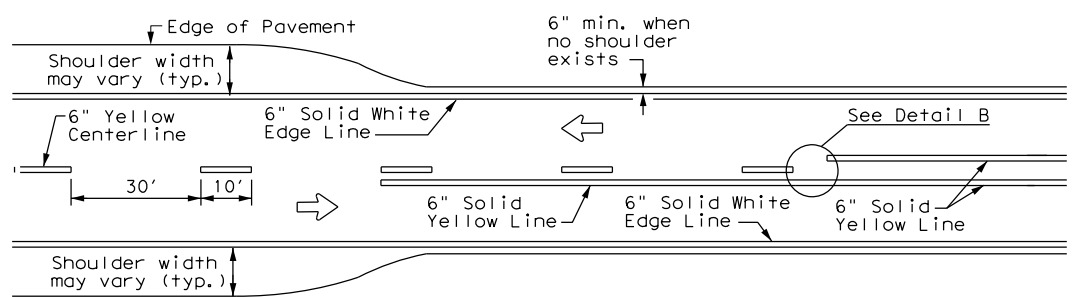


**DETAIL "A"**  
 9" \*\* min. - 10" typ.  
 (18" max. for traveled way greater than 48' only)

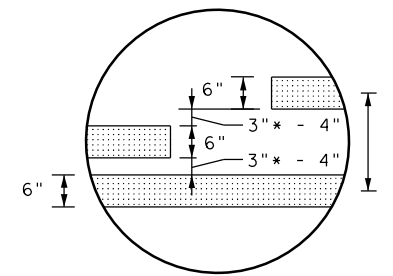
\* 2" minimum for restripe projects when approved by the Engineer.  
 \*\* 8" minimum for restripe projects when approved by the Engineer.



**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
 MARKINGS THROUGH INTERSECTIONS**

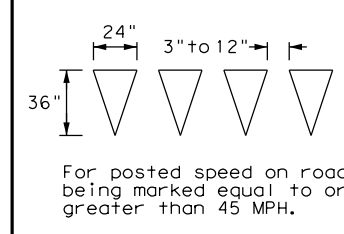


**TWO LANE TWO-WAY ROADWAY  
 WITH OR WITHOUT SHOULDERS**



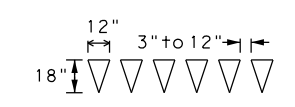
**DETAIL "B"**

\* 2" minimum for restripe projects when approved by the Engineer.



**YIELD LINES**

For posted speed on road being marked equal to or greater than 45 MPH.



For posted speed on road being marked equal to or less than 40 MPH.

**NOTES**

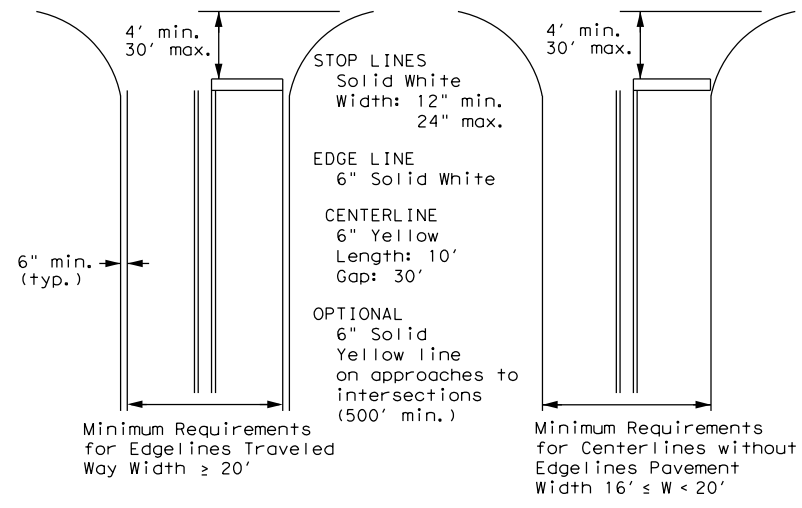
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

**GENERAL NOTES**

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

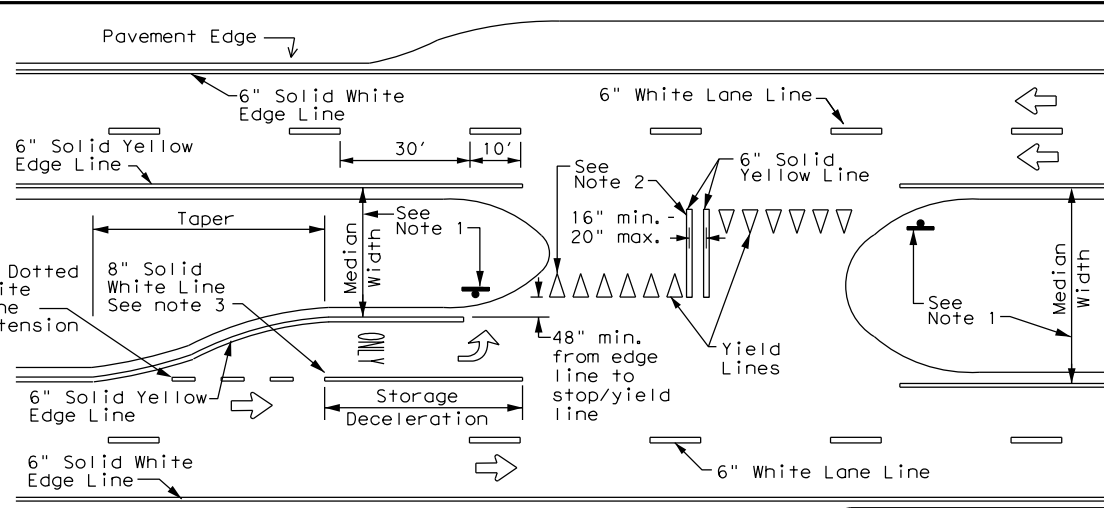
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

**GUIDE FOR PLACEMENT OF STOP LINES,  
 EDGE LINE & CENTERLINE**

Based on Traveled Way and Pavement Widths for Undivided Roadways



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**



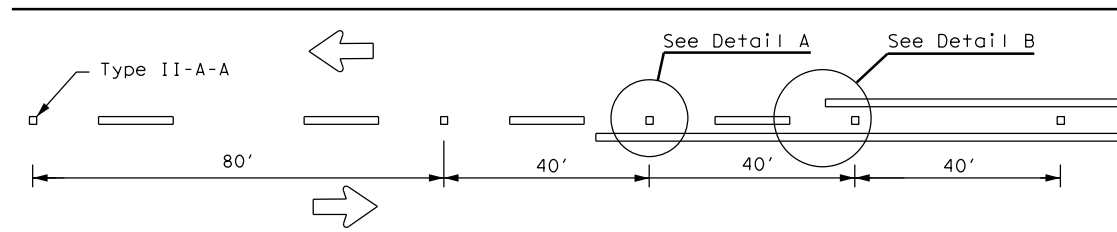
**TYPICAL STANDARD  
 PAVEMENT MARKINGS**

**PM(1) - 22**

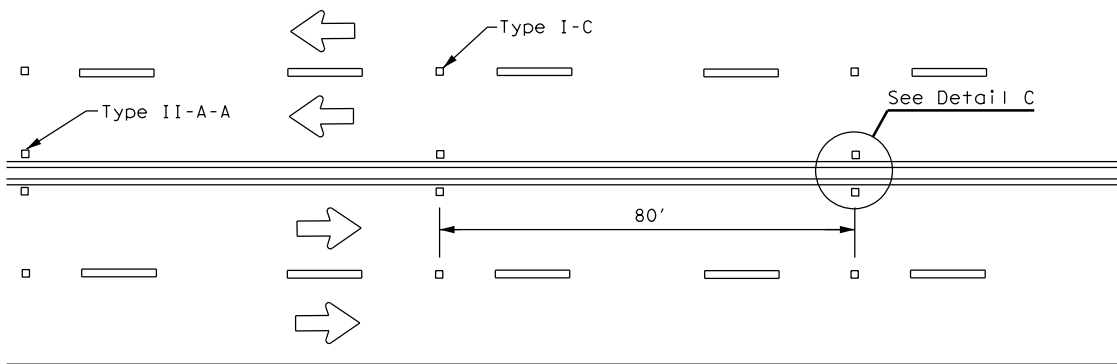
FILE:	pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT	December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	90	132	CS
11-78	8-00 6-20	DIST	COUNTY	SHEET NO.	
8-95	3-03 12-22	FTW	TARRANT	113	
5-00	2-12				

# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

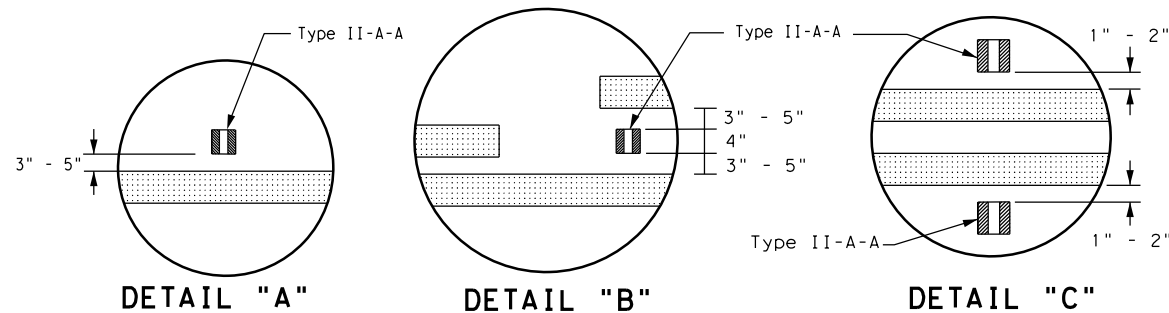
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**CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS**



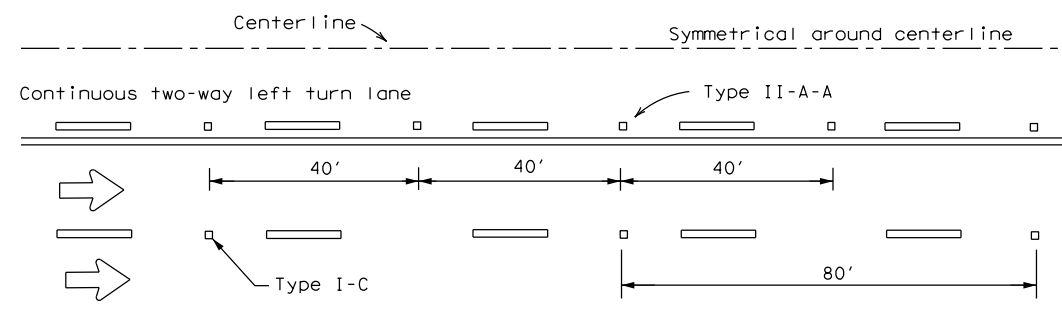
**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY ROADWAYS**



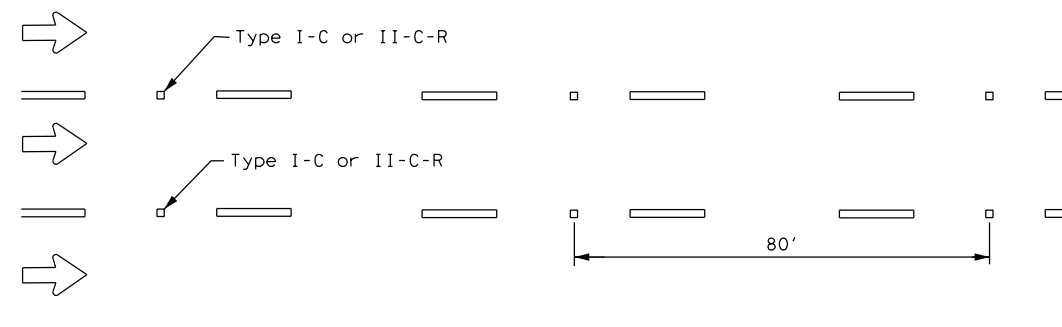
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**

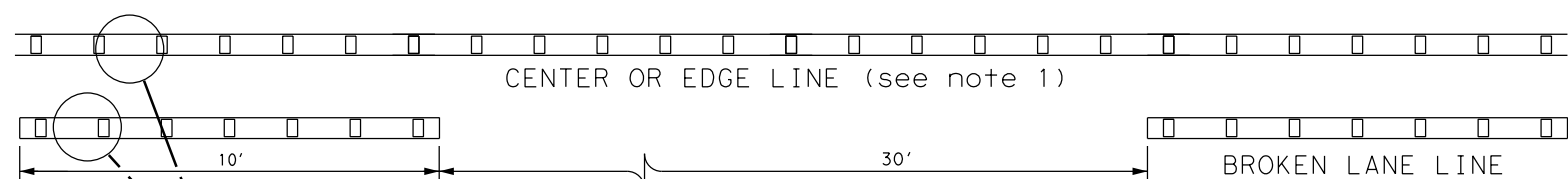


**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**



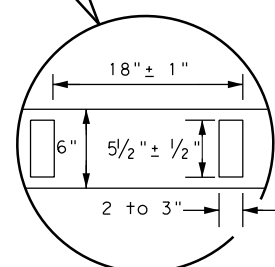
**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.  
See Note 3.



CENTER OR EDGE LINE (see note 1)

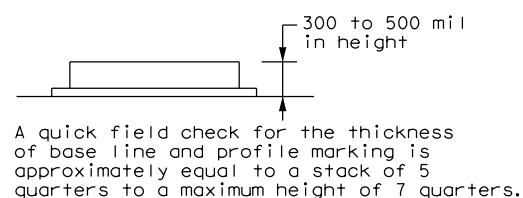
BROKEN LANE LINE



**REFLECTORIZED PROFILE  
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

6" EDGE LINE, 6" CENTERLINE  
OR 6" LANE LINE



**NOTES**

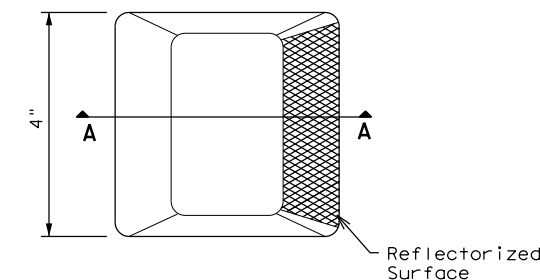
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

**GENERAL NOTES**

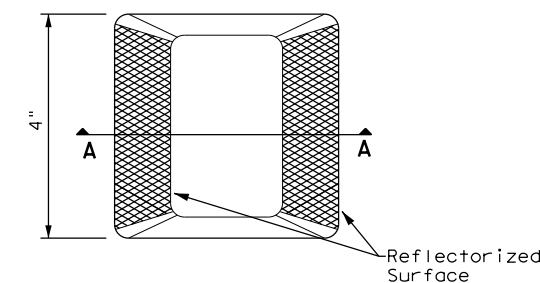
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

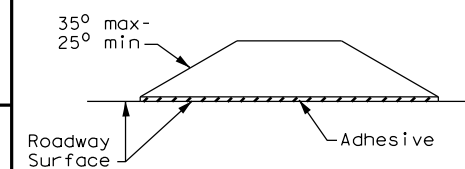
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

**RAISED PAVEMENT MARKERS**



**POSITION GUIDANCE USING  
RAISED MARKERS  
REFLECTORIZED PROFILE  
MARKINGS  
PM(2) - 22**

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	FTW	TARRANT	114	
5-00 2-12				

DATE: 1/25/2023 5:51:47 PM  
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**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

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

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

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

**1.0 SITE/PROJECT DESCRIPTION**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**

0902-90-132

**1.2 PROJECT LIMITS:**

AT LITTLE BEAR CREEK

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 32° 52' 20.42", (Long) -97° 07' 34.32"

END: (Lat) 32° 52' 23.99", (Long) -97° 07' 32.25"

**1.4 TOTAL PROJECT AREA (Acres): 1.24**

**1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.11**

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

Replace bridge and approaches  
Grading and replacing bridge approach pavement

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
Clay	Sandy lean, moist, brown, trace ferrous staining (CL)
Sand	Silty, clayey, loose, moist, brown fine grained (SC-SM)
Sand	Clayey, very loose, moist, dark brown fine grained, trace gravel (SC)
Sand	Clayey, loose, dry to moist, brown to 13', gray and brown thereafter, fine grained, trace to few gravel, trace ferrous staining to 9.5', SC-SM from 13' to 14.5' (SC)

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

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

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

Type	Sheet #s

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

**1.9 CONSTRUCTION ACTIVITIES:**

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

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

**1.10 POTENTIAL POLLUTANTS AND SOURCES:**

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

**1.11 RECEIVING WATERS:**

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

Tributaries	Classified Waterbody
Little Bear Creek	
Bear Creek	
West Fork Trinity River	

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

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

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

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

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

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

MS4 Entity
None

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**



Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6	(See Title Sheet)			115
STATE	STATE DIST.	COUNTY		
TEXAS	FTW	TARRANT		
CONT.	SECT.	JOB	HIGHWAY NO.	
0902	90	132	CS	

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

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

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

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

**T / P**

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

**2.2 SEDIMENT CONTROL BMPs:**

**T / P**

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

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

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

**T / P**

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

**2.3 PERMANENT CONTROLS:**

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

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

**2.5 POLLUTION PREVENTION MEASURES:**

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

**2.6 VEGETATED BUFFER ZONES:**

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

Type	Stationing	
	From	To

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

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

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

**2.8 INSPECTIONS:**

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

**2.9 MAINTENANCE:**

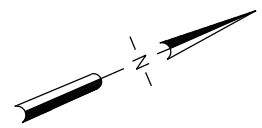
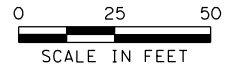
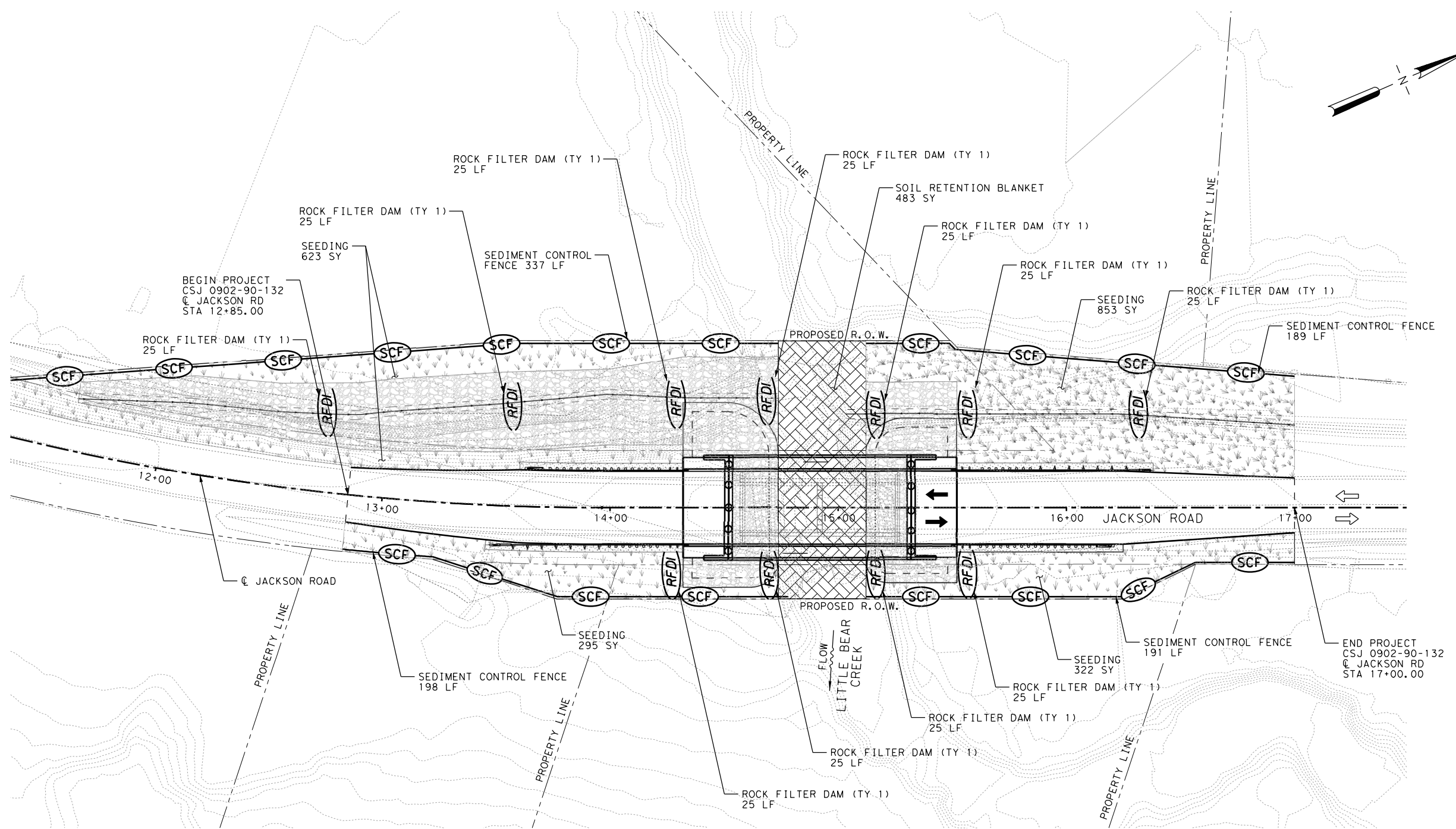
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being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

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	(See Title Sheet)		116
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0902	90	132	CS

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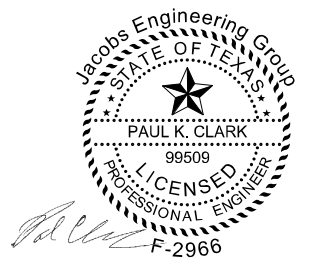
**LEGEND**

- SEDIMENT CONTROL FENCE
- ROCK FILTER DAM (TY 1)
- STONE RIPRAP
- CONC MOWSTRIP
- SEEDING
- SOIL RETENTION BLANKET

**NOTES:**

1. CONSTRUCTION EXIT LOCATIONS TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
2. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF BMPs SHOWN AND ALTER LOCATIONS AS NEEDED TO ACHIEVE INTENDED PURPOSE AS APPROVED BY THE ENGINEER.

1/26/2023



**Jacobs**  
1999 BRYAN ST, SUITE 1200  
DALLAS, TX 75201-3136  
Phone: +1 (214) 638-0145  
Firm Registration: F-2966



**JACKSON POOL  
EROSION CONTROL PLAN**

SCALE: 1"=50' (H) SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
JDB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JTB	TEXAS	FTW	TARRANT	117
GRAPHICS	BHK	CONTROL	SECTION	
CHECK	PKC	0902	90	
			132	

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DATE: 3/6/2023  
FILE: ...\\ST\SW3P\Jackson Rd\132epic.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. The Storm Water Management Plan covers all the incorporated urbanized areas of the City

No Action Required       Required Action

Action No.

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

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

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

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

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

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

- 1. NWP 14 - Little Bear Creek
- 2.
- 3.
- 4.

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
<input checked="" 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 type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> 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 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

**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

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

No Action Required       Required Action

Action No.

- 1. The following species could occur in the project area: Louisiana pigtoe, sandbank pocketbook, Texas heelsplitter, Strecker's chorus frog, Woodhouse's toad, big brown bat, eastern spotted skunk, swamp rabbit, slender glass lizard, Texas garter snake, timber (canebrake) rattlesnake, American bumblebee, Sutherland hawthorn, Monarch butterfly, Alligator snapping turtle, Eastern Red bat, Hoary bat, Tricolored bat, Eastern box turtle, and Western box turtle. Follow the BMPs and Special Notes listed below to protect these species.
- 2. Survey is required for Louisiana pigtoe, sandbank pocketbook, and Texas heelsplitter at Little Bear Creek (STA 15+00). TxDOT to complete the survey at this location prior to disturbance.
- 3. Contractor to implement the following BMPs from "Beneficial Management Practices: Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources" available at <https://ftp.txdot.gov/pub/txdot-info/env/toolkit/300-01-bmp.pdf>.
  - a. Section 2.6.2 Terrestrial Amphibian and Reptile BMP Section
  - b. Section 2.6.1 Aquatic Amphibian and Reptile BMP
  - c. Section 2.4.3 Freshwater Mussel BMP
  - d. Section 2.2.1 Bird BMP
  - e. Section 1.4 Water Quality BMP
  - f. Section 1.5 Stream Crossing BMP
  - g. Section 1.6 Dewatering BMP
  - h. Section 1.2 Vegetation BMP
  - i. Section 2.4.4 Insect Pollinator BMP
  - j. Section 2.5.2 Bat BMP
  - k. Section 2.5.1 Small Mammal BMP

Special note: The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on site during construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

**LIST OF ABBREVIATIONS**

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

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

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

Contact the Engineer if any of the following are detected:

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

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

Yes       No

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

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

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

Yes       No

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

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

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

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

No Action Required       Required Action

Action No.

- 1.

**VII. OTHER ENVIRONMENTAL ISSUES**


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

No Action Required       Required Action

Action No.

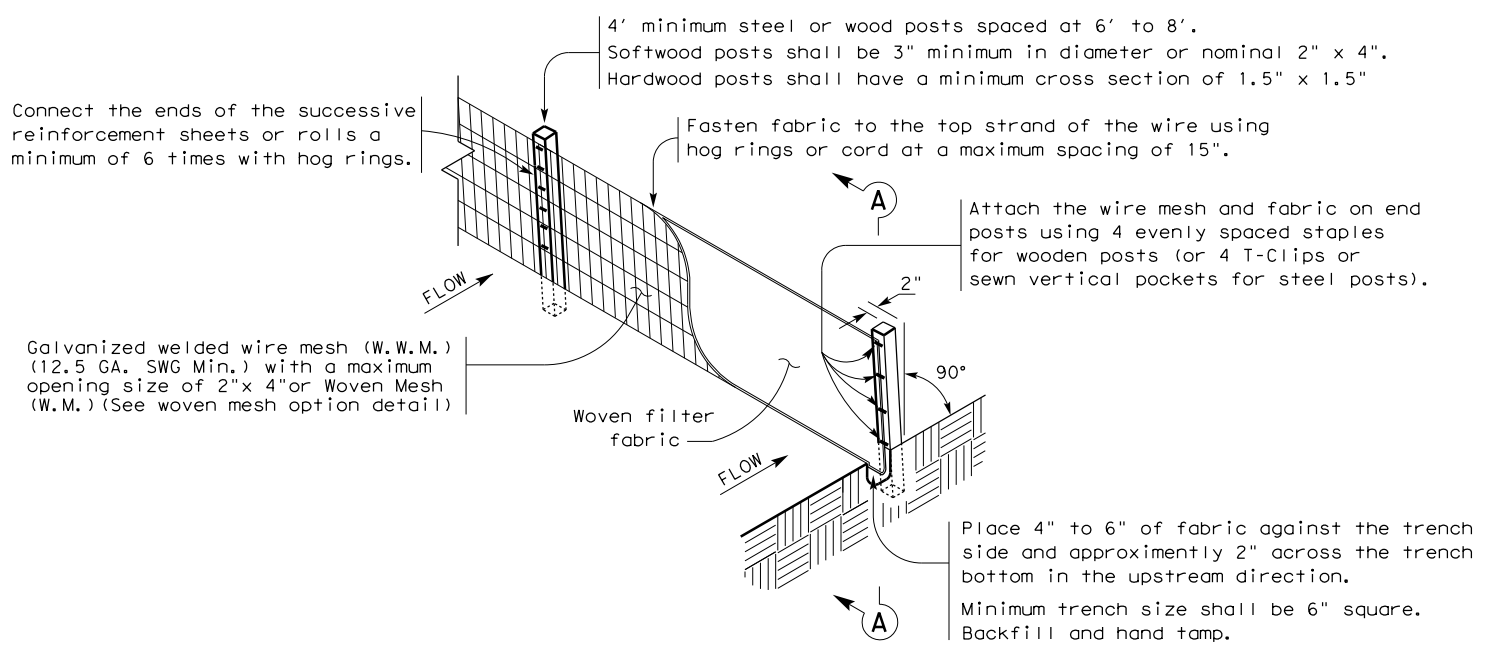
- 1. The Texas Department of Transportation proposes to have a temporary occupancy impact on the existing trail system, and utilizes a Determination of No Adverse Effects and Certification of 4(f) Exception for this trail.

**JACKSON POOL**

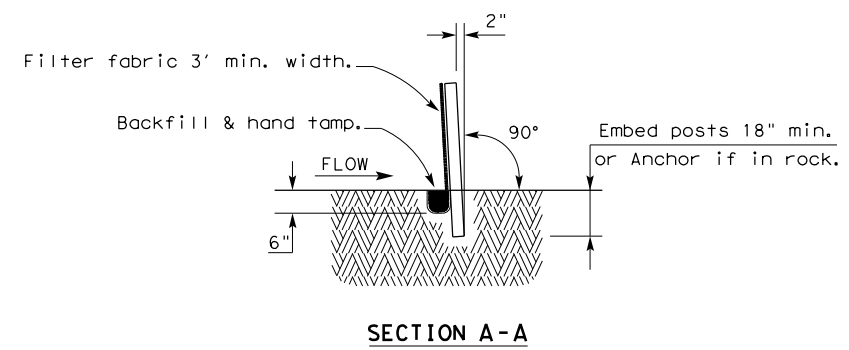
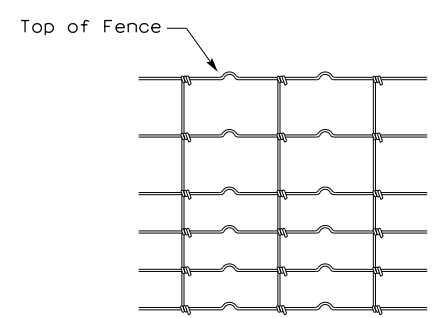
		<b>Design Division Standard</b>	
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</b>  <b>EPIC</b>			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
©TxDOT: February 2015	CONT	SECT	JOB
12-12-2011 (DS) REVISIONS	0902	90	132
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	FTW	TARRANT	118

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10/25/2023  
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**TEMPORARY SEDIMENT CONTROL FENCE**



**HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL**

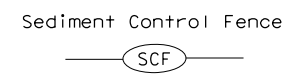
Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

**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.

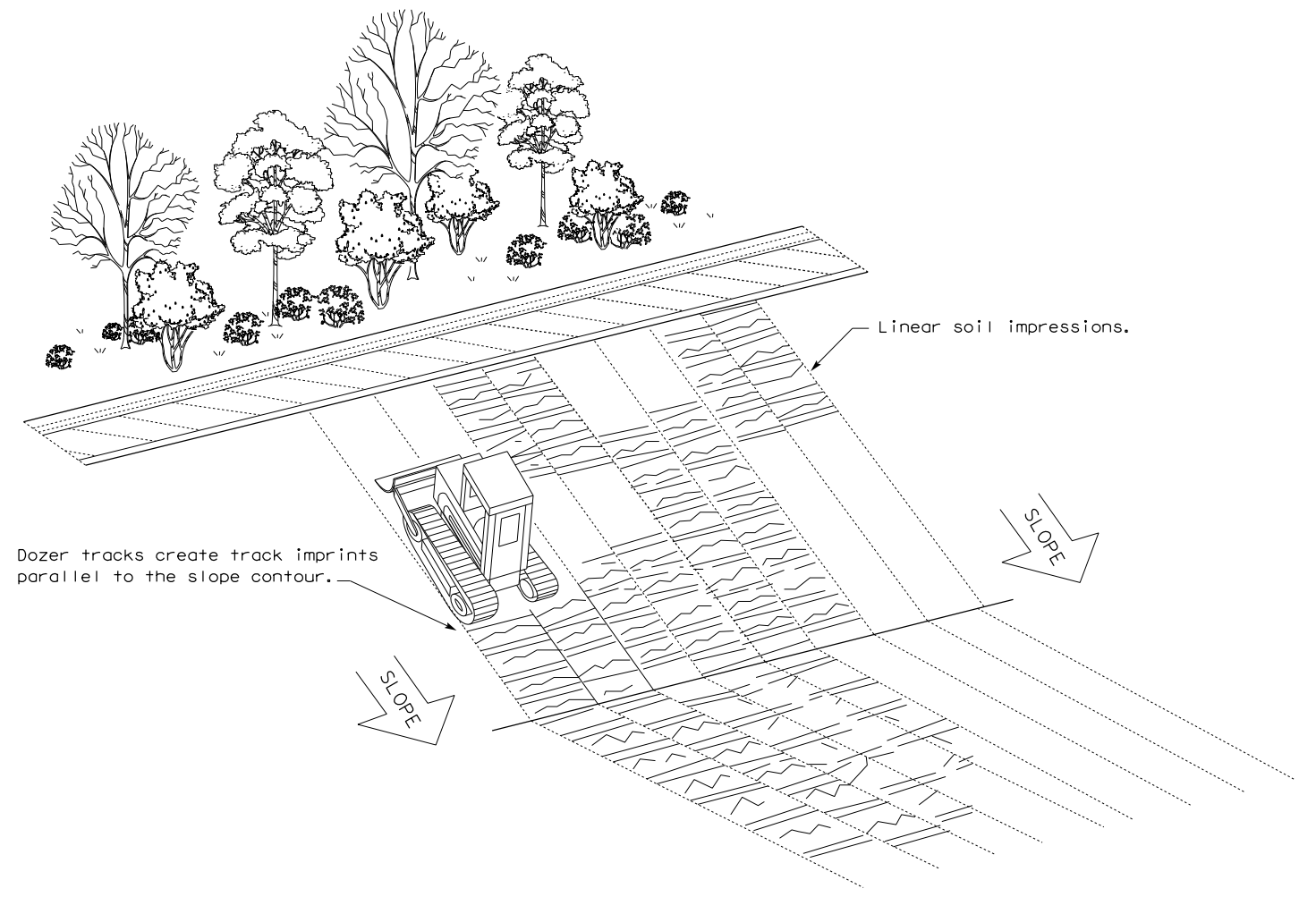
Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

**LEGEND**



**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**



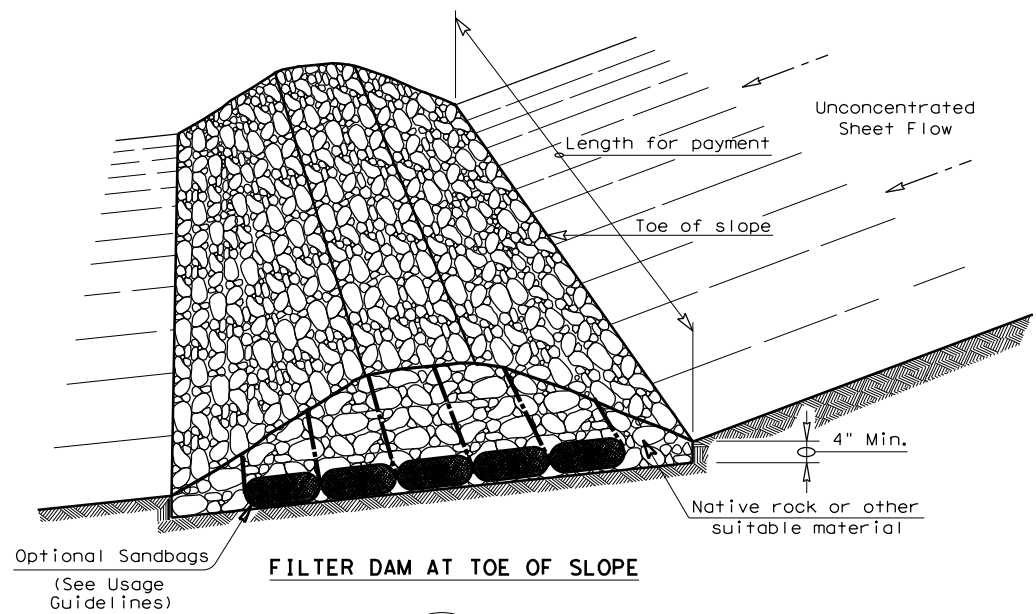
**TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1) - 16**

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	119	



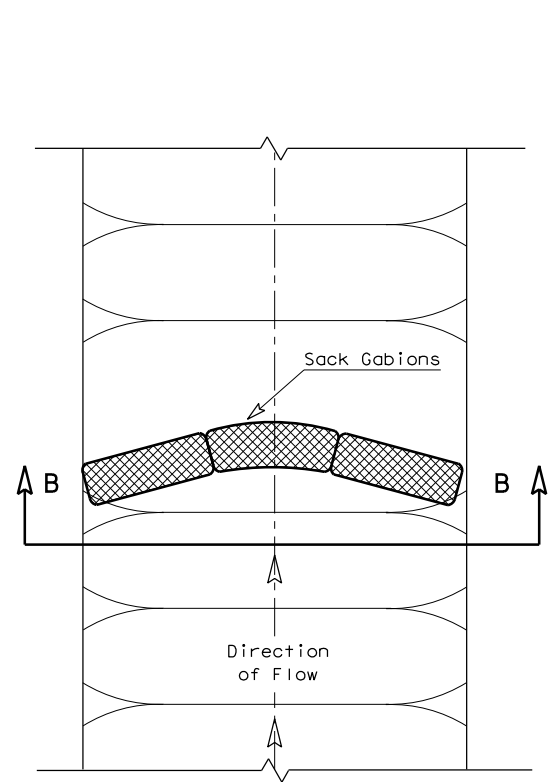
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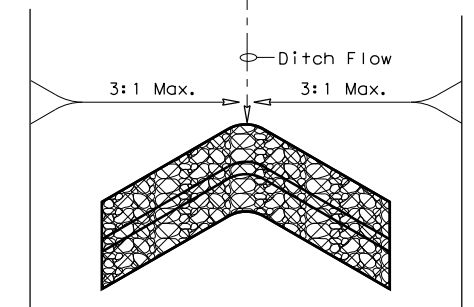


**FILTER DAM AT TOE OF SLOPE**

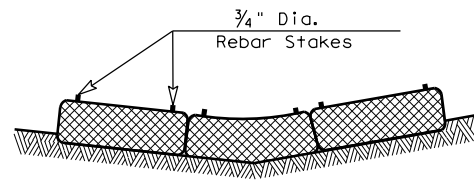
(RFD1) OR (RFD2)



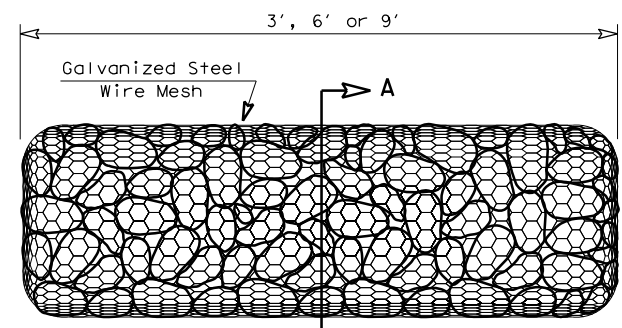
**PLAN VIEW**



**"V" SHAPE PLAN VIEW**

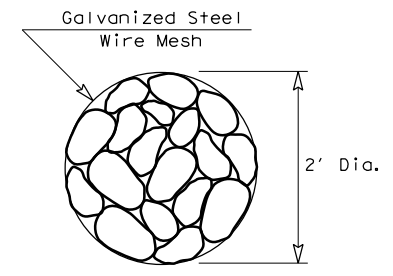


**SECTION B-B**

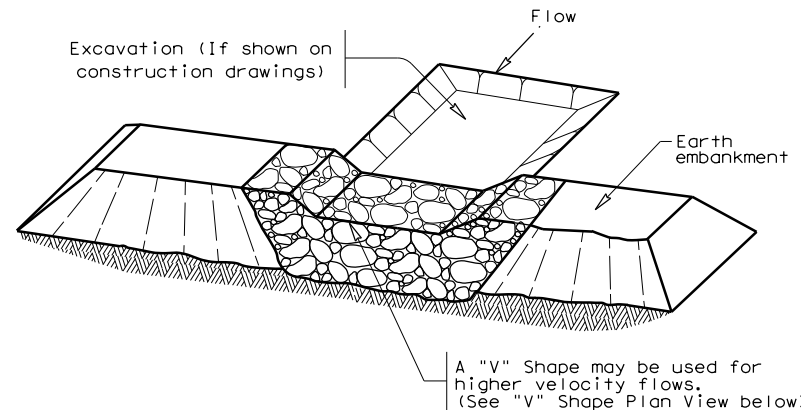


**TYPE 4 (SACK GABIONS)**

(RFD4)

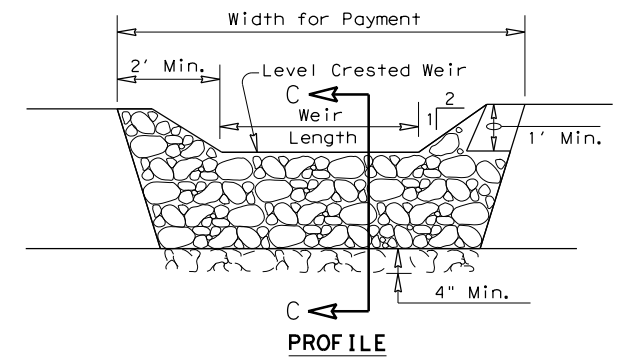


**SECTION A-A**

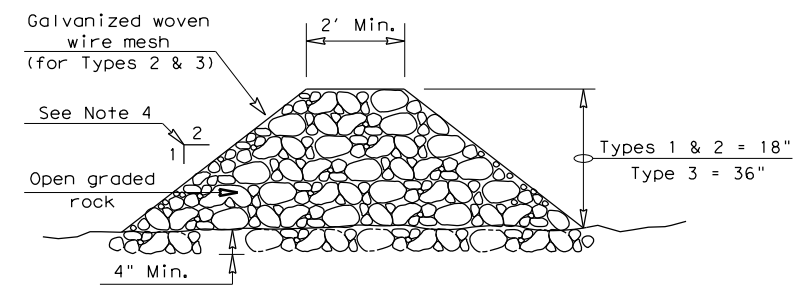


**FILTER DAM AT SEDIMENT TRAP**

(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.

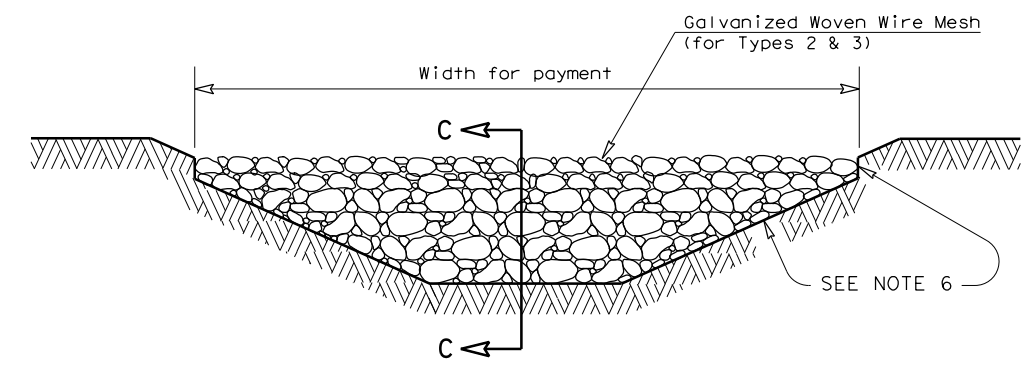
**Type 1 (18" high with no wire mesh) (3" to 6" aggregate):** Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high 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.

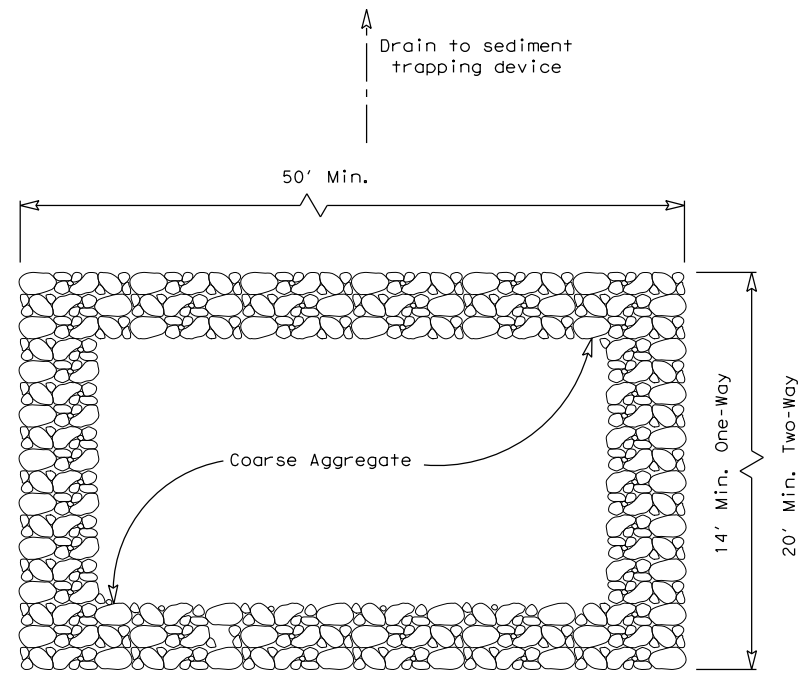
**PLAN SHEET LEGEND**

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

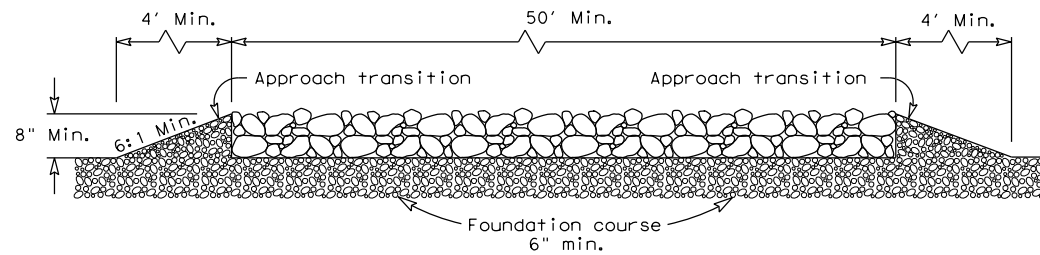
		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>ROCK FILTER DAMS</b> <b>EC(2)-16</b>			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT: 0902	SECT: 90	JOB: 132
REVISIONS	DIST: FTW	COUNTY: TARRANT	SHEET NO.: 120

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PLAN VIEW

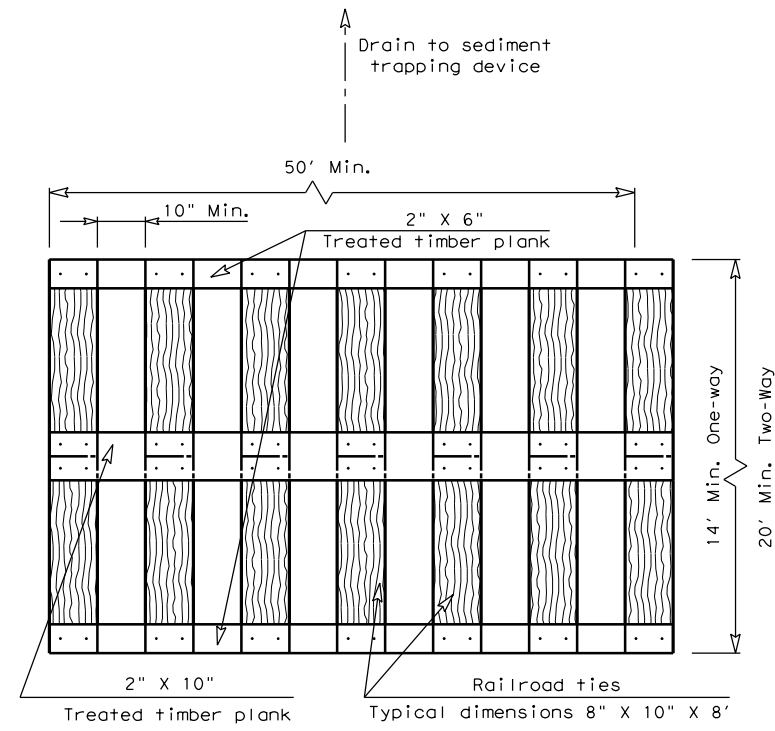


ELEVATION VIEW

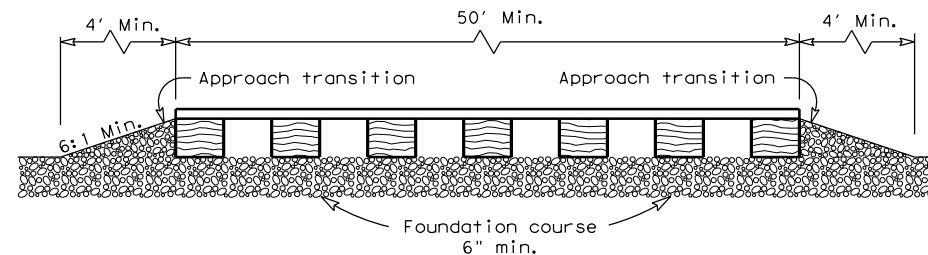
CONSTRUCTION EXIT (TYPE 1)  
 ROCK CONSTRUCTION (LONG TERM)

**GENERAL NOTES (TYPE 1)**

- The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
- The coarse aggregate should be open graded with a size of 4" to 8".
- The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
- The construction exit shall be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW

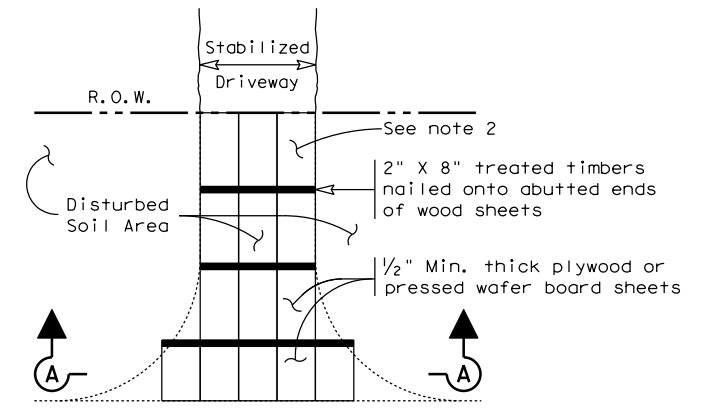


ELEVATION VIEW

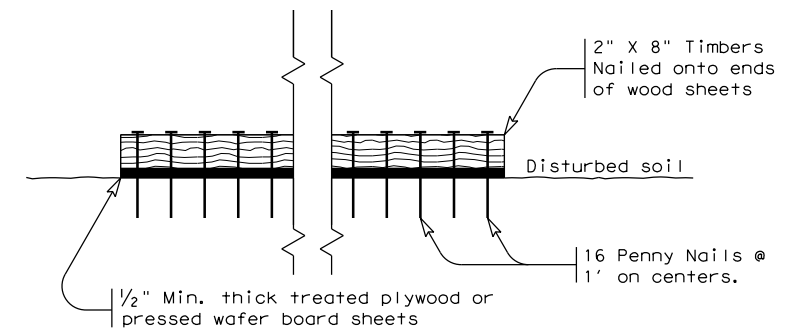
CONSTRUCTION EXIT (TYPE 2)  
 TIMBER CONSTRUCTION (LONG TERM)

**GENERAL NOTES (TYPE 2)**

- The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
- The treated timber planks shall be attached to the railroad ties with 1/2" x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
- The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
- The construction exit should be graded to allow drainage to a sediment trapping device.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.
- Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



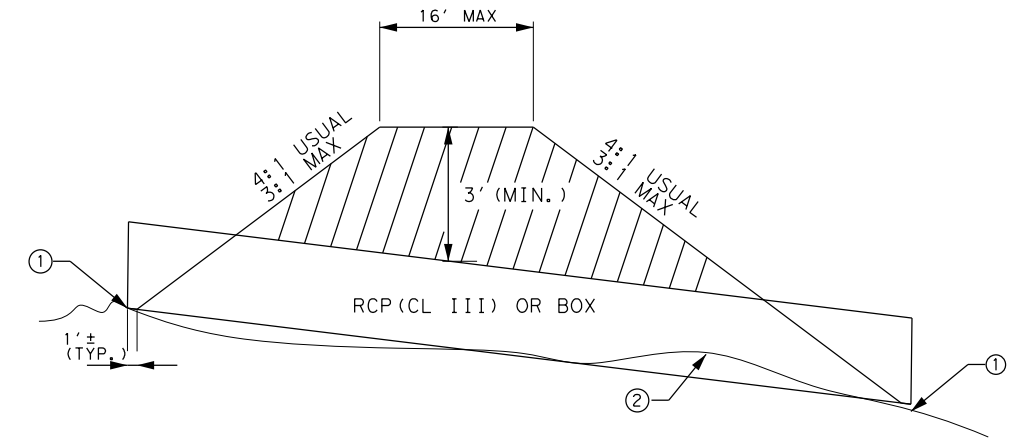
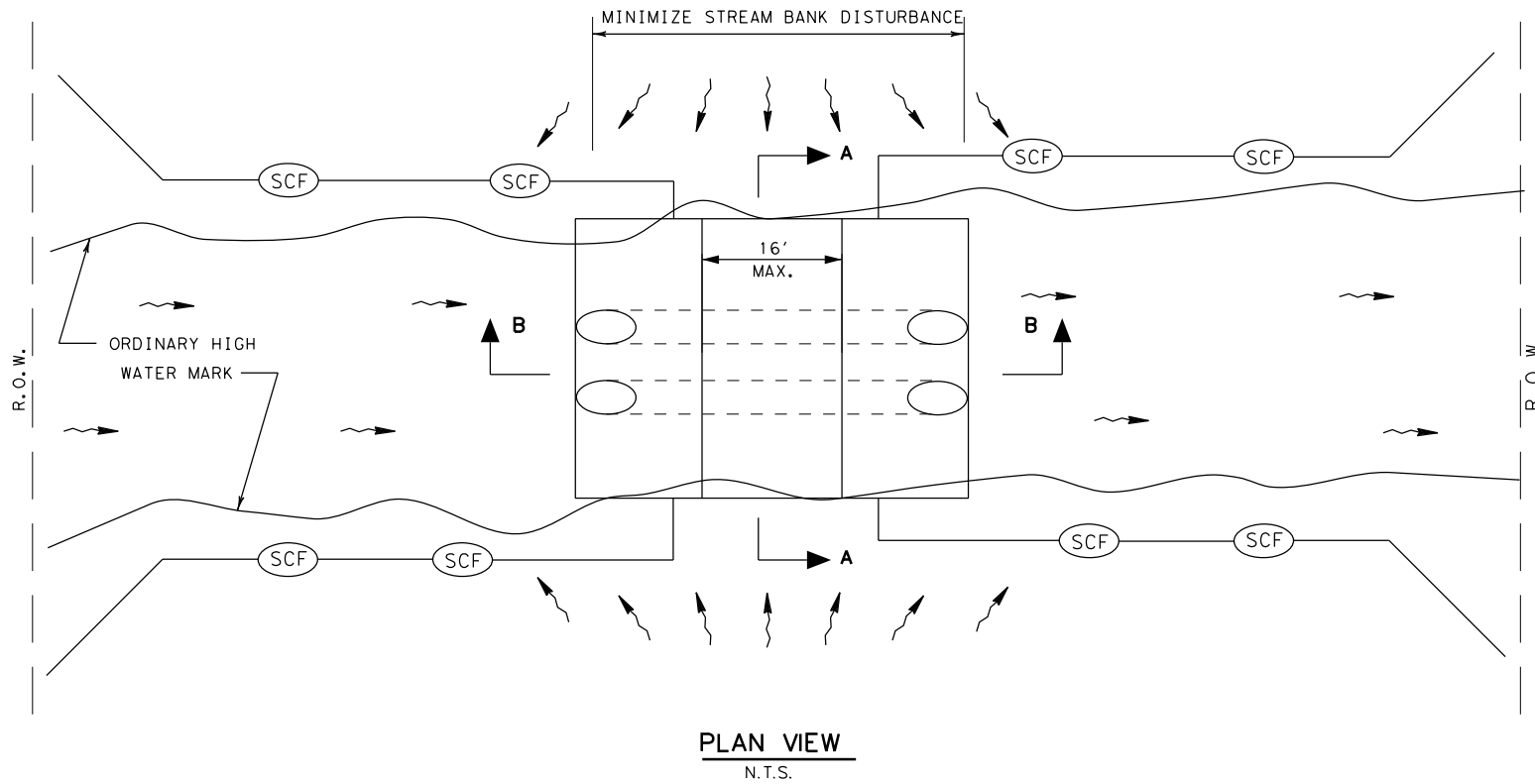
SECTION A-A  
 CONSTRUCTION EXIT (TYPE 3)  
 SHORT TERM

**GENERAL NOTES (TYPE 3)**

- The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.

				Design Division Standard
<b>TEMPORARY EROSION,          SEDIMENT AND WATER          POLLUTION CONTROL MEASURES          CONSTRUCTION EXITS          EC(3)-16</b>				
FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	132	CS
	DIST	COUNTY	SHEET NO.	
	FTW	TARRANT	121	

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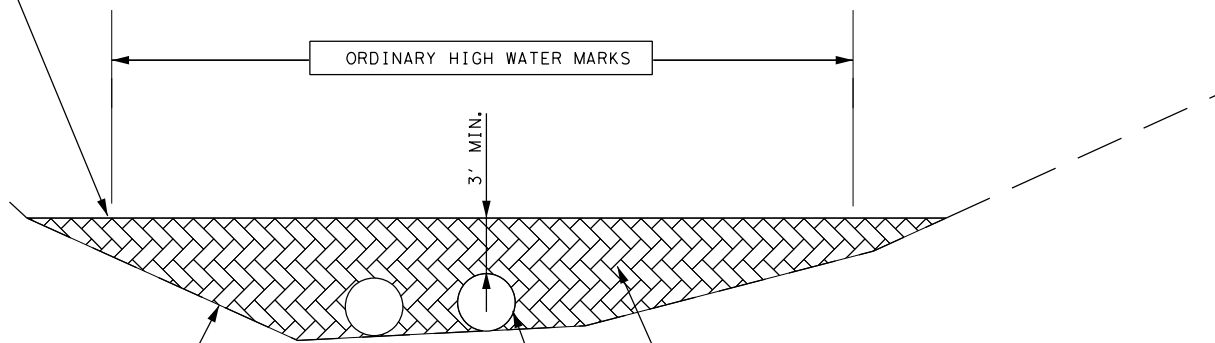
- ① MATCH EXISTING STREAM BED ELEVATION. MULTIPLE PIPES MAY HAVE DIFFERENT PROFILES.
- ② CROSSING LOCATION TO BE SELECTED SO THAT PIPES PROVIDE POSITIVE DRAINAGE WITH MINIMAL DISTURBANCE OF THE STREAM BED.

**GENERAL NOTES**

1. THIS DETAIL IS TO BE USED AT ANY LOCATIONS WHERE A TEMPORARY STREAM CROSSING IS NEEDED. A STREAM CROSSING IS ANY LOCATION WHERE CONCENTRATED FLOWING WATER OCCURS OR IS EXPECTED TO OCCUR FOLLOWING A RAIN EVENT. TEMPORARY CROSSINGS ARE NOT PERMITTED TO IMPOUND WATER BY BLOCKING A NATURAL WATERCOURSE.
2. THE CONTRACTOR WILL SUBMIT, IN WRITING AND ACCOMPANIED BY APPROPRIATE DRAWINGS, THE TYPE AND LOCATION OF EACH PROPOSED TEMPORARY STREAM CROSSING. THE SUBMITTAL WILL SHOW, IN DETAIL, THE PROPOSED WORK SEQUENCE AND THE MATERIALS TO BE USED IN THE CONSTRUCTION OF THE CROSSING. THE SUBMITTAL WILL BE EVALUATED BY THE TXDOT DISTRICT ENVIRONMENTAL QUALITY COORDINATOR AND APPROVED BY THE ENGINEER.
3. USE REINFORCED CONCRETE PIPE (CLASS III) OR PRECAST BOX CULVERTS UNLESS OTHERWISE APPROVED. DO NOT USE CORRUGATED METAL PIPE.
4. TEMPORARY STREAM CROSSINGS WILL BE PERMITTED ONLY WHEN NECESSARY AS DETERMINED BY THE ENGINEER. TXDOT WILL EVALUATE ACCESS FROM BOTH SIDES OF THE BRIDGE OR CULVERT AND ALSO EVALUATE THE CONTRACTOR'S PROPOSED DEMOLITION AND CONSTRUCTION TECHNIQUES.
5. ORDINARY HIGH WATER MARKS ARE ESTABLISHED BY THE FLUCTUATIONS OF WATER IN THE STREAM AND ARE INDICATED BY PHYSICAL CHARACTERISTICS SUCH AS A CLEAR NATURAL LINE IMPRESSED ON THE BANK, SHELVEING, CHANGES IN THE SOIL CHARACTER, ABSENCE OF TERRESTRIAL VEGETATION, PRESENCE OF LITTER OR DEBRIS, OR OTHER APPROPRIATE MEANS THAT CONSIDER THE CHARACTERISTICS OF THE SURROUNDING AREAS.
6. DO NOT PUSH OR MOVE SOIL FROM ABOVE OR OUTSIDE THE ORDINARY HIGH WATER MARKS TO BELOW OR INSIDE THE ORDINARY HIGH WATER MARKS. NON-COMPLIANT WORK WILL BE REMOVED AT THE CONTRACTOR'S EXPENSE.
7. DAMAGE TO ANY TEMPORARY STREAM CROSSING WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
8. REMOVE ANY TEMPORARY STREAM CROSSINGS AS SOON AS POSSIBLE.
9. EXCEPT FOR SEDIMENT CONTROL FENCE, THE MATERIALS AND LABOR REQUIRED FOR CONSTRUCTION OF TEMPORARY STREAM CROSSINGS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

SEDIMENT CONTROLS AND ORDINARY HIGH WATER MARK FENCING NOT SHOWN.

SEE SW3P AND EPIC SHEETS.



PLACE GEOTECHNICAL FABRIC ALONG EXISTING STREAM PROFILE WITH MINIMAL SHAPING OF THE CHANNEL. DO NOT REMOVE AQUATIC VEGETATION ROOTS. THE FABRIC SEPARATES THE ROCK FROM THE STREAM BOTTOM AND HELPS WITH ROCK REMOVAL.

CONSTRUCT TEMPORARY FILL BETWEEN THE ORDINARY HIGH WATER MARKS USING 4 INCH TO 6 INCH NOMINAL DIAMETER ROCKS OR BROKEN/CRUSHED CONCRETE. CLAY, SAND, AND FINER MATERIALS ARE NOT ALLOWED TO BE PLACED BETWEEN THE ORDINARY HIGH WATER MARKS.

INSTALL PIPES OR BOXES THAT MAINTAIN LOW STREAM FLOWS EVEN IF THE STREAM IS CURRENTLY DRY. GRADE TO ALLOW FLOW TO PASS COMPLETELY DURING LOW FLOW PERIODS. CABLES TO ANCHOR THE PIPE(S) DURING HIGH FLOWS ARE ACCEPTABLE. BLOCKING FLOW IN THE STREAM IS NOT ALLOWED.

	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE

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		Fort Worth District Standard	
<b>TEMPORARY STREAM CROSSING DETAIL</b>			
<b>TSCD-FTW</b>			
ORIGINAL DRAWING: 05/2019	tscdffw.dgn	PROJECT NO.	SHEET NO.
DATE	REVISIONS	(See Title Sheet)	
05/2019	NEW STANDARD	STATE	COUNTY
		TEXAS	TARRANT
		CONT.	SECT.
		0902	90
		JOB	HIGHWAY NO.
		132	CS