FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
PROJECT NO. BR 2021(237), ETC.

SEE SHEET 2
PROJECT LOCATION MAP
AND SHEET 3 FOR
INDEX OF SHEETS

MALLARD RD AT BERRY CREEK / CR244 AT SESSUMS CREEK
BURLESON COUNTY

MALLARD RD: NET LENGTH OF PROJECT: 538.00 FT. = 0.101 MI
CR244: NET LENGTH OF PROJECT: 330.00 FT. = 0.062 MI

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT.
CONSISTING OF REPLACING BRIDGE AND APPROACHES & GRADING.

FINAL PLANS

CONTRACTOR:

LETTING DATE:

DATE CONTRACTOR BEGAN WORK:

DATE WORK WAS COMPLETED:

DATE WORK WAS ACCEPTED:

FINAL CONTRACT COST: $

LOCATION NO.	HIGHWAY	CSJ	LIMITS	ADT	DESIGN SPEED (MPH)	STATION FROM	STATION TO	TOTAL LENGTH (FT)	BRIDGE LENGTH (FT)	ROADWAY LENGTH (FT)
1	MALLARD RD	0917-30-059	MALLARD RD AT BERRY CREEK STR: 17-026-0-AA07-44-101	2020: 180 2040: 180	MEETS OR EXCEEDS EXISTING	41+12.00	46+50.00	538.00	80.00	458.00
2	CR 244	0917-30-060	CR 244 AT SESSUMS CREEK STR: 17-026-0-AA01-85-101	2020: 180 2040: 180	MEETS OR EXCEEDS EXISTING	54+20.00	57+50.00	330.00	70.00	260.00

THESE DOCUMENTS WERE PREPARED BY OR UNDER
THE SUPERVISION OF:

JENNA I. ALCHEVSKY, P.E. — 12/8/2022 DATE

Jacobs
JACOBS ENGINEERING GROUP INC. FIRM #2966
2705 BEE CAVE ROAD, SUITE 300
AUSTIN, TEXAS 78746
(512) 314-3100 FAX (512) 314-3135

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS INCLUDED IN THE CONTRACT, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JUL 05, 2022)

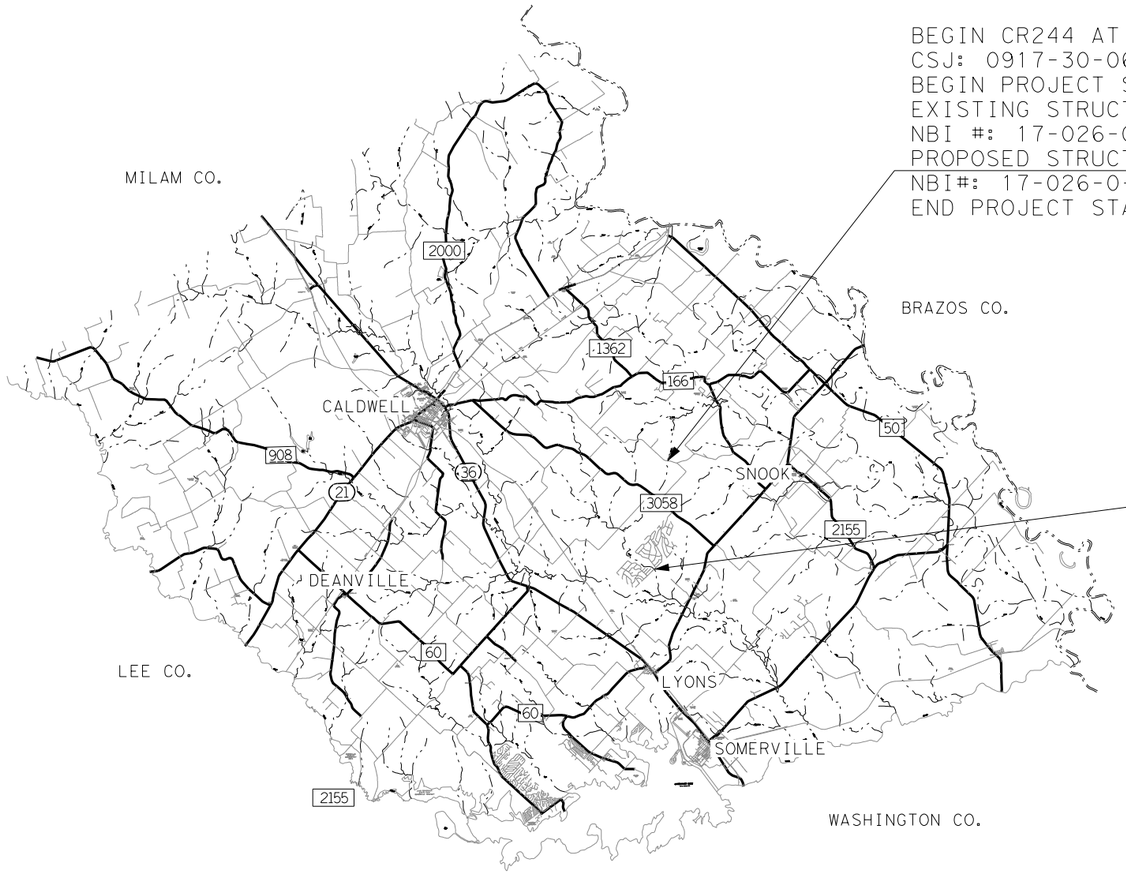
NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

TEXAS DEPARTMENT OF TRANSPORTATION®

SUBMITTED FOR LETTING: 12/8/2022
DocuSigned by: 01EBC5C65E334CE...
BRIDGE ENGINEER

RECOMMENDED FOR LETTING: 12/8/2022
DocuSigned by: DAA3B0824EE3419...
DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

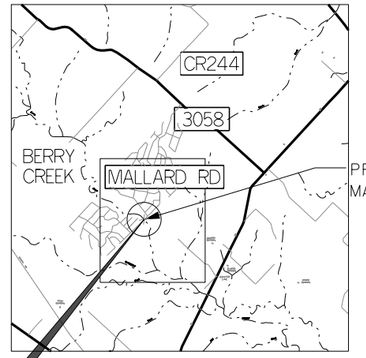
APPROVED FOR LETTING: 12/8/2022
DocuSigned by: 60E5537715D24EA...
DISTRICT ENGINEER



BEGIN CR244 AT SESSUMS CREEK
CSJ: 0917-30-060
BEGIN PROJECT STA. 54+20.00
EXISTING STRUCTURE
NBI #: 17-026-0-AA01-85-001
PROPOSED STRUCTURE
NBI#: 17-026-0-AA01-85-101
END PROJECT STA. 57+50.00

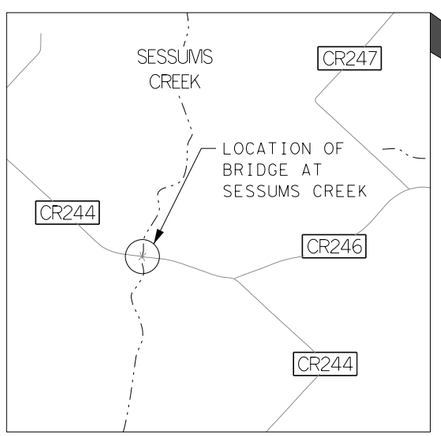
BEGIN MALLARD RD AT BERRY CREEK
CSJ: 0917-30-059
BEGIN PROJECT STA. 41+12.00
EXISTING STRUCTURE
NBI #: 17-026-0-AA01-99-001
PROPOSED STRUCTURE
NBI#: 17-026-0-AA07-44-101
END PROJECT STA. 46+50.00

BURLESON COUNTY
SCALE N.T.S.

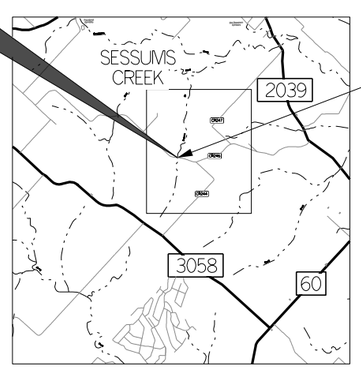


PROJECT LOCATION
MALLARD RD AT BERRY CREEK

BURLESON COUNTY PROJECT
MALLARD RD AT BERRY CREEK
SCALE N.T.S.

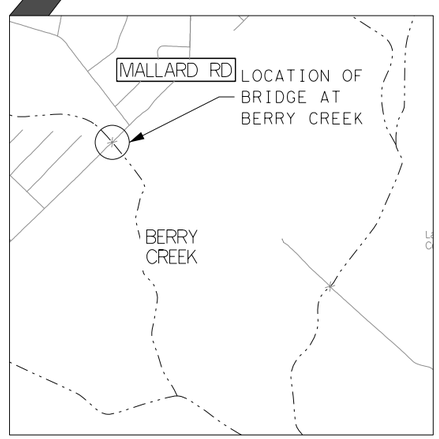


CR 244 AT SESSUMS CREEK
LOCATION DETAIL
SCALE N.T.S.



PROJECT LOCATION
CR 244 AT SESSUMS CREEK

BURLESON COUNTY PROJECT
CR 244 AT SESSUMS CREEK LOCATION
SCALE N.T.S.



MALLARD RD AT BERRY CREEK
LOCATION DETAIL
SCALE N.T.S.

STATE OF TEXAS
JAMIE M. FURNEY
125835
LICENSED
PROFESSIONAL ENGINEER
11/23/2022

Drawings Not To Scale

PRINT DATE	REVISION DATE
11/23/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

PROJECT LOCATION MAP

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 2

...\MALLARD RD_CR244_PROJ LOC MAP_01
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SHEET	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	PROJECT LOCATION MAP
3	INDEX OF SHEETS
4	EXISTING TYPICAL SECTIONS - MALLARD RD
5	PROPOSED TYPICAL SECTIONS - MALLARD RD
6	EXISTING TYPICAL SECTIONS - CR 244
7	PROPOSED TYPICAL SECTIONS - CR 244
8, 8A- 8C	GENERAL NOTES
9 - 9A	ESTIMATE AND QUANTITIES
	QUANTITY SUMMARY SHEETS
10	ROADWAY & TCP SUMMARY
11	SW3P SUMMARY
	TRAFFIC CONTROL PLAN
12	TCP TYPICAL SECTIONS & SEQUENCE OF CONSTRUCTION - MALLARD RD
13	TRAFFIC CONTROL PLAN PHASE 1 - MALLARD RD
14	TRAFFIC CONTROL PLAN PHASE 2 - MALLARD RD
15	TRAFFIC CONTROL PLAN PHASE 3 - MALLARD RD
16	TEMPORARY SHORING PHASE 2 - MALLARD RD
17	ADVANCED WARNING SIGNS - CR 244
18	TRAFFIC CONTROL PLAN & SEQUENCE OF CONSTRUCTION - CR 244
	TRAFFIC CONTROL PLAN STANDARDS
19 - 30	BC(1)-(12)-21*
31	TCP(1-2)-18*
32	TCP(2-8)-18*
33	WZ(RCD)-13*
34 - 35	LPCB-13*
36	TREATMENT FOR VARIOUS EDGE CONDITIONS
	ROADWAY
37 - 39	SURVEY CONTROL - MALLARD RD
40 - 42	SURVEY CONTROL - CR 244
43	HORIZONTAL ALIGNMENT DATA - MALLARD RD
44	HORIZONTAL ALIGNMENT DATA - CR 244
45	PLAN AND PROFILE - MALLARD RD
46	PLAN AND PROFILE - CR 244
47	SIGNS AND OBJECT MARKERS - MALLARD RD
48	SIGNS AND OBJECT MARKERS - CR 244
	ROADWAY STANDARDS
49	GF(31)-19*
50	GF(31)TRTL2-19*
51	MBGF(SR)-19*
52	BED-14*
53	SGT(10S)31-16*
54	SGT(11S)31-18*
55	SGT(12S)31-18*
56	SGT(15)31-20*
57	WF(1)-10*
58 - 60	D&OM(1)-20 TO D&OM(3)-20*
61	D&OM(5)-20*
62	D&OM(VIA)-20*
63	SUMMARY OF SMALL SIGNS
64	SMD(GEN)-08*
65 - 67	SMD(SLIP-1)-08 TO SMD(SLIP-3)-08*
68	RAIL-ADJ(A)-19*
69	RAIL-ADJ(B)-19*

SHEET	DESCRIPTION
	BRIDGE
	MALLARD RD AT BERRY CREEK
70	DRAINAGE AREA MAP
71	HYDRAULIC DATA SHEET
72	SCOUR DATA SHEET
73	BRIDGE LAYOUT
74	CONSTRUCTION PHASING PLAN
75	TEST HOLE DATA
76	ESTIMATED QUANTITIES
77	TOP OF CAP ELEVATIONS
78	ABUTMENT NO. 1 & 3 (PHASE 2)
79	ABUTMENT NO. 1 & 3 (PHASE 3)
80	MISCELLANEOUS ABUTMENT DETAILS
81	BENT NO. 2 (PHASE 2)
82	BENT NO. 2 (PHASE 3)
83	BEAM LAYOUT
84	80.00' PRESTRESSED CONC BOX BEAM UNIT (PHASE 2)
85	80.00' PRESTRESSED CONC BOX BEAM UNIT (PHASE 3)
86	PRESTRESSED CONCRETE BOX BEAM DESIGNS (BBND)
	CR244 AT SESSUMS CREEK
87	DRAINAGE AREA MAP
88	HYDRAULIC DATA SHEET
89	SCOUR DATA SHEET
90	BRIDGE LAYOUT
91	TEST HOLE DATA
92	ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS
	BRIDGE STANDARDS
93	NBI NUMBER LABELS
94 - 96	AIG-24*
97 - 99	BB-B20*
100	BBEB*
101	BBRAS*
102	BIG-24*
103 - 104	CSAB*
105 - 106	FD*
107 - 108	IGD*
109 - 111	IGEB*
112 - 113	IGMS*
114 - 115	IGSD-24*
116	IGSK*
117	IGTS*
118 - 119	MEBR(C)*
120 - 121	PBC-RC*
122 - 125	PCP*
126 - 127	PCP(O)*
128 - 129	PCP(O)-FAB*
130	PCP-FAB*
131 - 132	PMDF*
133 - 134	SIG-24*
135 - 136	SRR*
137 - 139	T223*
140 - 141	T631*
	SW3P
142	STORM WATER POLLUTION PREVENTION PLAN (SW3P) - MALLARD RD
143	STORM WATER POLLUTION PREVENTION PLAN (SW3P) - CR244
144	EPIC - MALLARD RD
145	EPIC - CR244
146	SW3P LAYOUT - MALLARD RD
147	SW3P LAYOUT - CR244
	SW3P STANDARDS
148	EC(1)-16*
149	EC(2)-16*

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

JENNA I. ALCHEVSKY, P.E. 12/8/2022

STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED PROFESSIONAL ENGINEER
12/8/2022

PRINT DATE	REVISION DATE
12/8/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

INDEX OF SHEETS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 3

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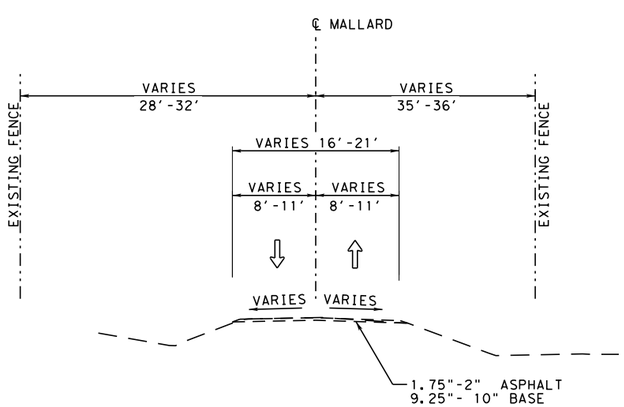
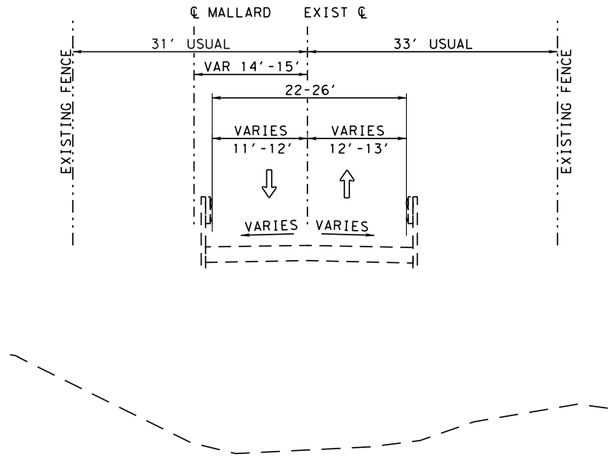


EXISTING MALLARD RD TYPICAL
N.T.S.



EXISTING MALLARD RD (BRIDGE) TYPICAL
STA 43+61.26 TO 43+94.32
N.T.S.

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STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED
PROFESSIONAL ENGINEER
11/23/2022

Drawings Not To Scale

INT DATE	REVISION DATE
11/23/2022	

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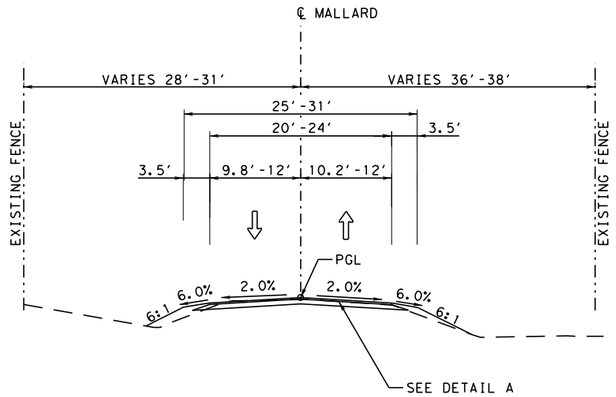
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

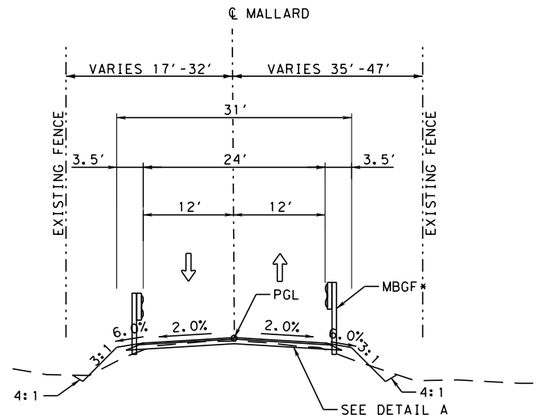
EXISTING TYPICAL SECTIONS MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 4



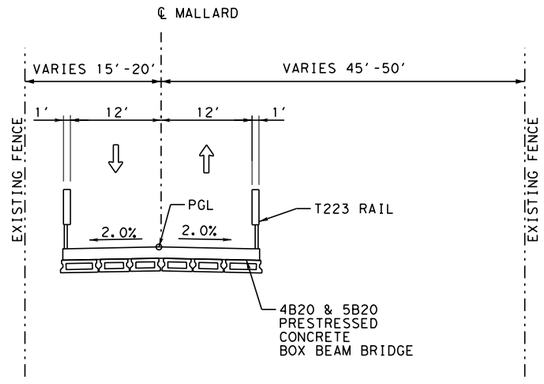
PROPOSED MALLARD RD TYPICAL

STA 41+12.00 TO 41+72.65
STA 45+92.69 TO 46+50.00
N.T.S.



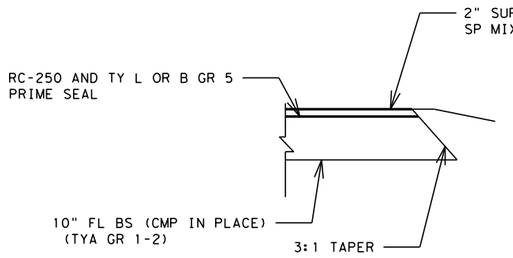
PROPOSED MALLARD RD TYPICAL

STA 41+72.65 TO 43+37.00
STA 44+17.00 TO 45+92.69
*SEE PLAN AND PROFILE SHEET FOR MBGF LIMITS
N.T.S.



PROPOSED MALLARD RD (BRIDGE) TYPICAL

STA 43+37.00 TO 44+17.00
N.T.S.



DETAIL "A"

N.T.S.

JENNA I. ALCHEVSKY
141671
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
11/23/2022

Drawings Not To Scale

PRINT DATE	REVISION DATE
11/23/2022	

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AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

PROPOSED TYPICAL SECTIONS MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 5

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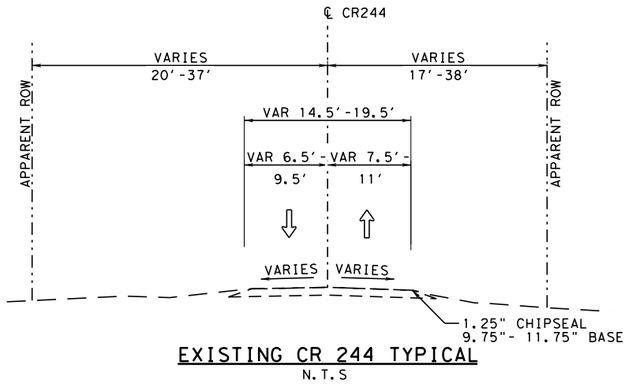
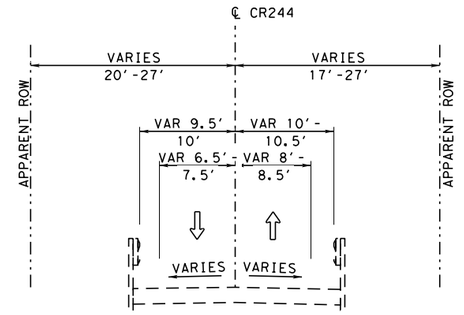


EXISTING CR 244 TYPICAL

N.T.S



EXISTING CR 244 (BRIDGE) TYPICAL

STA 55+72.15 TO 56+01.73

N.T.S.

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STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED
PROFESSIONAL ENGINEER
11/23/2022

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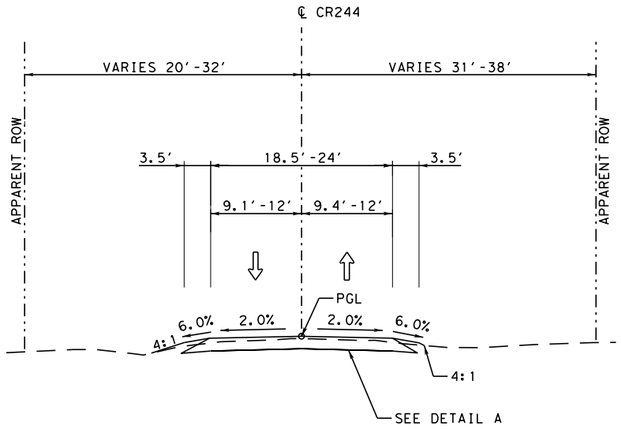
Texas Department of Transportation
Bryan District

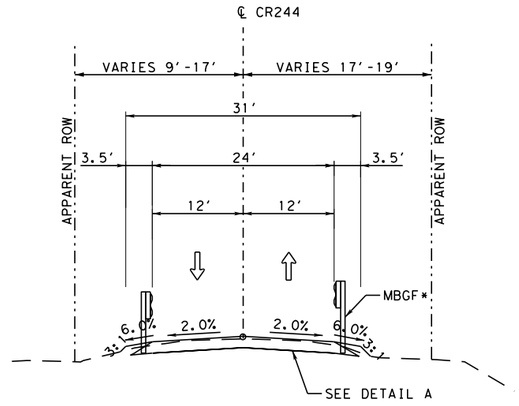
EXISTING TYPICAL SECTIONS CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 6



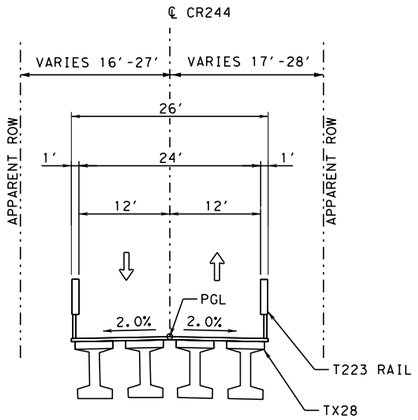
PROPOSED CR 244 TYPICAL

STA 54+20.00 TO 55+00.00
STA 56+70.00 TO 57+50.00
N.T.S.



PROPOSED CR 244 TYPICAL

STA 55+00.00 TO 55+50.00
STA 56+20.00 TO 56+70.00
*SEE PLAN AND PROFILE SHEET FOR MBGF LIMITS
N.T.S.



PROPOSED CR 244(BRIDGE) TYPICAL

STA 55+50.00 TO 56+20.00
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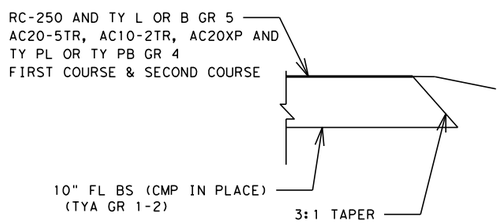

DETAIL "A"

N.T.S.

STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED
PROFESSIONAL ENGINEER

11/23/2022

Drawings Not To Scale

PRINT DATE	REVISION DATE
11/23/2022	

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AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

PROPOSED TYPICAL SECTIONS CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR

STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON

CONTROL	SECTION	JOB	SHEET NO.
0917	30	059, ETC.	7

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BASIS OF ESTIMATE (CSJ 0917-30-059)					
ITEM	**DESCRIPTION**	**COURSE**	**RATE**	**AMOUNT**	**QUANTITY**
168	Vegetative Watering		10 GAL/SY	2084 SY	21 MG
316	ASPH (RC-250)	PRIME SEAL	0.25 GAL/SY	1238 SY	310 GAL
316	AGGR (TY-B GR-5 OR TY-L GR-5)	PRIME SEAL	1 CY/135SY	1238 SY	9 CY
3077	SP MIXES SP-C PG64-22	HOT MIX	220 LB/SY	1186 SY	130 TON

BASIS OF ESTIMATE (CSJ 0917-30-060)					
ITEM	**DESCRIPTION**	**COURSE**	**RATE**	**AMOUNT**	**QUANTITY**
168	Vegetative Watering		10 GAL/SY	974 SY	9.7 MG
316	ASPH (RC-250)	1ST COURSE	0.25 GAL/SY	648 SY	162 GAL
316	AGGR (TY-B GR-5 OR TY-L GR-5)	1ST COURSE	1 CY/135SY	648 SY	5 CY
316	ASPH (AC-20-5TR)	2ND COURSE	0.38 GAL/SY	648 SY	246 GAL
316	(TY-PB GR-4 OR TY-PL GR-4 SAC-A)	2ND COURSE	1 CY/125 SY	648 SY	5 CY

BASIS OF ESTIMATE (CSJ 0917-30-059) * for contractor's information only					
ITEM	**DESCRIPTION**	**COURSE**	**RATE**	**AMOUNT**	**QUANTITY**
166*	FERTILIZER **		60 LBS/AC	2084 SY	0.013 TON

Note: Rates are for estimating purposes only. Actual Rates will be determined in the field.
** Tonnage represents Nitrogen content only.

BASIS OF ESTIMATE (CSJ 0917-30-060) * for contractor's information only					
ITEM	**DESCRIPTION**	**COURSE**	**RATE**	**AMOUNT**	**QUANTITY**
166*	FERTILIZER **		60 LBS/AC	974 SY	0.006 TON

Note: Rates are for estimating purposes only. Actual Rates will be determined in the field.
** Tonnage represents Nitrogen content only.

GENERAL:

Contractor questions on this project are to be addressed to the following individuals:
James Kreamer, P.E., A.E., James.Kreamer@txdot.gov
Ross McCall, P.E., A.A.E., John.McCall@txdot.gov

Project Number: See Title Sheet **Sheet:** 8
Highway: CR **Control:** 0917-30-059, Etc.
County: Burleson

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

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

For non-bridge items, send eligible shop plan submittals with PDF attachments directly to the reviewing office. Submit bridge, retaining wall, and structural item shop drawings following the directions described at
http://www.txdot.gov/business/resources/specifications/shop-drawings.html

ITEM 5 "CONTROL OF THE WORK"

Prior to letting, earthwork construction cross-section data is available at the Area Engineer's office in ***Brenham*** for inspection by prospective bidders. In addition, bidders may request electronic earthwork construction cross-section data by sending an email to:
James.Kreamer@txdot.gov or John.McCall@txdot.gov

Earthwork files will be provided by email or by using TxDOT's Dropbox FTP Service. These cross-sections are for non-construction purposes only, and it is the responsibility of the prospective bidder to validate the data for this project.

After letting, the Engineer will provide final earthwork construction cross-section data necessary for the contractor to establish and control the work.

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 "BUY AMERICA"

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

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

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

ITEM 7 "LEGAL RELATIONS AND RESPONSIBILITIES"

In the event of the declaration of a hurricane watch, warning, other severe weather warning or national or state emergency that requires the roadways in the vicinity be used as evacuation routes, cease all work that requires the Contractor's, sub-contractors' or material suppliers' vehicles to enter the stream of traffic on these primary or secondary evacuation routes. This work includes material hauling and delivery, and mobilization or demobilization of equipment.

The following roadways are recognized evacuation routes in the Bryan District:

Primary Evacuation Routes: IH 45, US 290, SH 6, SH 36.

Secondary Evacuation Routes: US 79, US 84, SH 7, SH 30, SH 21, SH 105.

Other routes may be designated.

- No significant traffic generator events identified.

ITEM 8 "PROSECUTION AND PROGRESS"

By noon of each Wednesday, provide the Engineer a written outline of the daily work schedule for the following week. Include in the outline the times and places for proposed traffic control changes, lane and shoulder closures, and moving operations or other operations that affect traffic on the roadway. Unless otherwise authorized by the Engineer, prosecute the work on this project in accordance with the following sequence of work:

Mallard Rd:
1) Place advanced signing and barricades. Set up detour and place SW3P devices.
2) Prepare right of way, remove existing fence and install temporary fencing along temporary construction easement. Construct temporary roadway, Phase 1 of bridge and metal beam guard fence per TCP.
3) Switch traffic to the temporary and permanent pavement constructed in Phase 1 per TCP.
4) Demolish existing bridge and remove stabilized base. Construct Phase 2 of bridge, full depth reconstruct proposed roadway and metal beam guard fence per TCP. Remove Temporary rail and repair deck.

Project Number: See Title Sheet **Sheet:** 8A
Highway: CR **Control:** 0917-30-059, Etc
County: Burleson

5) Remove temporary fencing, construct permanent fencing, grade channel, and construct riprap. Place permanent signs, and object markers. Remove temporary SW3P devices and install permanent SW3P components. Stabilize disturbed soil (permanent).
6) Final cleanup.

CR 244:
1) Place advanced signing and barricades. Set up detour and place SW3P devices.
2) Close roadway then demolish existing bridge and remove stabilized base. Construct new bridge and full depth reconstruct proposed roadway. Return right of way to previous conditions.
3) Construct metal beam guard fence, grade channel, and construct riprap. Place permanent signs, and object markers. Remove temporary SW3P devices and install permanent SW3P components. Stabilize disturbed soil (permanent).
4) Final cleanup.

Some of these operations may be performed simultaneously.

Prepare Progress Schedule Bar Chart.

Equipment and material may be pre-staged at approved locations.

The 90-day delayed start allowed after authorization under SP008-003 is for Contractor time for material acquisition.

ITEM 100 "PREPARING RIGHT OF WAY"

During burn bans obtain written approval from the Commissioners Court prior to burning brush.

Prevent ashes from burned vegetation to be transported into any stream.

If burning is not allowed, all trees and brush will be disposed of by shredding, logging or other methods approved by the Engineer. Create a windrow, stockpile, or topdress biomass on disturbed areas along the project at locations approved by necessary permits and the Engineer.

ITEM 132 "EMBANKMENT"

Provide Embankment material for areas within the limits of the Pavement Structure that meet one of the following requirements:

- Sources outside the ROW provide material with a plasticity index between 10 and 25 and with less than 25% silt.
- Sources within the ROW provide material with a plasticity index between 10 and 25 and with less than 25% silt.

Provide Embankment material for areas outside the limits of the Pavement Structure with a plasticity index between 10 and 35.

ITEM 160 "TOPSOIL"

All slopes requiring topsoil will be tracked immediately upon final grading to prevent erosion per standard sheet EC(1)-16. Tracking slopes to prevent erosion will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Topsoil may be obtained from the right of way at sites of proposed excavation and embankment.

ITEM 166 "FERTILIZER"

Fertilize all areas of project that are being seeded or sodded.

ITEM 168 "VEGETATIVE WATERING"

Vegetative watering is required for all areas of the project that are being seeded or sodded.

ITEM 247 "FLEXIBLE BASE"

Place flexible base in equal lifts of 4 to 8 in. in depth unless otherwise approved by the Engineer. Use ordinary compaction.

ITEM 316 "SEAL COAT"

When placing surface treatment on base material, prepare surface by sweeping or other approved methods. Before applying bituminous material, lightly sprinkle the surface with water. When directed, sweep the surface after sprinkling with water. Do not apply bituminous material when water is puddling on the surface.

Sweep excess aggregate no sooner than 2 hours after rolling or as directed.

Vehicles used to haul aggregate from the stockpile to the chip spreader will not be overloaded. Any damage to the roadway caused by the vehicles will be repaired by the Contractor at his expense and subsequent loads will be reduced so as not to cause further damage.

Transverse variance rates shall be used as directed. The nozzles outside the wheel paths will output up to 20% more asphalt by volume than the nozzles over the wheel paths.

Project Number: See Title Sheet **Sheet:** 8B
Highway: CR **Control:** 0917-30-059, Etc
County: Burleson

The Contractor may be required to furnish and set string line to insure straight and uniform alignment as directed by the Engineer. The Contractor may use other methods subject to approval of the Engineer.

Air and surface temperature for asphalt material application will be in accordance with the specification and the manufacturer's recommendation. However, the engineer may limit the use of an asphalt material due to the time of year.

ITEM 416 "DRILLED SHAFT FOUNDATIONS"

Stake foundation locations and have them approved by the Engineer before installation.

ITEM 454 "BRIDGE EXPANSION JOINTS"

The list of approved Header Type Expansion Joints can be found at:

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

ITEM 496 "REMOVING STRUCTURES"

Notify the Engineer of the exact date of bridge removal at least twenty (20) working days prior to the removal of the existing structure to allow for compliance with the Texas Department of State Health Services requirements for structural demolition. Bridge removal will not be allowed to take place until this notice is given.

Store the following items to be salvaged at a location designated by the Engineer: All steel material including piles, caps, stringers, and floor beams.

ITEM 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING"

Removal of ground mounted temporary signs and supports as specified on standard sheet BC(5), shall include the immediate backfilling of support holes with Type B embankment material and the compaction of the backfill material.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

ITEM 540 "METAL BEAM GUARD FENCE"

Furnish and Install only one type of timber post.

ITEM 544 "GUARDRAIL END TREATMENTS"

Furnish and install only MASH compliant guardrail end treatments.

ITEM 644 "SMALL ROADSIDE SIGN ASSEMBLIES"

Salvage and deliver all aluminum sign faces to the local TxDOT maintenance office.

Project Number: See Title Sheet **Sheet:** 8C
Highway: CR **Control:** 0917-30-059, Etc.
County: Burleson

ITEM 3077 "SUPERPAVE MIXTURES"

Hamburg Wheel Test Requirements			
High-Temperature Binder Grade	**Test Method**	**Laboratory Mixture Design or Trial Batch**	**Production and Placement Test[1]**
		Minimum # of Passes @ 0.5" Rut Depth, Tested @122°F	**Minimum # of Passes @ 0.5" Rut Depth, Tested @122°F**
PG 64 or lower	Tex-242-F	7,000	7,000

[1]. The Engineer may accept if no more than 1of the 5 most recent Hamburg Wheel tests is below the specified number of passes and the failing test is no more than 2,000 passes below the specified number of passes.

Add one (1.0) percent hydrated lime, commercial lime slurry, or an equivalent anti-stripping agent, based on the total aggregate weight, as mix enhancer for all mixture types unless otherwise approved by the Engineer. Provide hydrated lime or commercial lime slurry in accordance with DMS-6350, "Lime and Lime Slurry". Add hydrated lime, commercial lime slurry, or an equivalent anti-stripping agent in accordance with Section 301.4.2.

Project Number: See Title Sheet **Sheet:** 8C
Highway: CR **Control:** 0917-30-059, Etc.
County: Burleson

Apply tack coat through a distributor spray bar in accordance with Section 316.3.1. Distributor. If residual from emulsion tack is not tacky, then the Engineer can require the use of PG binder.

RAS is not permitted in thin level-up courses.

ITEM 6001 "PORTABLE CHANGEABLE MESSAGE SIGN"

Furnish, install, and operate up to two (2) Portable Changeable Message Signs (PCMS) for this project. The signs can be used both on the project and within a ten (10) mile radius of the project. Locations, messages, and durations of use will be specified by the Engineer. The primary uses will be to inform the public of special events, lane and road closures, and changes in traffic control. Signs will be paid for only when used as directed by the Engineer.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0917-30-059 **DISTRICT** Bryan **COUNTY** Burleson
HIGHWAY CR 344, CR 744

			CONTROL SECTION JOB		**0917-30-059**		**0917-30-060**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00124549**		**A00124548**			
			COUNTY		**Burleson**		**Burleson**			
			HIGHWAY		**CR 744**		**CR 344**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW		STA	5.400		3.300		8.700	
	100-6007	PREP ROW (TREE)(GREATER THAN 24" DIA)		EA			1.000		1.000	
	100-6009	PREPARING ROW (TREE) (6" TO 24" DIA)		EA			1.000		1.000	
	110-6001	EXCAVATION (ROADWAY)		CY	409.000		90.000		499.000	
	110-6002	EXCAVATION (CHANNEL)		CY	470.000		371.000		841.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)		CY	98.000		93.000		191.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")		SY	2,084.000		974.000		3,058.000	
	164-6023	CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)		SY	2,084.000		974.000		3,058.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)		SY	1,042.000		487.000		1,529.000	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)		SY	1,042.000		487.000		1,529.000	
	168-6001	VEGETATIVE WATERING		MG	21.000		9.700		30.700	
	247-6231	FL BS (CMP IN PLACE)(TY A GR 1-2)(10")		SY	1,465.000		715.000		2,180.000	
	316-6017	ASPH (AC-20-5TR)		GAL			246.000		246.000	
	316-6029	ASPH (RC-250)		GAL	310.000		162.000		472.000	
	316-6403	AGGR (TY-B GR-5 OR TY-L GR-5)		CY	9.000		5.000		14.000	
	316-6404	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC-A)		CY			5.000		5.000	
	400-6005	CEM STABIL BKFL		CY	61.000		60.000		121.000	
	403-6001	TEMPORARY SPL SHORING		SF	698.000				698.000	
	416-6003	DRILL SHAFT (30 IN)		LF	400.000				400.000	
	416-6004	DRILL SHAFT (36 IN)		LF			156.000		156.000	
	420-6013	CL C CONC (ABUT)		CY	26.800		32.800		59.600	
	420-6029	CL C CONC (CAP)		CY	8.800				8.800	
	420-6037	CL C CONC (COLUMN)		CY	5.000				5.000	
	422-6001	REINF CONC SLAB		SF			1,820.000		1,820.000	
	422-6005	REINF CONC SLAB (BOX BEAM)		SF	2,093.000				2,093.000	
	422-6023	SHEAR KEY		CY	10.600				10.600	
	425-6001	PRESTR CONC BOX BEAM (4B20)		LF	316.020				316.020	
	425-6002	PRESTR CONC BOX BEAM (5B20)		LF	158.000				158.000	
	425-6035	PRESTR CONC GIRDER (TX28)		LF			278.000		278.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)		CY	322.000		276.000		598.000	
	450-6006	RAIL (TY T223)		LF	192.000		172.000		364.000	
	450-6018	RAIL (TY T631)		LF	80.000				80.000	
	454-6021	TYPE A JOINT		LF	53.000		52.000		105.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)		EA	1.000		1.000		2.000	
	496-6043	REMOV STR (SMALL FENCE)		LF	116.000		216.000		332.000	
	496-6099	REMOVE STR (RAIL)		LF	80.000				80.000	
	500-6001	MOBILIZATION		LS	1.000				1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0917-30-059 **DISTRICT** Bryan **COUNTY** Burleson
HIGHWAY CR 344, CR 744

				0917-30-059		0917-30-060		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB							
		PROJECT ID		**A00124549**		**A00124548**			
		COUNTY		**Burleson**		**Burleson**			
		HIGHWAY		**CR 744**		**CR 344**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		4.000		16.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	92.000		50.000		142.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	92.000		50.000		142.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,126.000		544.000		1,670.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,126.000		544.000		1,670.000	
	508-6001	CONSTRUCTING DETOURS	SY	284.000				284.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	10.000				10.000	
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	60.000				60.000	
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	40.000				40.000	
	512-6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	60.000				60.000	
	512-6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	40.000				40.000	
	530-6014	DRIVEWAYS AND TURNOUTS (ACP)	SY			29.000		29.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	100.000		100.000		200.000	
	540-6007	MTL BEAM GD FEN TRANS (TL2)	EA	4.000		4.000		8.000	
	540-6014	SHORT RADIUS	LF			25.000		25.000	
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA			1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		3.000		7.000	
	552-6001	WIRE FENCE (TY A)	LF	113.000		134.000		247.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	6.000		2.000		8.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	2.000		3.000		5.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	4.000		3.000		7.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	4.000		4.000		8.000	
	3077-6011	SP MIXESSP-CPG64-22	TON	130.000				130.000	
	4171-6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	2.000		2.000		4.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY			14.000		14.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000				1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000				1.000	

SUMMARY OF ROADWAY ITEMS																	
								PRIME SEAL/ 1ST COURSE		2ND COURSE							
LOCATION	100 6002	100 6009	100 6007	110 6001	110 6002	132 6006	247 6231	316 6029*	316 6403*	316 6017*	316 6404*	496 6009	496 6043	530 6014	540 6001	540 6007	540 6014
	PREPARING ROW	PREPARING ROW (TREE) (6" TO 24" DIA)	PREP ROW (TREE) (GREATER THAN 24" DIA)	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	FL BS (CMP IN PLACE) (TY A GR 1-2) (10")	ASPH (RC-250)	AGGR (TY-B GR-5 OR TY-L GR-5)	ASPH (AC-20-5TR)	(TY-PB GR-4 OR TY-PL GR-4 SAC-A)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOVE STR (SMALL FENCE)	DRIVEWAYS (ACP)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (TL2)	SHORT RADIUS
	STA	EA	EA	CY	CY	CY	SY	AREA (SY)	AREA (SY)	AREA (SY)	AREA (SY)	EA	LF	SY	LF	EA	LF
0917-30-059	5.4			409	470	98	1465	1238	1238			1	116		100	4	
0917-30-060	3.3	1	1	90	371	93	715	648	648	648	648	1	216	29	100	4	25
PROJECT TOTALS	8.7	1	1	499	841	191	2180	1886	1886	648	648	2	332	29	200	8	25

*CONTRACTOR INFO ONLY. SEE BASIS OF ESTIMATE FOR RATES.

SUMMARY OF ROADWAY ITEMS								
LOCATION	540 6015	544 6001	552 6001	644 6004	644 6076	658 6014	658 6062	3077 6011
	DRIVEWAY TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY A)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	SP MIXES SP-C PG64-22*
	EA	EA	LF	EA	EA	EA	EA	AREA (SY)
0917-30-059		4	113	6	2	4	4	1186
0917-30-060	1	3	134	2	3	3	4	
PROJECT TOTALS	1	7	247	8	5	7	8	1186

SUMMARY OF TRAFFIC CONTROL ITEMS												
LOCATION		403 6001	450 6018	496 6099	502 6001	508 6001	512 6009	512 6010	512 6057	512 6058	6001 6001	510 6003
		TEMPORARY SPL SHORING	RAIL (TY T631)	REMOV STR (RAIL)	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	PORT CTB (FUR & INST) (LOW PROF) (TY 1)	PORT CTB (FUR & INST) (LOW PROF) (TY 2)	PORT CTB (REMOVE) (LOW PROF) (TY 1)	PORT CTB (REMOVE) (LOW PROF) (TY 2)	PORTABLE CHANGEABLE MESSAGE SIGN	ONE-WAY TRAFFIC CONTROL (PORT TRAF SIG)
		SF	LF	LF	MO	SY	LF	LF	LF	LF	DAY	MO
0917-30-059	PHASE 1				2	284						
	PHASE 2	698	80		5		60	40				5
	PHASE 3			80	5				60	40		5
0917-30-060					4						14	
PROJECT TOTALS		698	80	80	16	284	60	40	60	40	14	10

PRINT DATE	REVISION DATE
12/8/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

ROADWAY & TCP SUMMARY

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 10

SUMMARY OF SW3P ITEMS										
	160 6003	164 6023	164 6029	164 6031	* 168 6001	506 6002	506 6003	506 6011	506 6038	506 6039
	FURNISHING AND PLACING TOPSOIL (4")	CELL FBR MLCHSEED (PERM) (RURAL)	CELL FBR MLCHSEED (TEMP) (WARM)	CELL FBR MLCH SEED (TEMP)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
LOCATION	SY	SY	SY	SY	SY	LF	LF	LF	LF	LF
0917-30-059	2084	2084	1042	1042	2084	92	0	92	1126	1126
0917-30-060	974	974	487	487	974	50	0	50	544	544
PROJECT TOTALS	3058	3058	1529	1529	3058	142	0	142	1670	1670

* FOR CONTRACTOR USE ONLY, SEE BASIS OF ESTIMATE FOR RATE

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

SW3P SUMMARY

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 11

...\SUM\Mallard_CR244_ SW3P SUMM
11/22/2022 4:33:02 PM

SEQUENCE OF CONSTRUCTION

GENERAL
MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES. TEMPORARY DRAINAGE SHALL BE CONSIDERED SUBSIDIARY TO THE OTHER BID ITEMS.

EXISTING SIGNS THAT CONFLICT WITH THE TEMPORARY TRAFFIC CONTROL PLAN SHALL BE REMOVED OR COVERED AS DIRECTED.

LOCAL ACCESS SHALL BE MAINTAINED AT ALL TIMES TO ALL EXISTING ROADS, CROSS STREETS AND DRIVEWAYS.

SHORT TERM TRAFFIC CONTROL OPERATIONS FOR PLACEMENT OF CHANNELIZING DEVICES SHALL BE AS DETAILED IN THE TCP STANDARD DRAWINGS OR AS DIRECTED BY THE ENGINEER.

PHASE 1

INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH TxDOT STANDARD BC(2)-21.

CONSTRUCT TEMPORARY PAVEMENT PER TCP. TRAFFIC SHALL REMAIN IN EXISTING CONFIGURATION.

PHASE 2

MAINTAIN ADVANCED WARNING SIGNS IN ACCORDANCE WITH STANDARD BC(2)-21.

CLOSE EXISTING SB LANE. SHIFT TRAFFIC ONTO EXISTING NB PAVEMENT AND PREVIOUSLY CONSTRUCTED TEMPORARY PAVEMENT USING ONE LANE TWO-WAY TRAFFIC CONTROL WITH TEMPORARY TRAFFIC SIGNAL BASED ON TCP (2-8B)-18. INSTALL LPCB IN ACCORDANCE WITH STANDARDS BC(8)-21 & BC(9)-21.

CONSTRUCT SB PERMANENT PAVEMENT AND PROPOSED BRIDGE PER TCP. UTILIZE TEMPORARY SPECIAL SHORING AS INDICATED IN THE PLANS OR AS DIRECTED ALONG INSIDE PAVEMENT CONSTRUCTION EDGE.

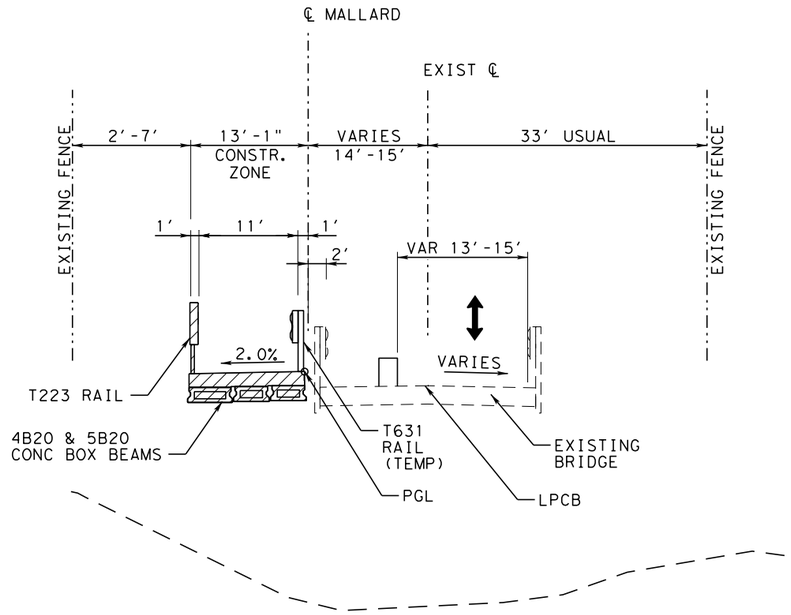
PHASE 3

MAINTAIN ADVANCED WARNING SIGNS IN ACCORDANCE WITH STANDARD BC(2)-21.

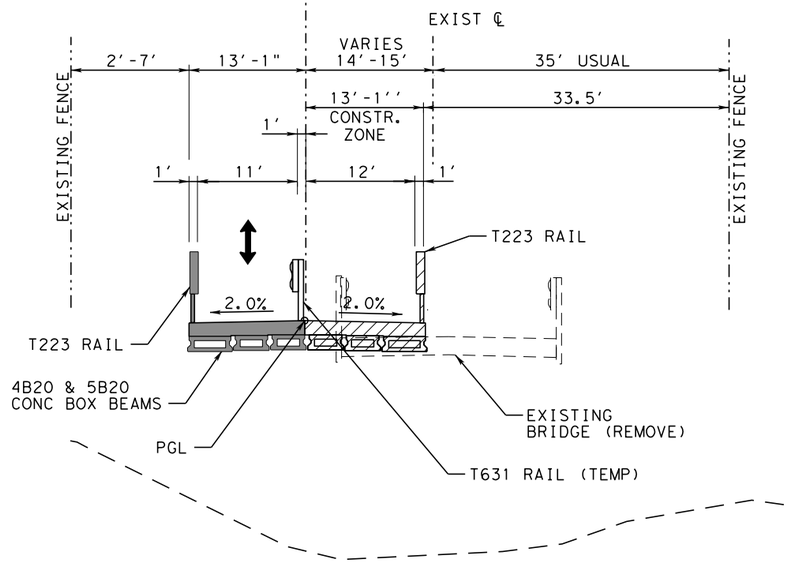
DIVERT TRAFFIC ONTO PREVIOUSLY CONSTRUCTED SB PAVEMENT PER TCP, USING ONE LANE TWO -WAY TRAFFIC CONTROL WITH TEMPORARY TRAFFIC SIGNAL BASED ON TCP (2-8B)-18. INSTALL CHANNELIZING DEVICES IN ACCORDANCE WITH STANDARDS BC(8)-21 & BC(9)-21, AND REFER TO STANDARD TCP (2-8)-18 FOR CONTROL WITH TEMPORARY TRAFFIC SIGNAL.

REMOVE EXISTING BRIDGE AND CONSTRUCT NB PERMANENT PAVEMENT AND PROPOSED BRIDGE PER TCP.

REMOVE TEMPORARY TY T631 RAIL, REMOVE ALL ADVANCE TRAFFIC CONTROL DEVICES AND LPCB, INSTALL PERMANENT SIGNS AND OBJECT MARKERS, AND OPEN UP TO TRAFFIC.



MALLARD RD (BRIDGE) TYPICAL SECTION PHASE 2
STA 43+37.00 TO 44+17.00
N.T.S.



MALLARD RD (BRIDGE) TYPICAL SECTION PHASE 3
STA 43+37.00 TO 44+17.00
N.T.S.

NOTES:

1. SEE BRIDGE CONSTRUCTION PHASING PLAN FOR MORE INFORMATION

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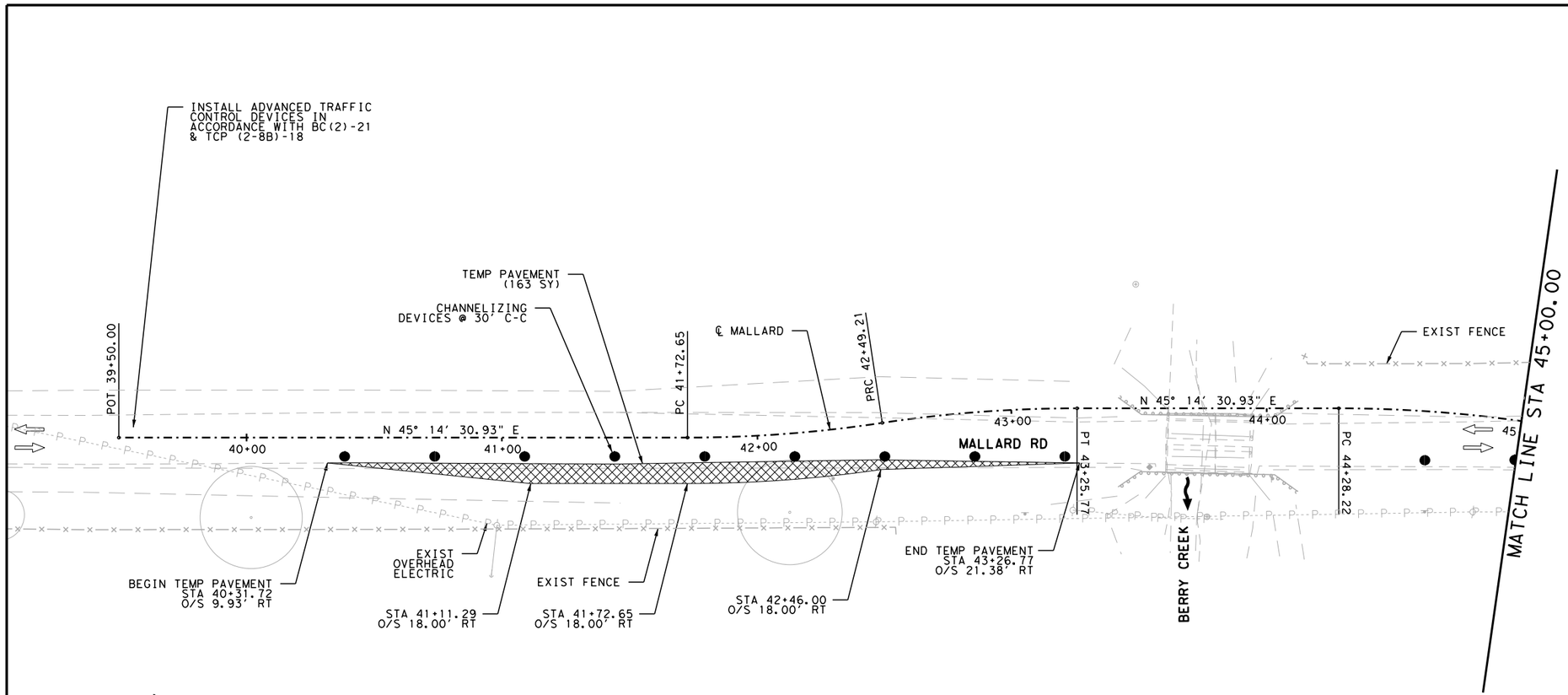
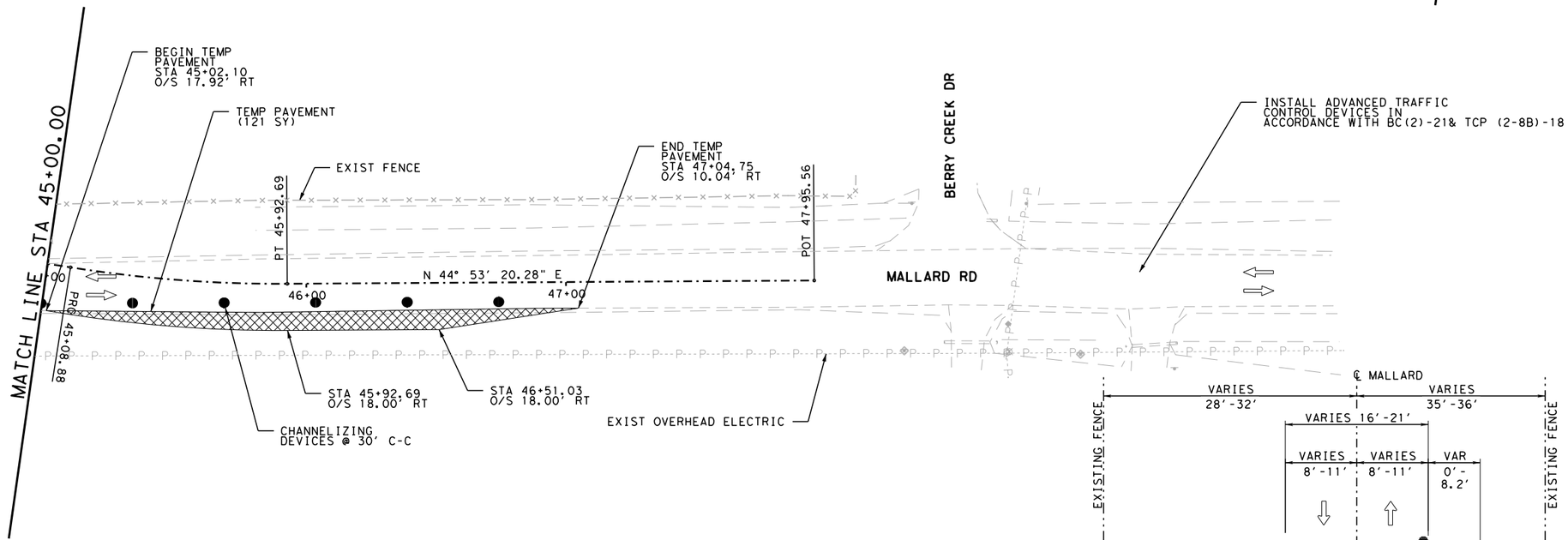
TCP TYPICAL SECTIONS & SEQUENCE OF CONSTRUCTION MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 12





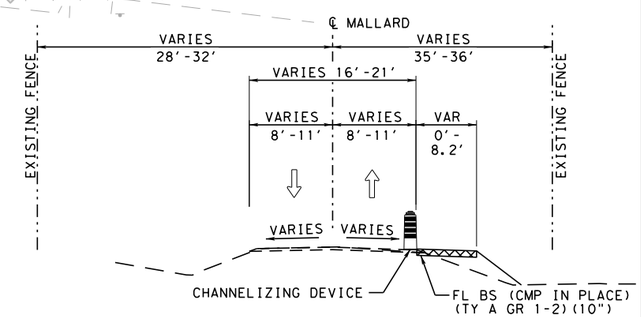
HORIZONTAL
0 25 50

LEGEND

- TEMPORARY TRAFFIC SIGNAL
- CHANNELIZING DEVICES
- TY II OR TY III BARRICADE
- AREA UNDER CONSTRUCTION
- TEMPORARY PAVEMENT
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT REMOVAL
- TRAFFIC FLOW
- DIRECTION OF CREEK FLOW

NOTES:

1. LOCAL ACCESS SHALL BE MAINTAINED FOR THE EXISTING COUNTY ROADS, CROSS STREETS, AND DRIVEWAYS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DRAINAGE AT ALL TIMES, TO BE SUBSIDIARY TO OTHER BID ITEMS.
3. INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARD BC(2)-21.
4. UTILIZE CHANNELIZING DEVICES TO CLOSE DRIVEWAYS UNDER CONSTRUCTION, WHEN ALTERNATE ACCESS IS PROVIDED.
5. SPACE CHANNELIZING DEVICES IN ACCORDANCE WITH TXDOT STANDARD BC(9)-21.



TYPICAL SECTION PHASE 1
N.T.S.

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TRAFFIC CONTROL PLAN PHASE 1 MALLARD RD

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6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 13

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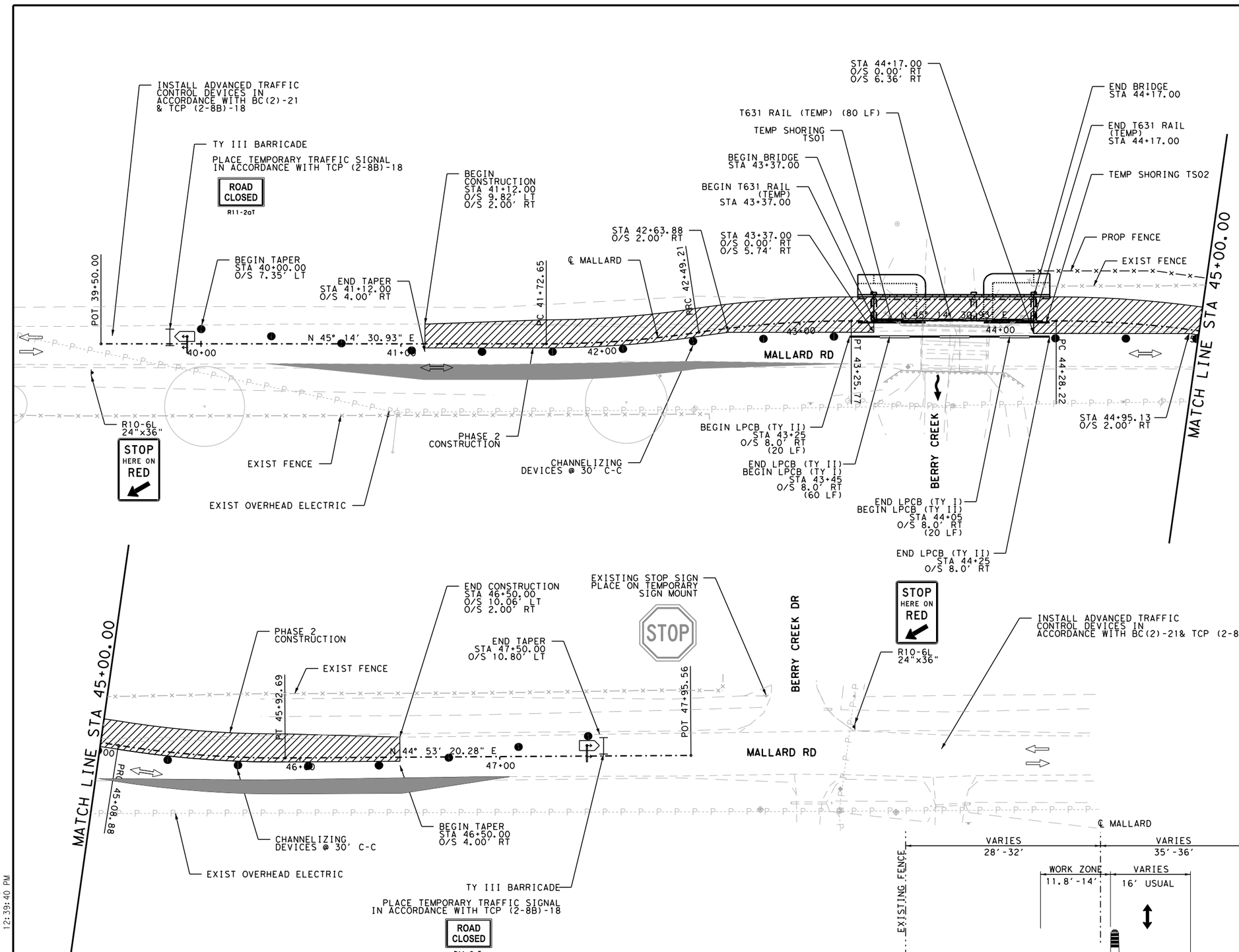

HORIZONTAL
0 25 50

LEGEND

- TEMPORARY TRAFFIC SIGNAL
- CHANNELIZING DEVICES
- TY II OR TY III BARRICADE
- AREA UNDER CONSTRUCTION
- TEMPORARY PAVEMENT
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT REMOVAL
- TRAFFIC FLOW
- DIRECTION OF CREEK FLOW

NOTES:

1. LOCAL ACCESS SHALL BE MAINTAINED FOR THE EXISTING COUNTY ROADS, CROSS STREETS, AND DRIVEWAYS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DRAINAGE AT ALL TIMES, TO BE SUBSIDIARY TO OTHER BID ITEMS.
3. INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARD BC(2)-21.
4. UTILIZE CHANNELIZING DEVICES TO CLOSE DRIVEWAYS UNDER CONSTRUCTION, WHEN ALTERNATE ACCESS IS PROVIDED.
5. SPACE CHANNELIZING DEVICES IN ACCORDANCE WITH TXDOT STANDARD BC(9)-21.
6. SEE TEMPORARY SHORING SHEET FOR ADDITIONAL INFORMATION.

TYPICAL SECTION PHASE 2
N.T.S.

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TRAFFIC CONTROL PLAN PHASE 2 MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 14

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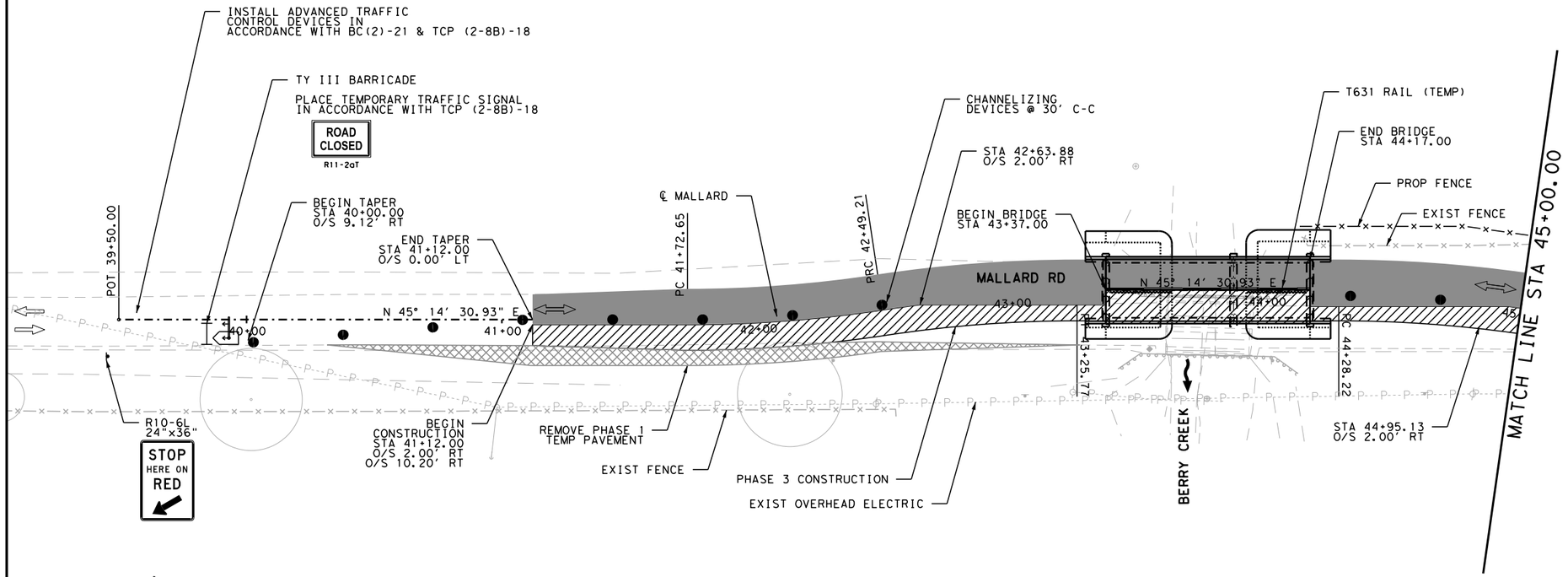

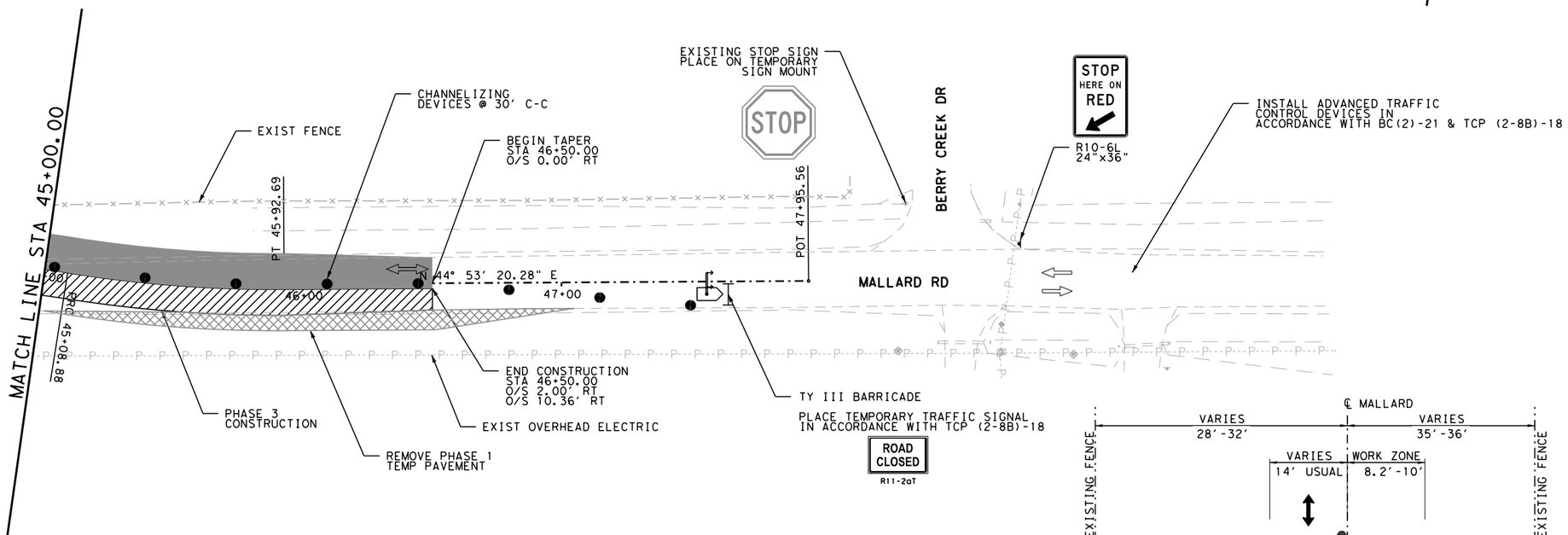

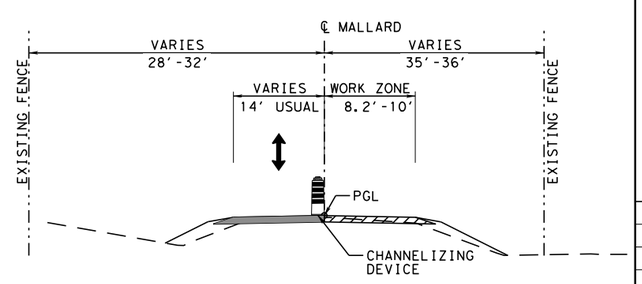

TYPICAL SECTION PHASE 3
N.T.S.

LEGEND

- TEMPORARY TRAFFIC SIGNAL
- CHANNELIZING DEVICES
- TY II OR TY III BARRICADE
- AREA UNDER CONSTRUCTION
- TEMPORARY PAVEMENT
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT REMOVAL
- TRAFFIC FLOW
- DIRECTION OF CREEK FLOW

NOTES:

1. LOCAL ACCESS SHALL BE MAINTAINED FOR THE EXISTING COUNTY ROADS, CROSS STREETS, AND DRIVEWAYS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DRAINAGE AT ALL TIMES, TO BE SUBSIDIARY TO OTHER BID ITEMS.
3. INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARD BC(2)-21.
4. UTILIZE CHANNELIZING DEVICES TO CLOSE DRIVEWAYS UNDER CONSTRUCTION, WHEN ALTERNATE ACCESS IS PROVIDED.
5. SPACE CHANNELIZING DEVICES IN ACCORDANCE WITH TXDOT STANDARD BC(9)-21.

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TRAFFIC CONTROL PLAN PHASE 3 MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 15

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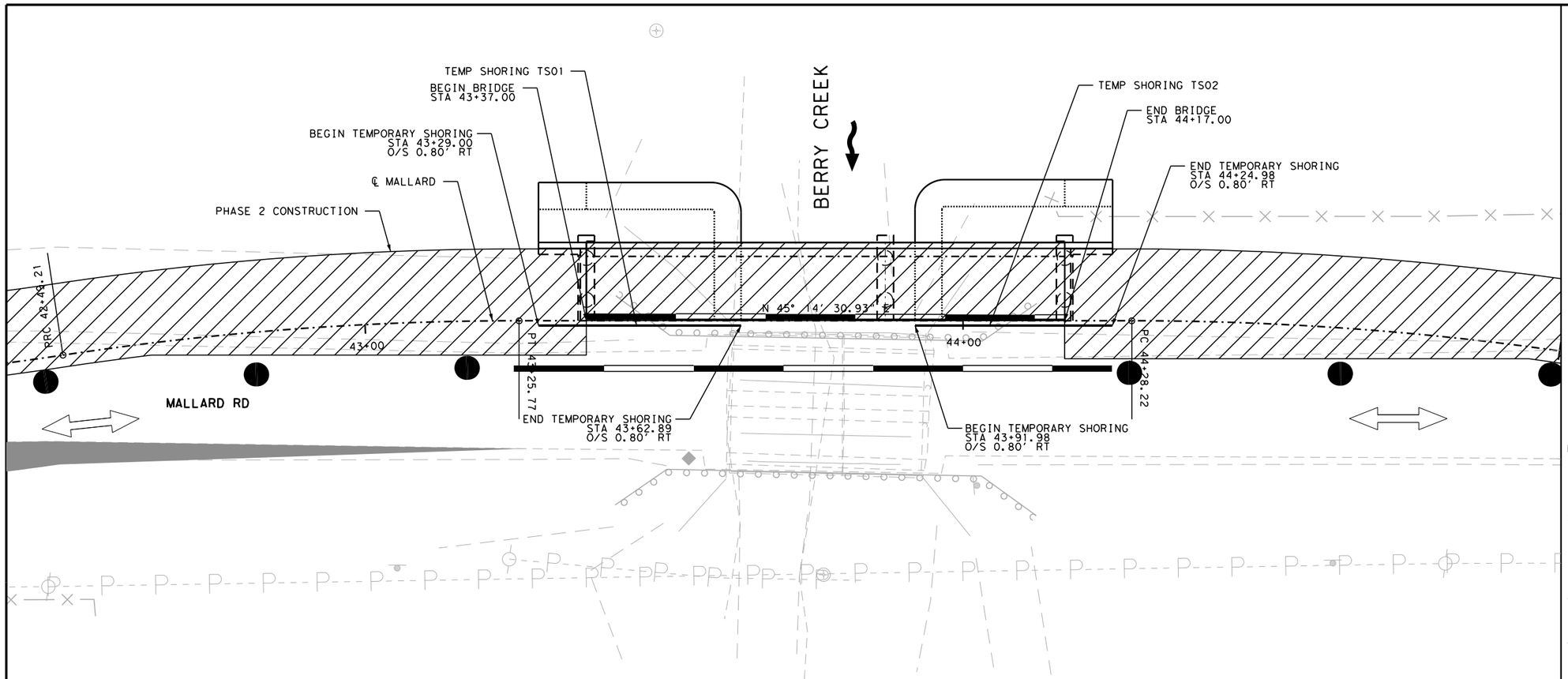

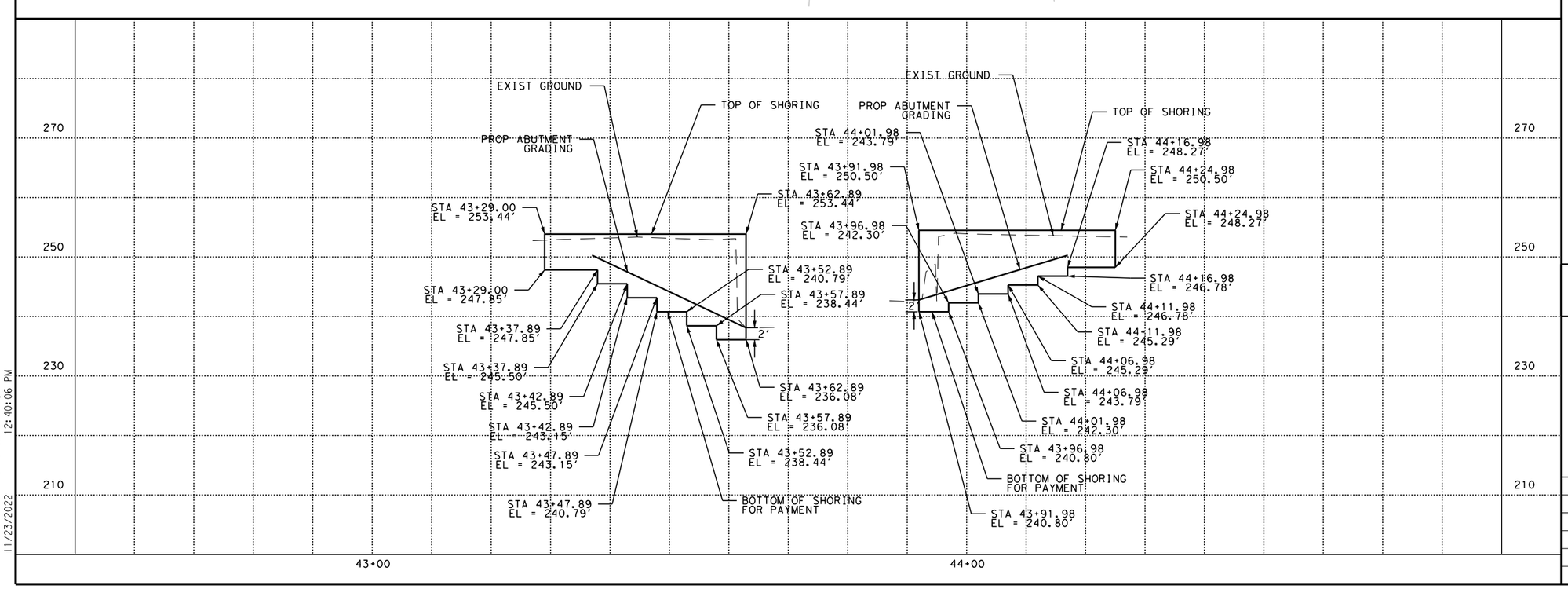

HORIZONTAL
0 10 20
0 1
VERTICAL

LEGEND

- TEMPORARY TRAFFIC SIGNAL
- CHANNELIZING DEVICES
- TY II OR TY III BARRICADE
- AREA UNDER CONSTRUCTION
- TEMPORARY PAVEMENT
- COMPLETED CONSTRUCTION
- TEMP PAVEMENT REMOVAL
- TRAFFIC FLOW
- DIRECTION OF CREEK FLOW

NOTES:

1. LOCAL ACCESS SHALL BE MAINTAINED FOR THE EXISTING COUNTY ROADS, CROSS STREETS, AND DRIVEWAYS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DRAINAGE AT ALL TIMES, TO BE SUBSIDIARY TO OTHER BID ITEMS.
3. INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARD BC(2)-21.
4. UTILIZE CHANNELIZING DEVICES TO CLOSE DRIVEWAYS UNDER CONSTRUCTION, WHEN ALTERNATE ACCESS IS PROVIDED.
5. SPACE CHANNELIZING DEVICES IN ACCORDANCE WITH TXDOT STANDARD BC(9)-21.

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TEMPORARY SHORING PHASE 2 MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 16

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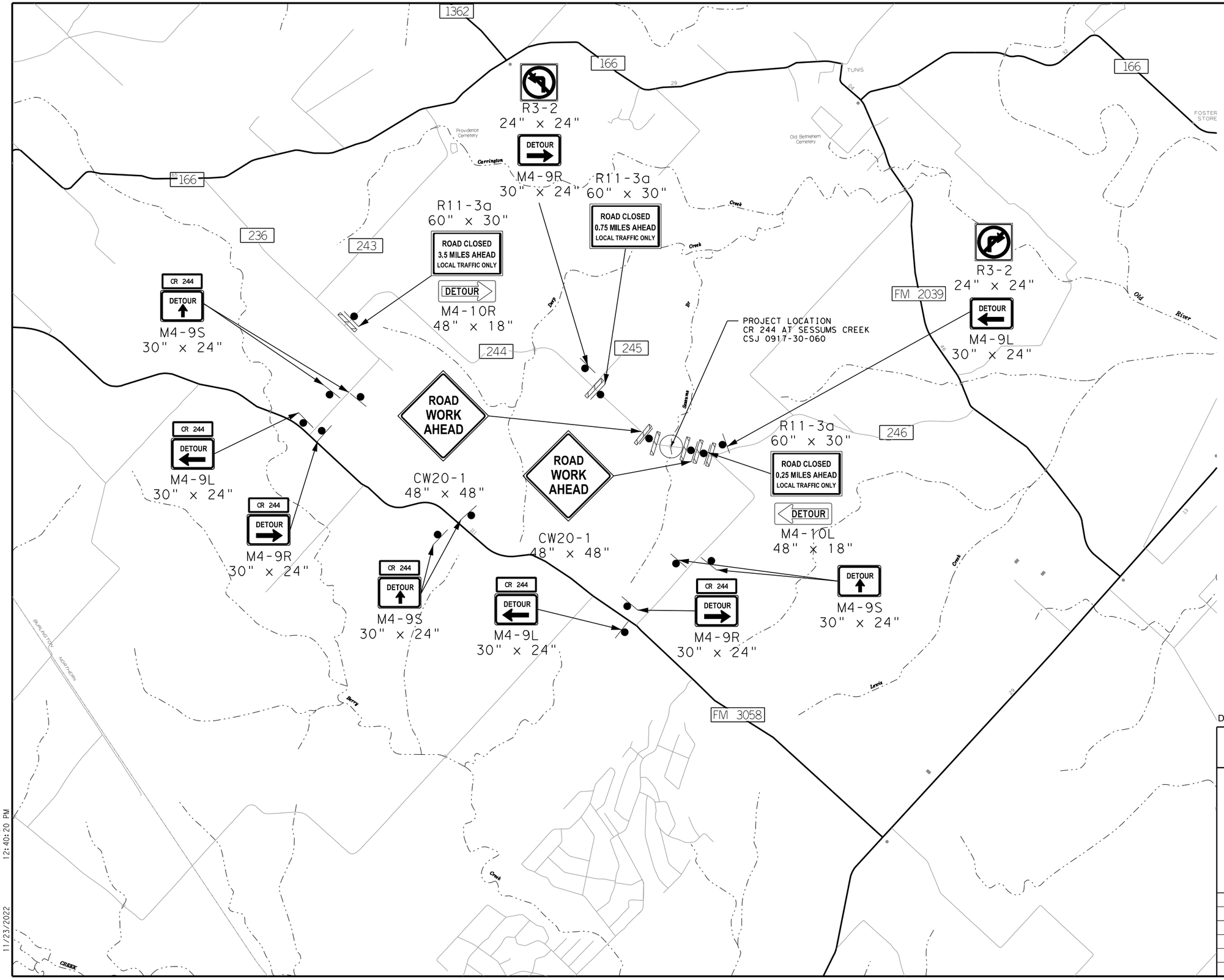

NOTES:

1. PLACE SIGNS IN ACCORDANCE WITH TXDOT STANDARDS BC(1)-BC(12), WZ(RCD), AND TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, REV 2 2014.

2. ADJUST SIGNING AS DIRECTED TO FIT FIELD CONDITIONS.

3. SEE TRAFFIC CONTROL PLAN FOR PLACEMENT OF ADDITIONAL SIGNS

LEGEND

TYPE III BARRICADE

DETOUR SIGN

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ADVANCED WARNING SIGNS CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR

STATE	DISTRICT	COUNTY	
TEXAS	BRY	BURLESON	
CONTROL	SECTION	JOB	SHEET NO.
0917	30	059, ETC.	17

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SEQUENCE OF CONSTRUCTION

MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES. TEMPORARY DRAINAGE SHALL BE CONSIDERED SUBSIDIARY TO THE OTHER BID ITEMS.
EXISTING SIGNS THAT CONFLICT WITH THE TEMPORARY TRAFFIC CONTROL PLAN SHALL BE REMOVED OR COVERED AS DIRECTED.

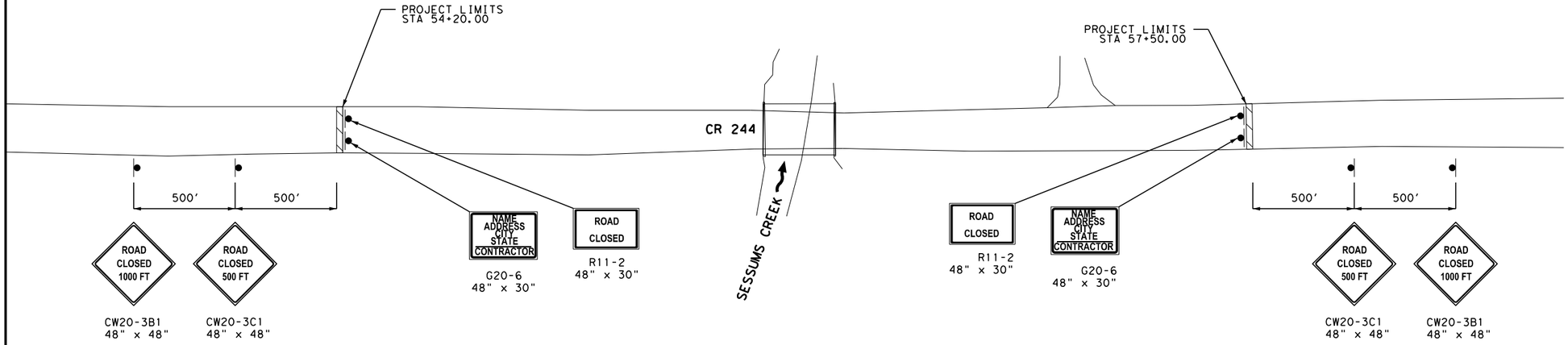
PHASE 1:
ONE WEEK PRIOR TO CONSTRUCTION, SET UP ONE PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) AT THE INTERSECTION OF CR 244 & CR 236 AND CR 244 & CR 246 TO ALERT PUBLIC TO UPCOMING CONSTRUCTION.
INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH STANDARD BC(2)-21.

PHASE 2:
SET UP DETOUR, CLOSE CR 244 TO THRU TRAFFIC, AND INSTALL TEMPORARY SW3P DEVICES.

PHASE 3:
DEMOLISH EXISTING BRIDGE, CONSTRUCT NEW ROADWAY, DITCHES AND BRIDGES, TIE TO EXISTING PAVEMENT.

PHASE 4:
INSTALL METAL BEAM GUARD FENCE AND DELINEATORS/OBJECT MARKERS.
COMPLETE PERMANENT SEEDING, INSTALL PERMANENT SW3P AND PLACE SIGNING.

PHASE 5:
RESTORE ROW BACK TO PRE-CONSTRUCTION CONDITIONS AND COMPLETE FINAL SITE CLEAN UP.
REMOVE ADVANCED WARNING SIGNS AND BARRICADES AND OPEN ROADWAY.



LEGEND

- TRAFFIC SIGN
- CHANNELIZING DEVICES
- TY III BARRICADE

NOTES:

1. LOCAL ACCESS SHALL BE MAINTAINED FOR THE EXISTING COUNTY ROADS, CROSS STREETS, AND DRIVEWAYS.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY DRAINAGE AT ALL TIMES, TO BE SUBSIDIARY TO OTHER BID ITEMS.

3. INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARD BC(2)-21.

4. UTILIZE CHANNELING DEVICES TO CLOSE DRIVEWAYS UNDER CONSTRUCTION, WHEN AN ALTERNATE ACCESS IS PROVIDED.

5. SPACE CHANNELIZING DEVICES IN ACCORDANCE WITH TXDOT STANDARD BC(9)-21.

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Drawings Not To Scale

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Bryan District

TRAFFIC CONTROL PLAN & SEQUENCE OF CONSTRUCTION CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 18

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0917	30	059, ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	BRY	BURLESON		19

DATE: 11/22/2022 5:59:40 PM
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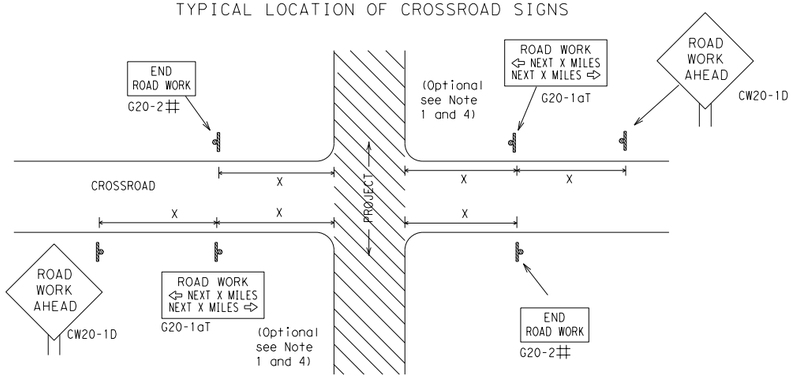
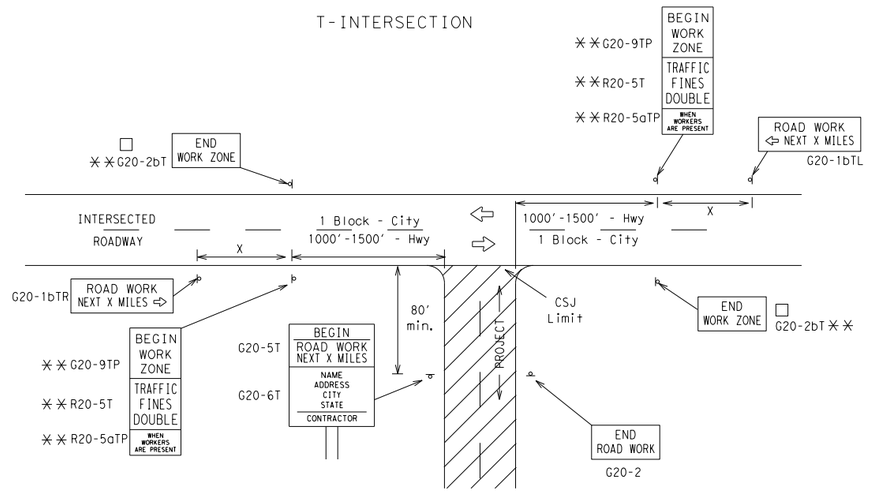
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

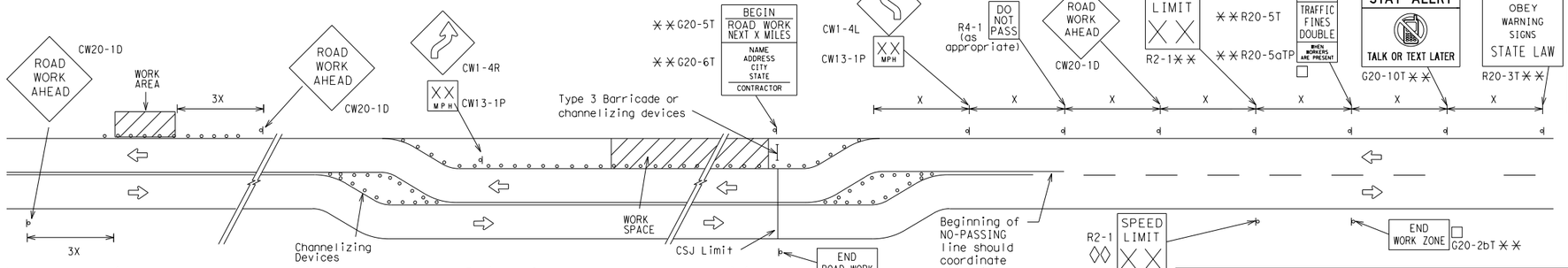
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

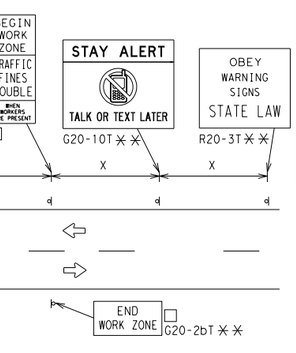
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

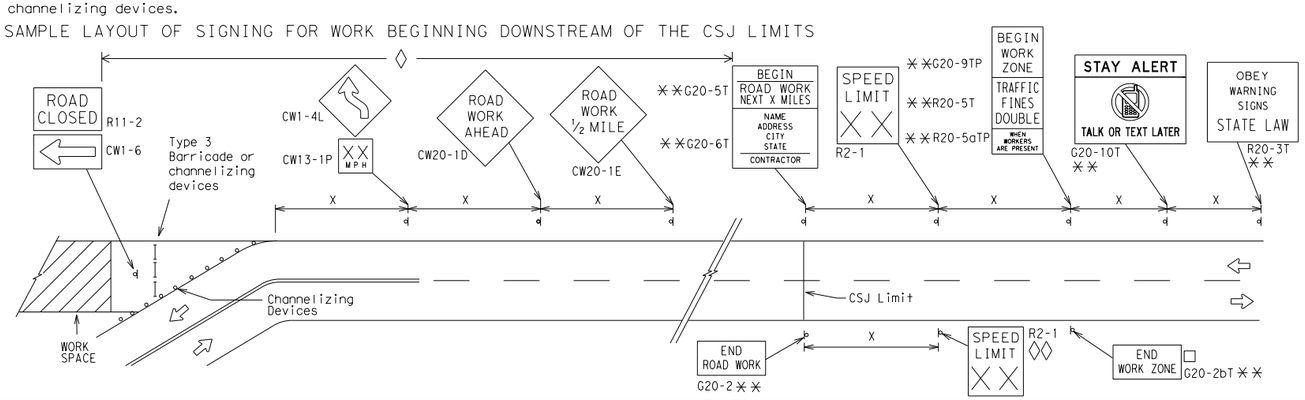


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRY	BURLESON		20

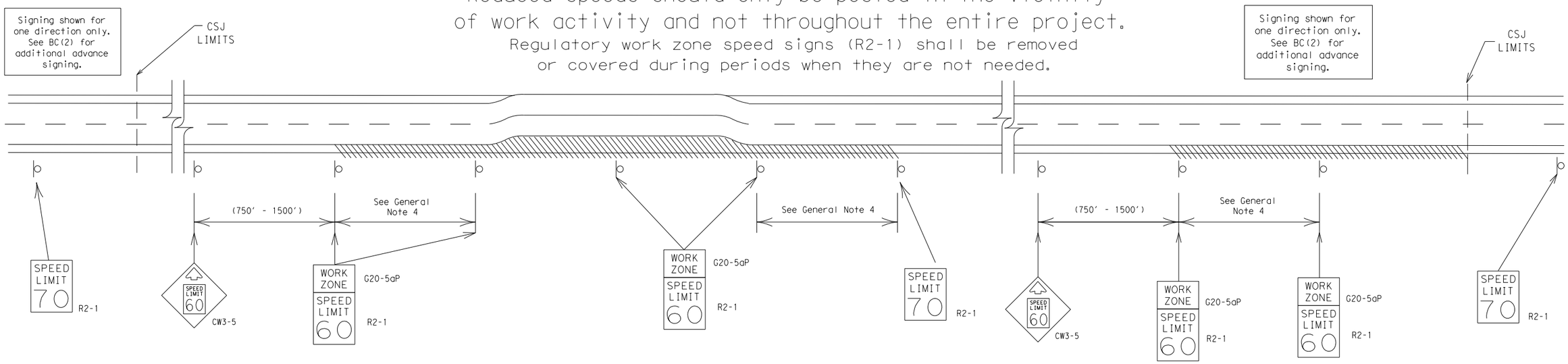
DATE: 11/22/2022 5:59:40 PM
FILE: dw:\\ProjectWiseAMER.jacobs.com:Jacobs_US_B_I_SS4\Documents\WJXN4000(BRY_BF_Ridge_Program)\bc-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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REVISIONS	0917	30	059, ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRY	BURLESON		21

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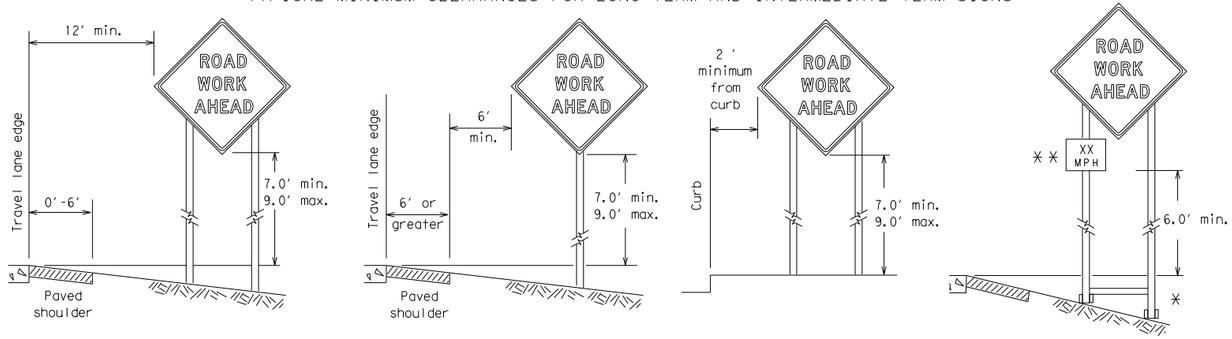
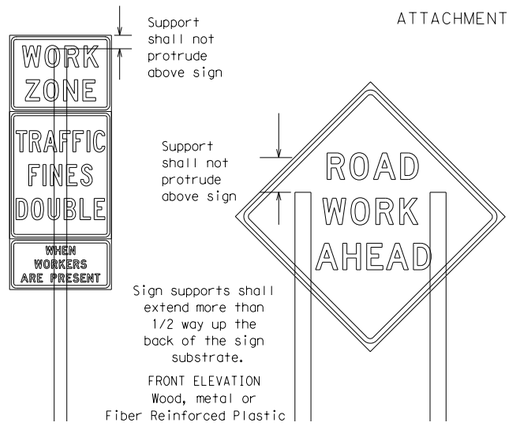
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



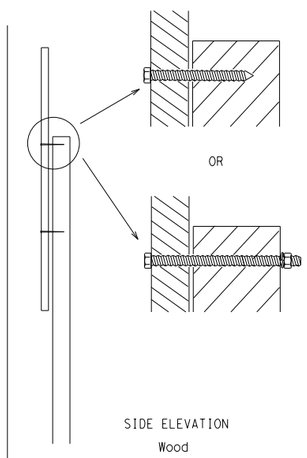
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

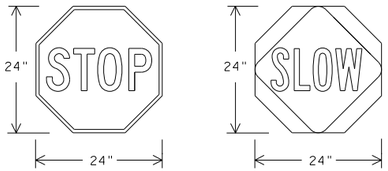
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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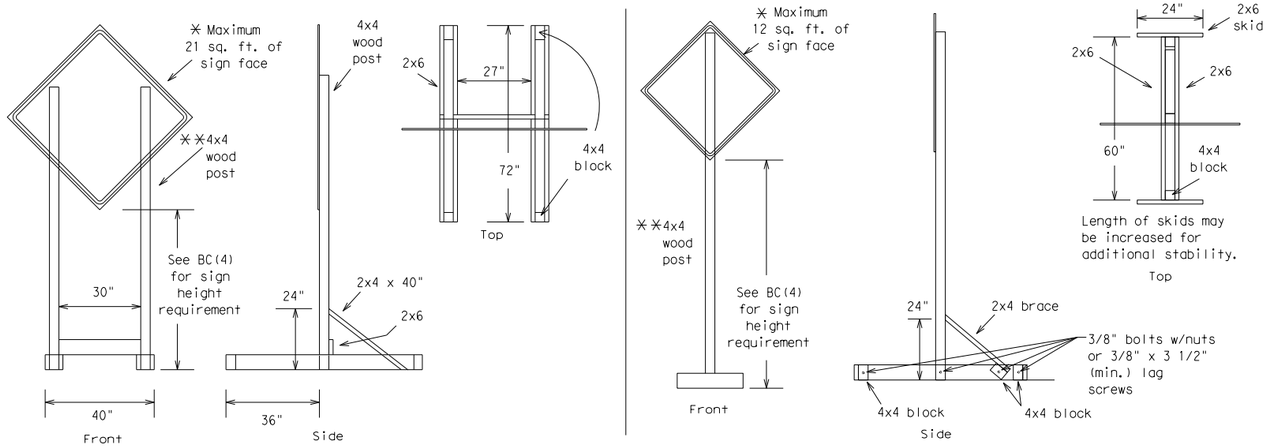
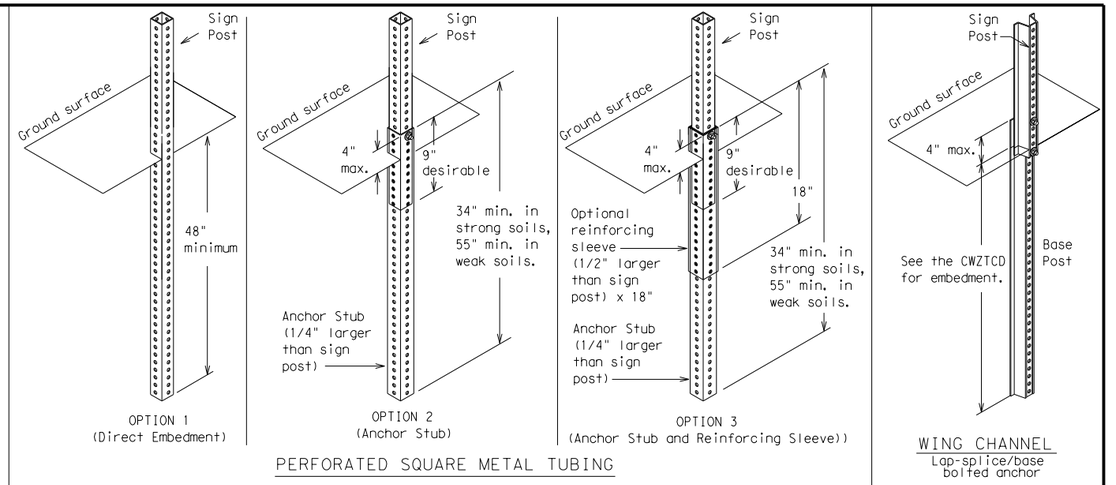


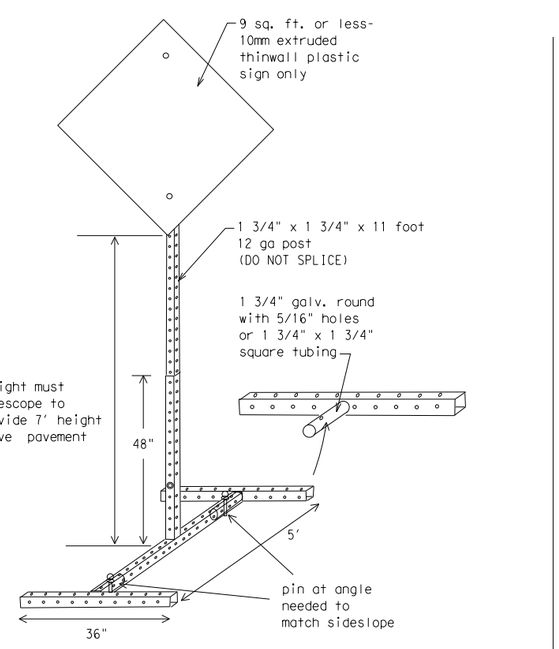
SKID MOUNTED WOOD SIGN SUPPORTS

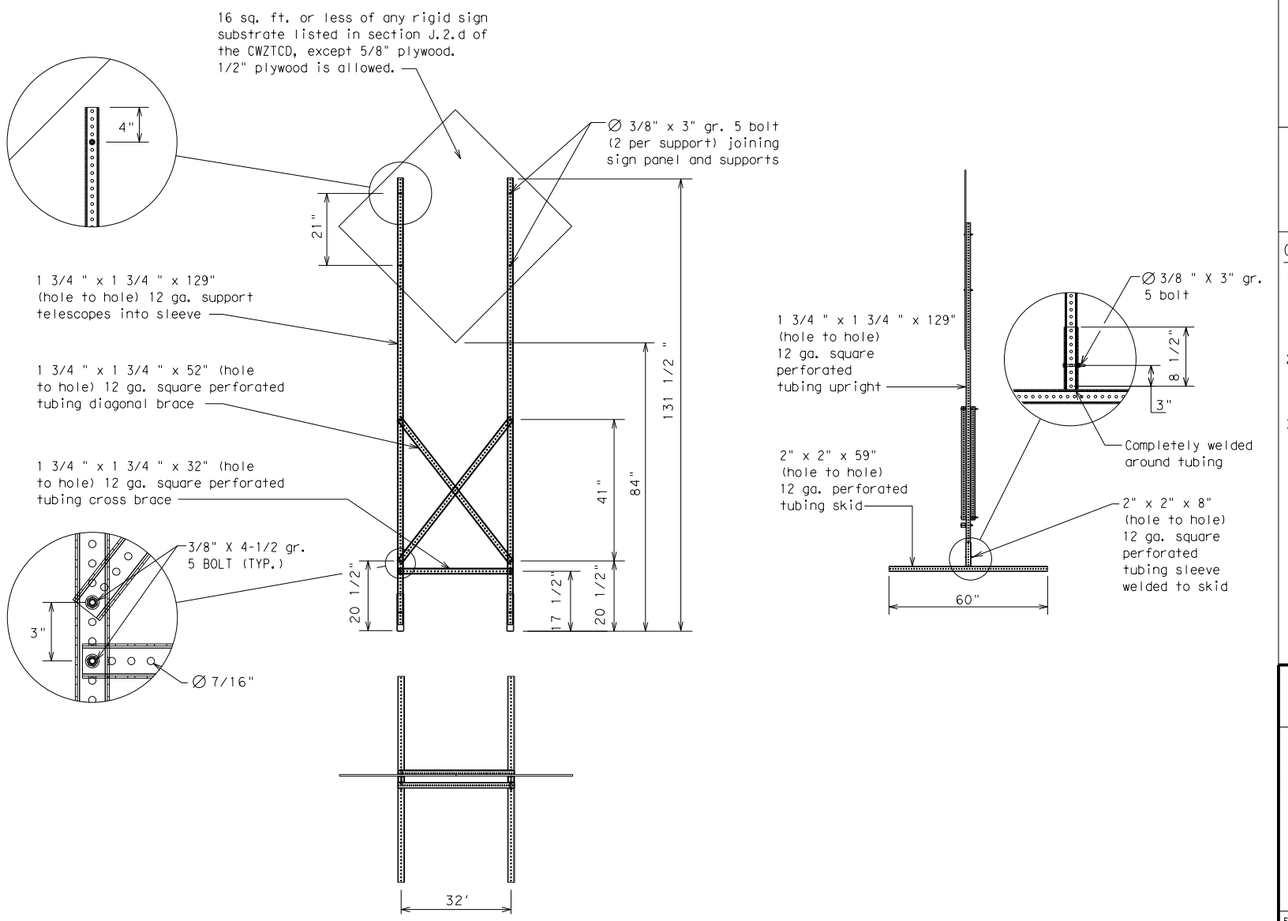
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



GROUND MOUNTED SIGN SUPPORTS

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





SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

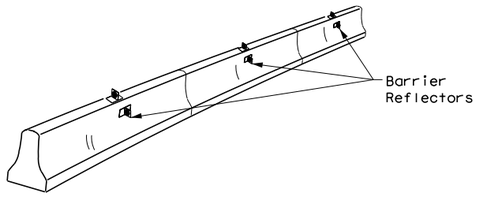
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRY	BURLESON		24

100

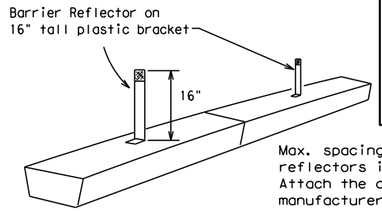
DATE: 12/8/2022 4:44:17 PM
FILE: pw:\\ProjectWiseAMER.jacobs.com:Jacobs_US_B_I_SS4\Documents\WJXN4000_BRY_Bridge_Program\WJXN4000\91730059_Mallard Rd\700 CADD\SIND\TCP\bc-21.dgn

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



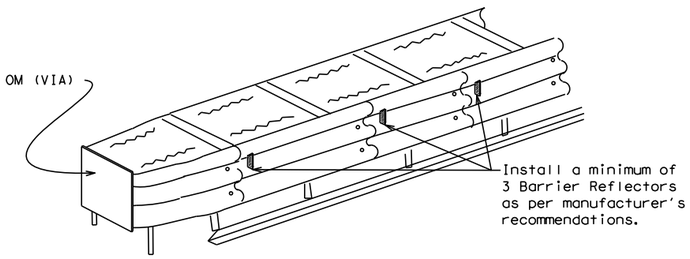
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

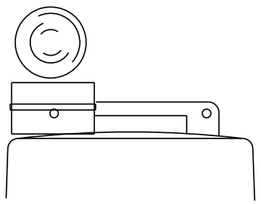
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

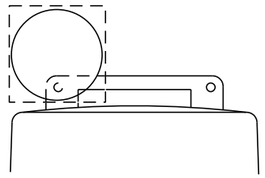
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

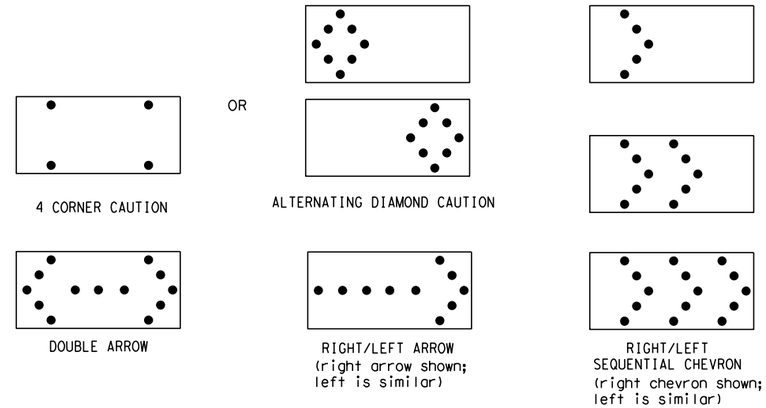
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRY	BURLESON		25

101

DATE: 11/22/2022 5:59:42 PM
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

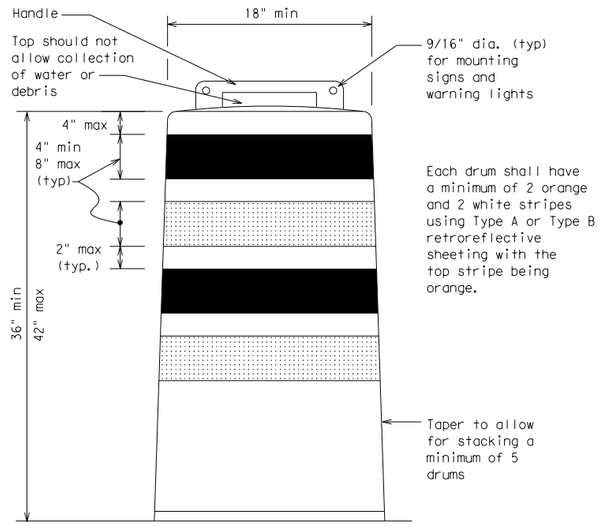
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

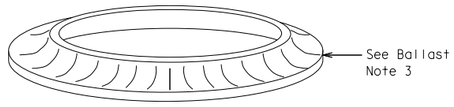
RETROREFLECTIVE SHEETING

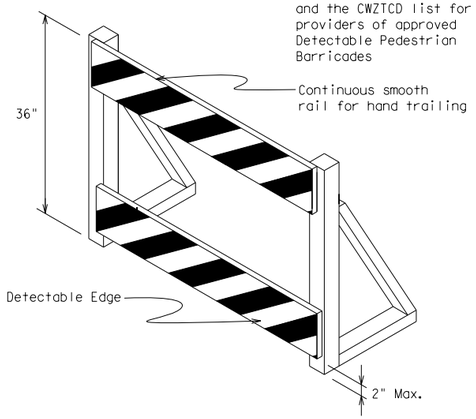
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

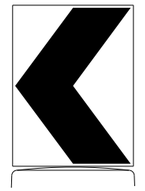




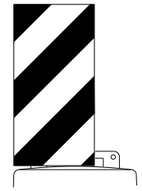


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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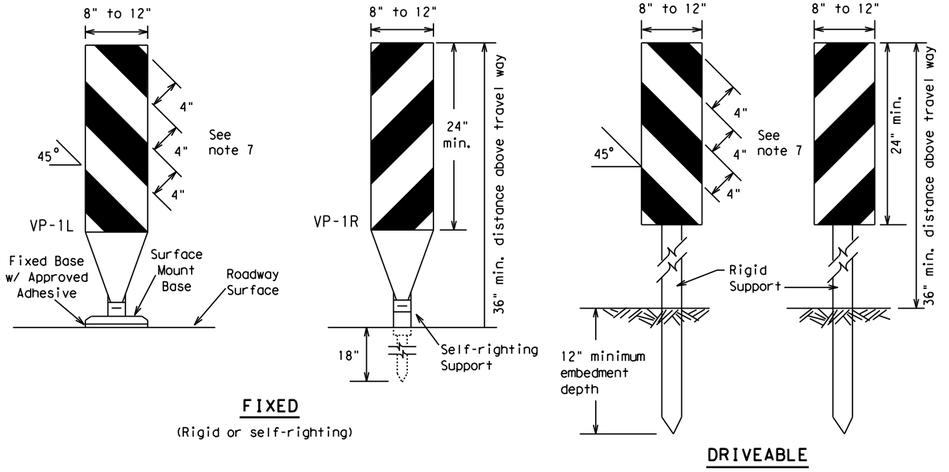
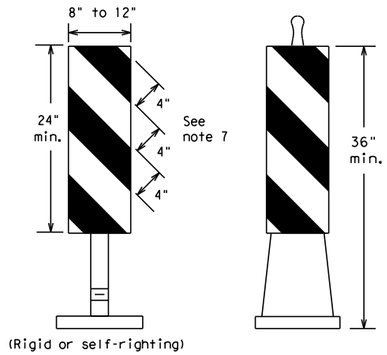


FIXED
(Rigid or self-righting)

DRIVEABLE

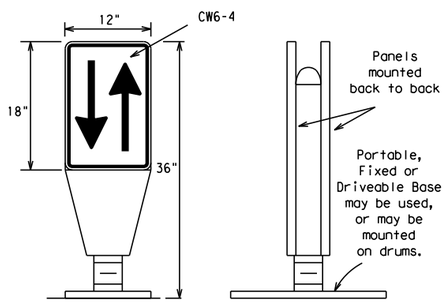


(Rigid or self-righting)

PORTABLE

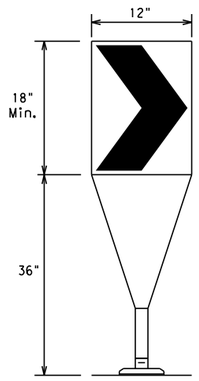
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



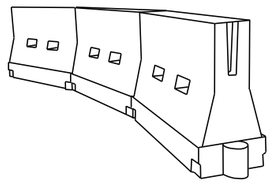
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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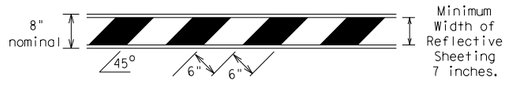
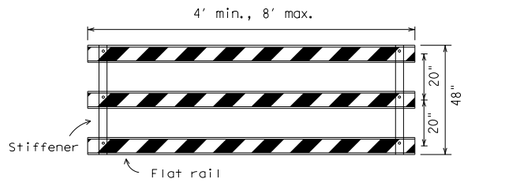
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



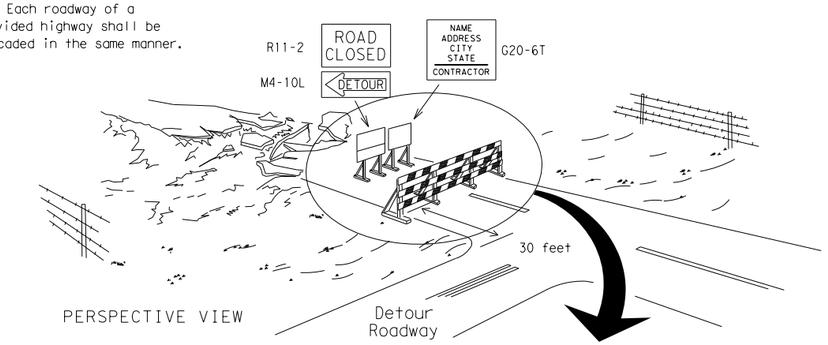
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

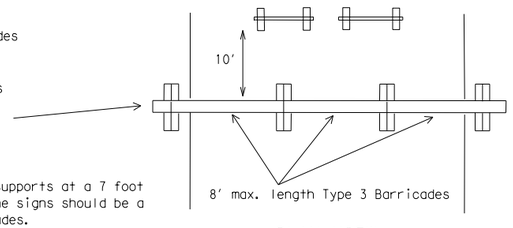
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

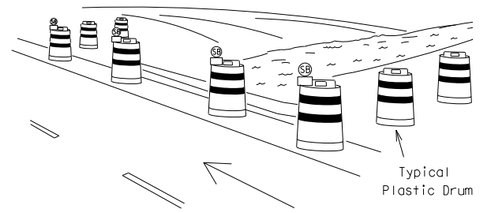
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

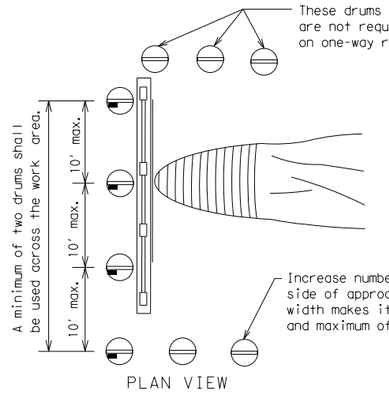
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

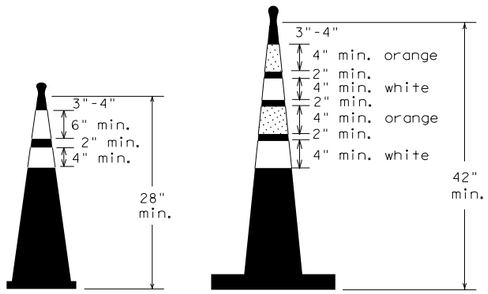
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



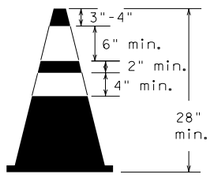
PLAN VIEW

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

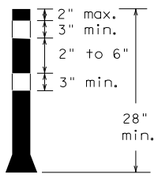
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

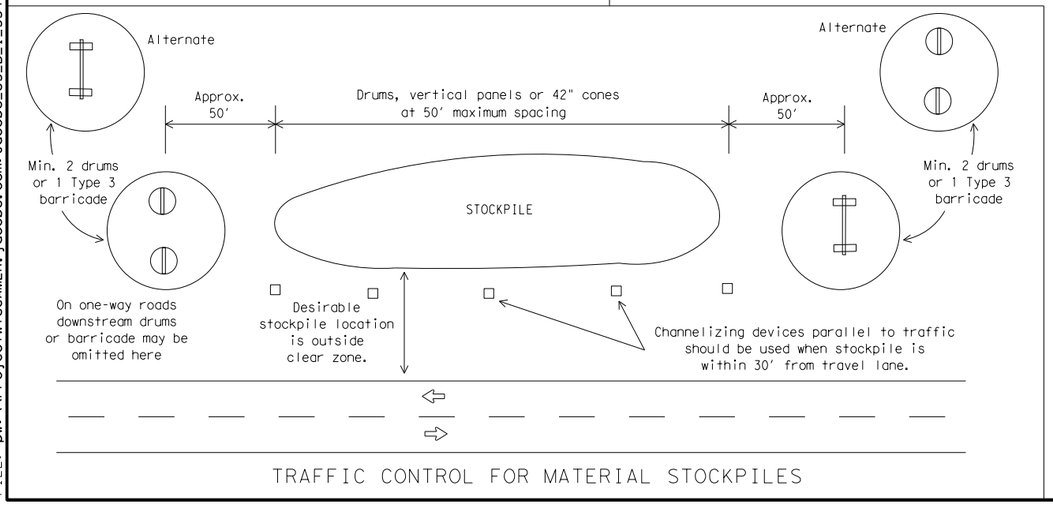


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

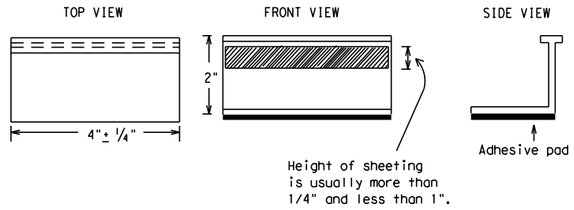
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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	BRY	BURLESON		29

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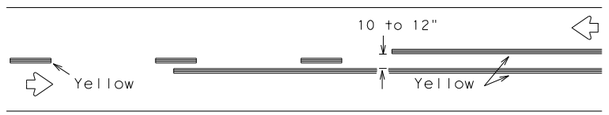
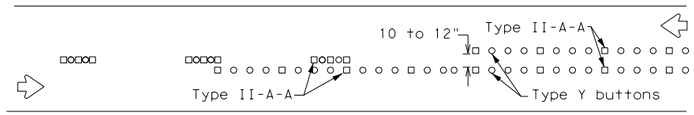
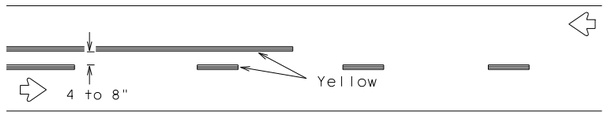
PAVEMENT MARKING PATTERNS



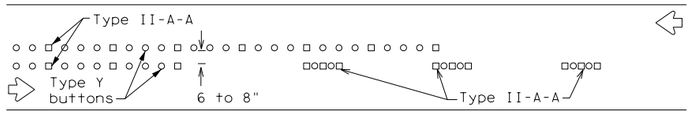
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



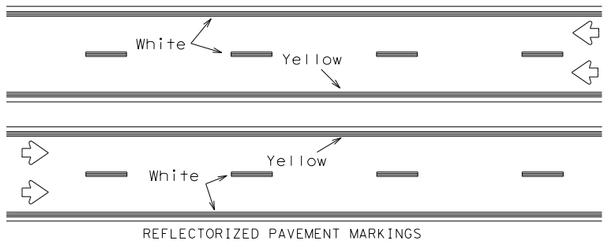
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



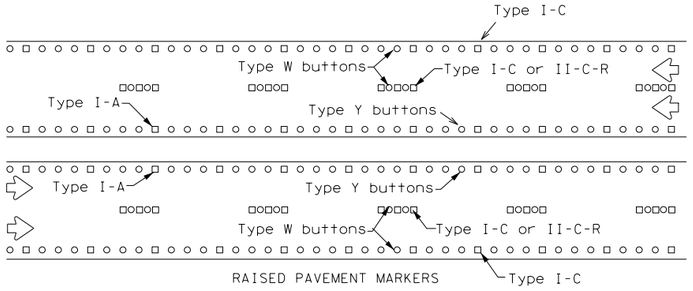
RAISED PAVEMENT MARKERS - PATTERN B

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

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



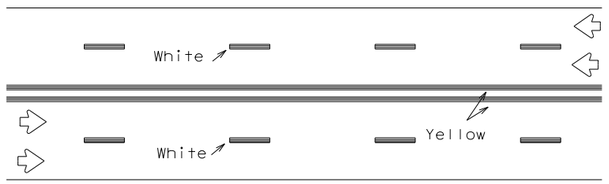
REFLECTORIZED PAVEMENT MARKINGS



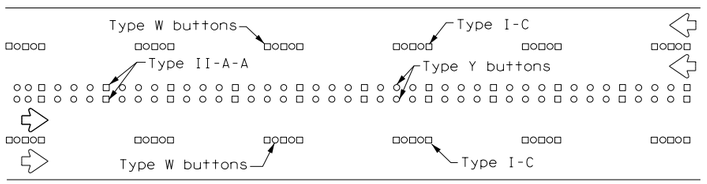
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



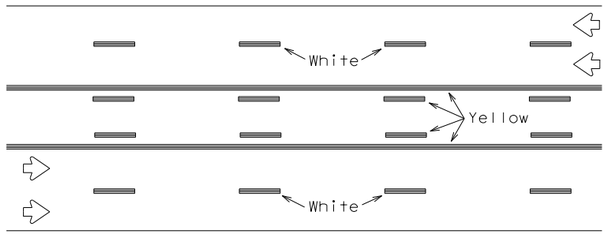
REFLECTORIZED PAVEMENT MARKINGS



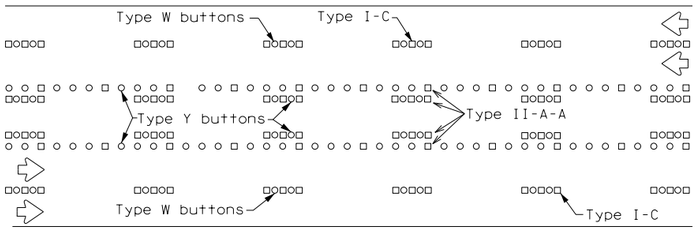
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

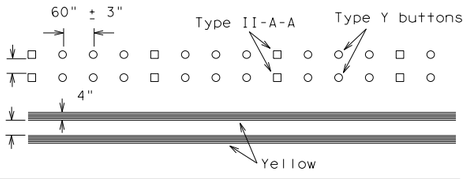
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

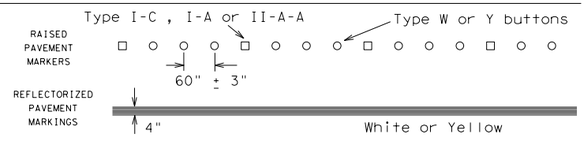
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

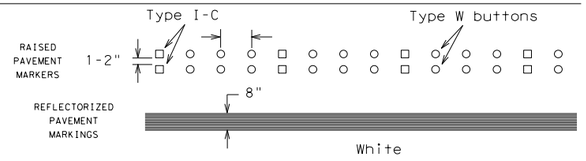


EDGE LINE OR SINGLE NO-PASSING LINE



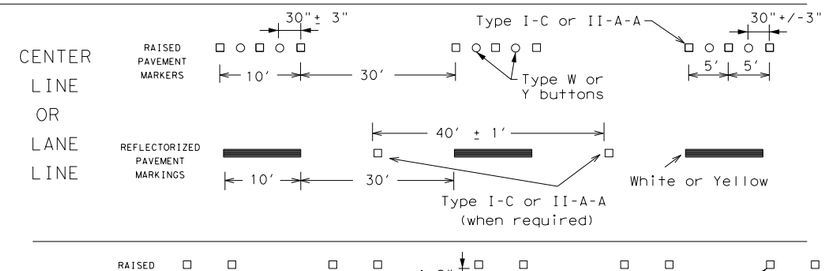
WIDE LINE

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

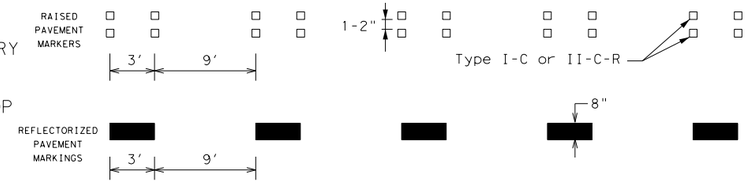


BROKEN LINES

CENTER LINE OR LANE LINE

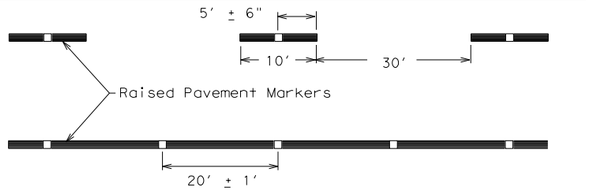


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0917	30	059, ETC.	CR
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	BRY	BURLESON		30

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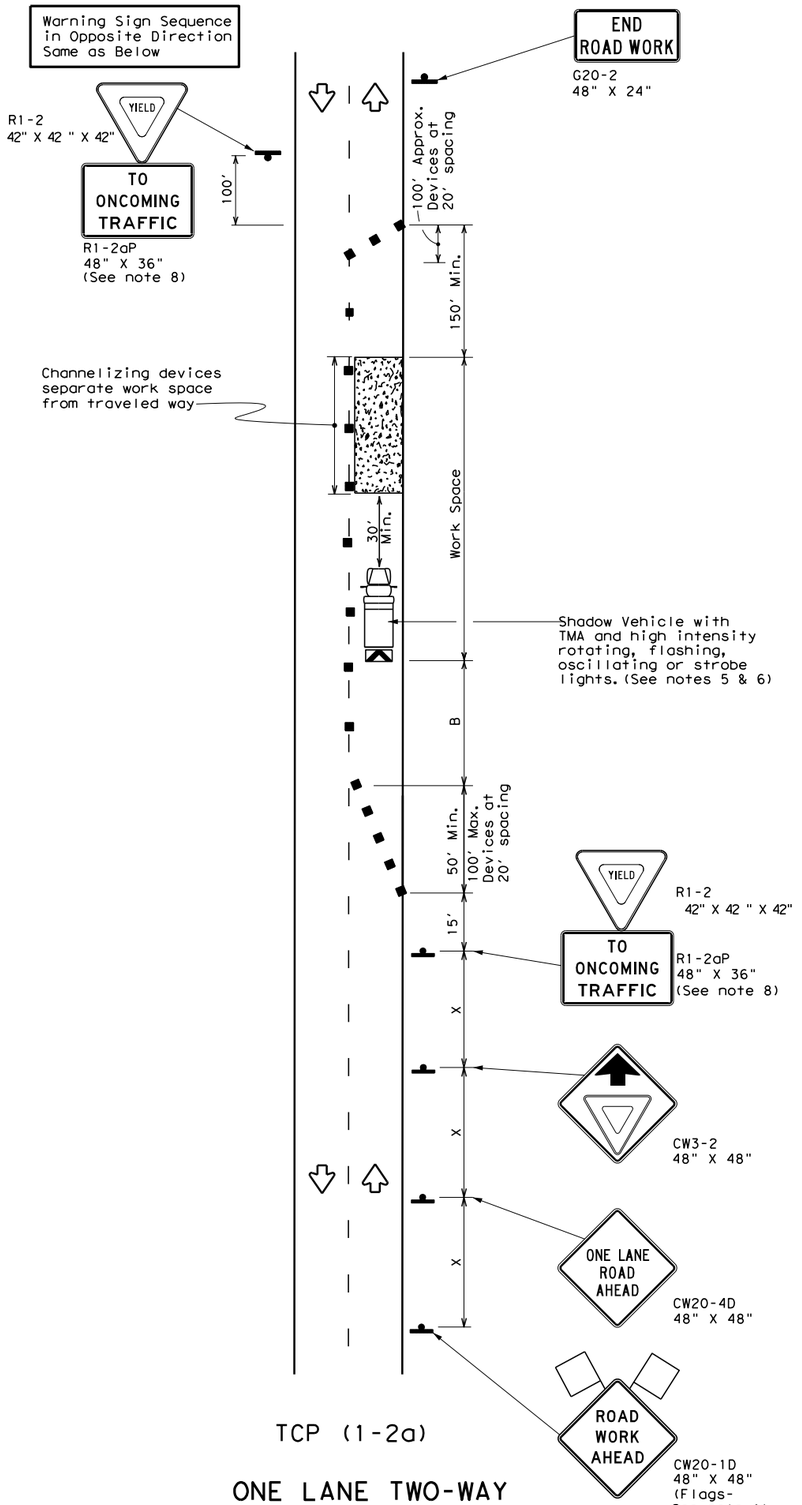
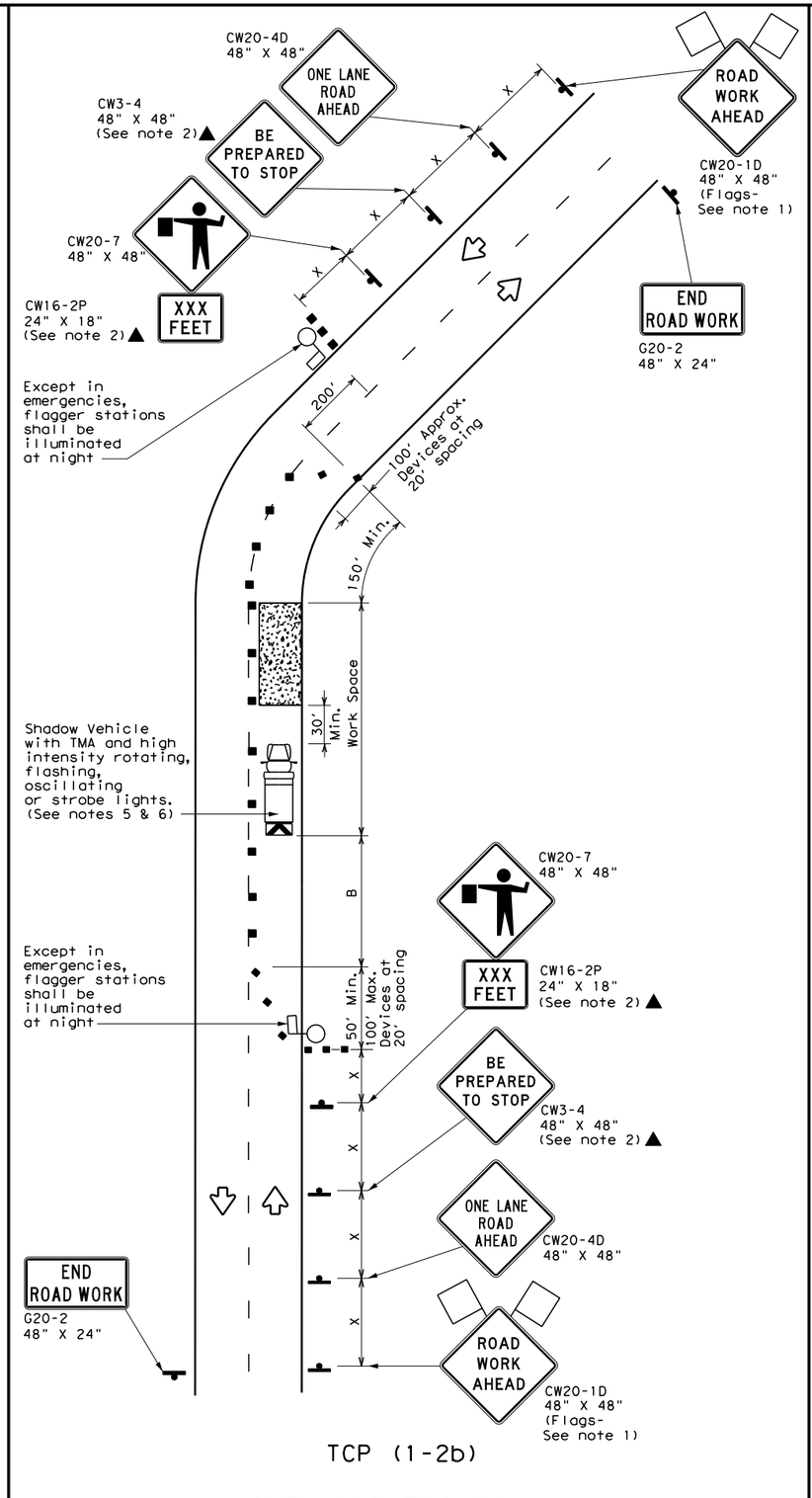


TCP (1-2a)

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0917	30	059, ETC.	CR
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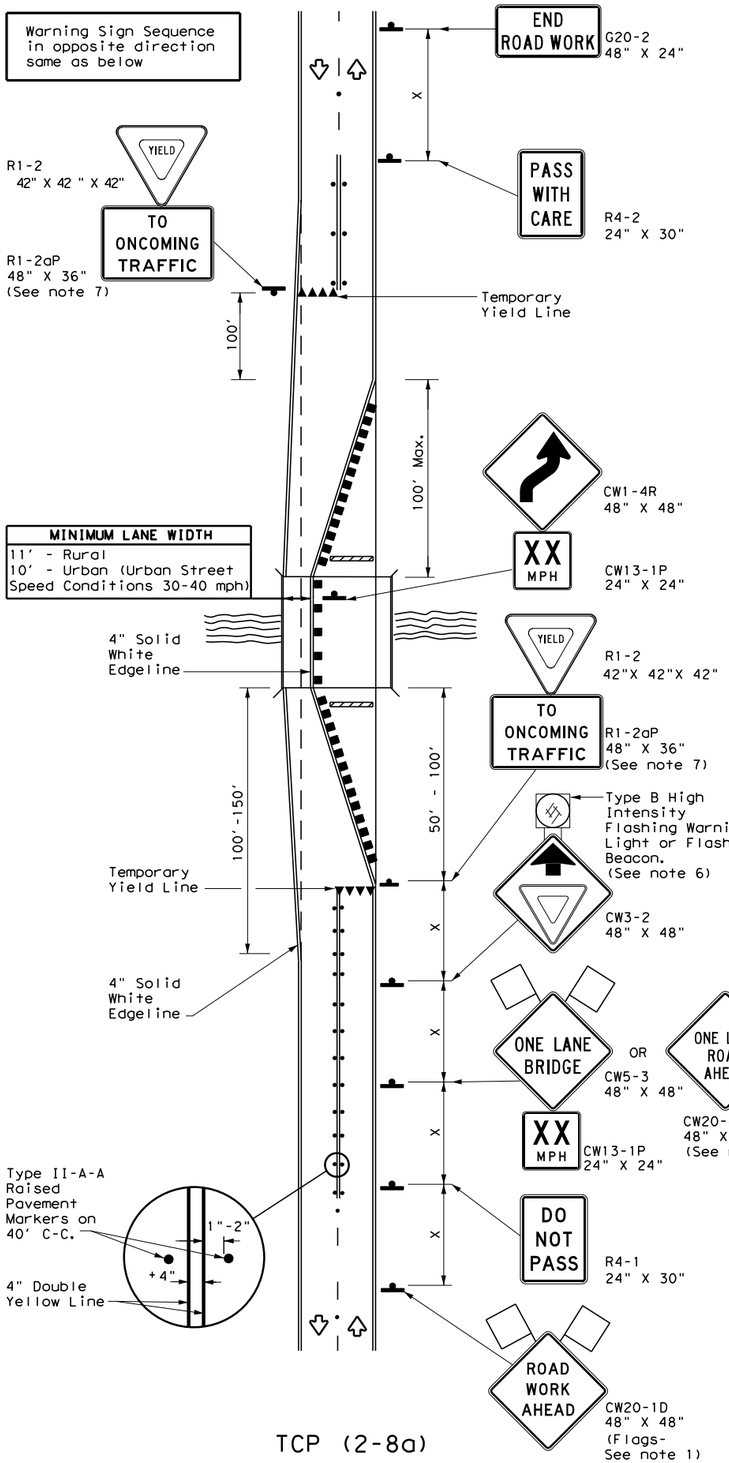
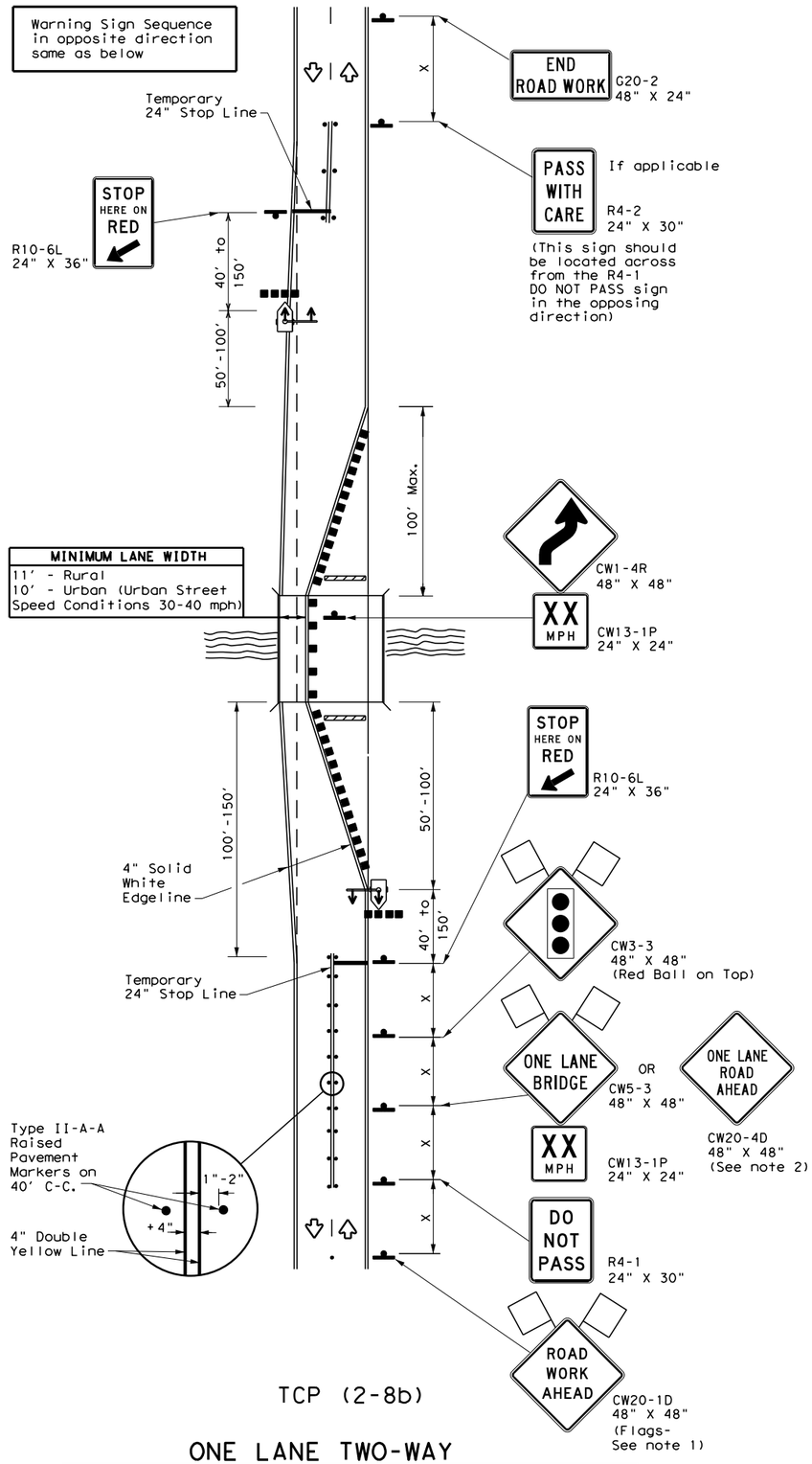
	BRY	BURLESON		31



TCP (2-8a)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH YIELD SIGNS
(Less Than 2000 ADT-See Note 5)



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
3. Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
4. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

TCP (2-8a)

5. Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
6. If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
7. The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.

TCP (2-8b)

8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM ONE-LANE TWO-WAY CONTROL

TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 2-12	BRY	BURLESON		32
4-98 2-18				

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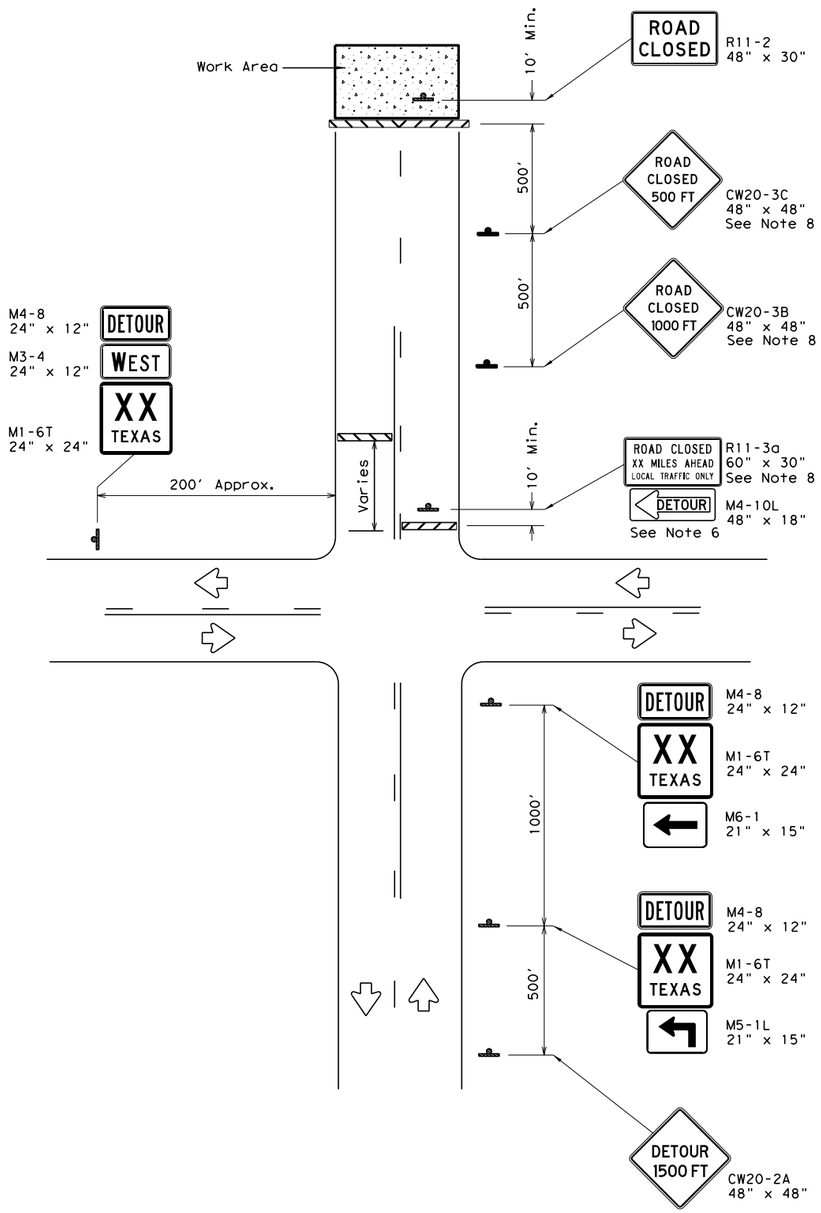
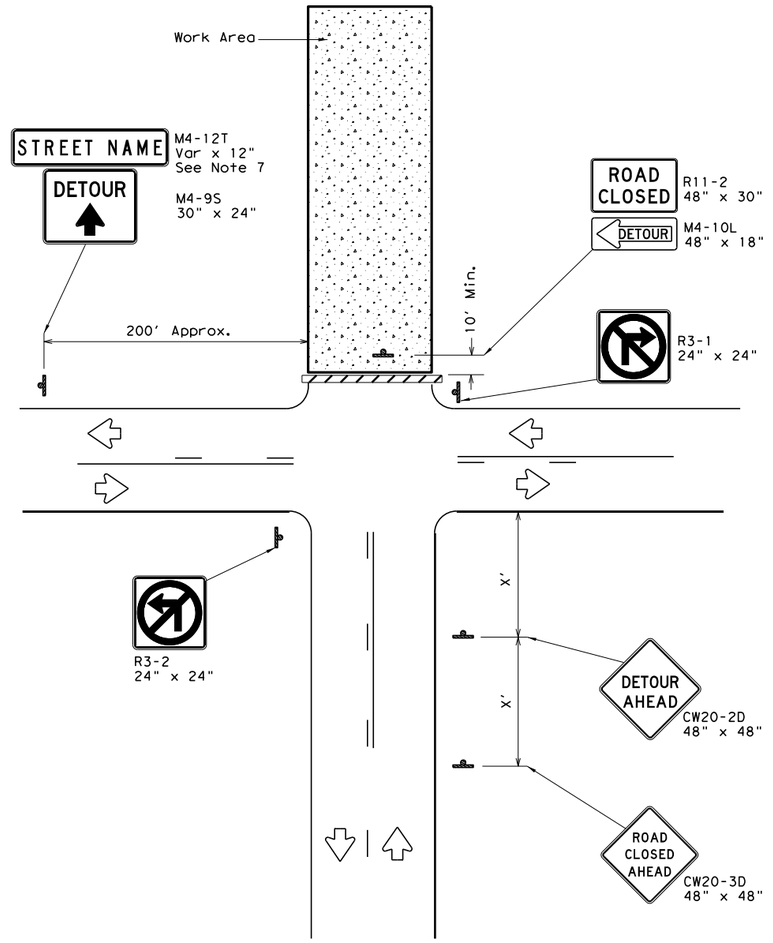


ROAD CLOSURE BEYOND THE INTERSECTION

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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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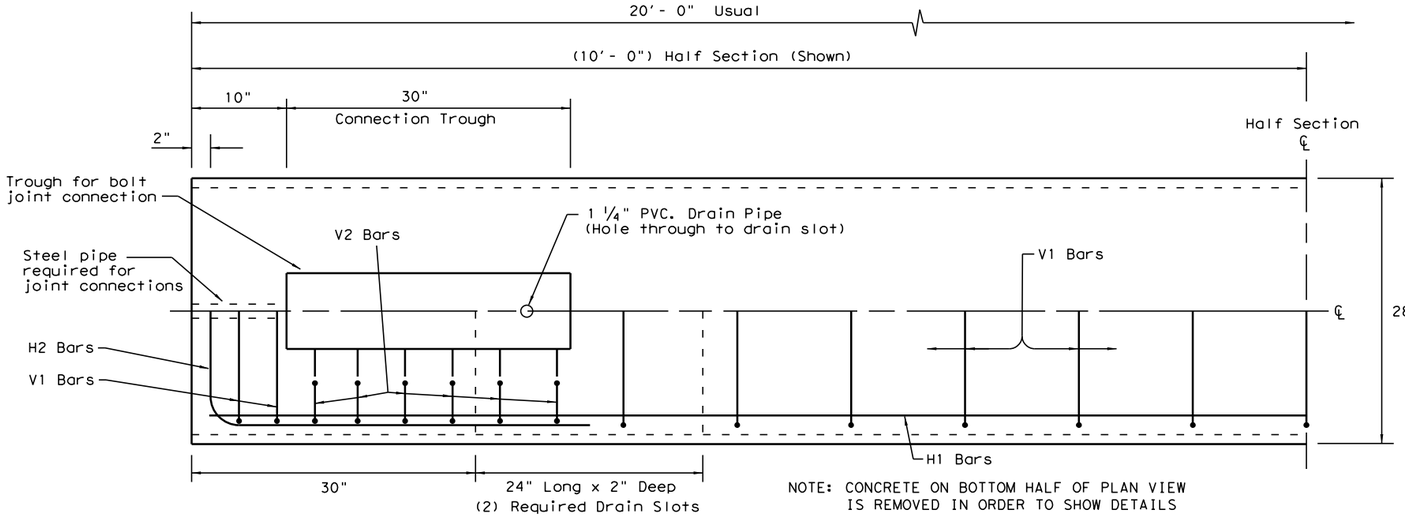
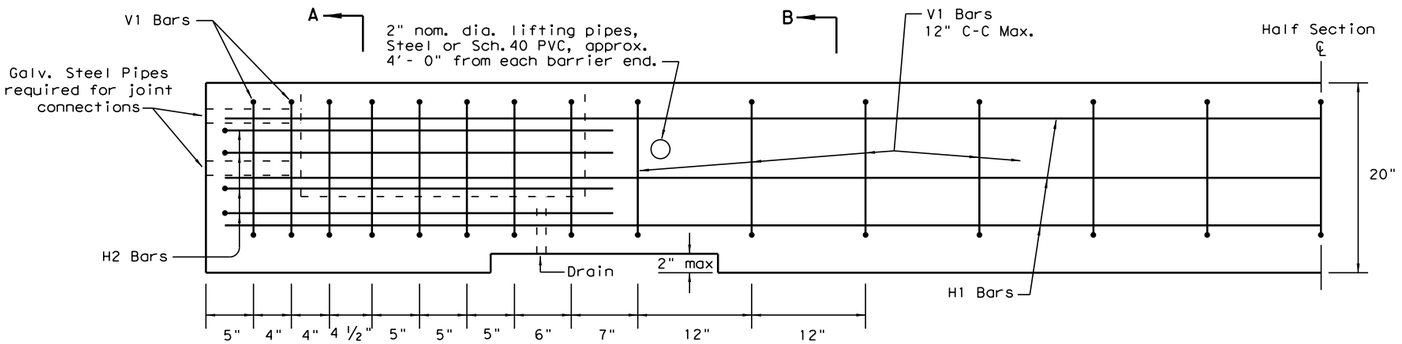
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	BRY	BURLESON		33

113

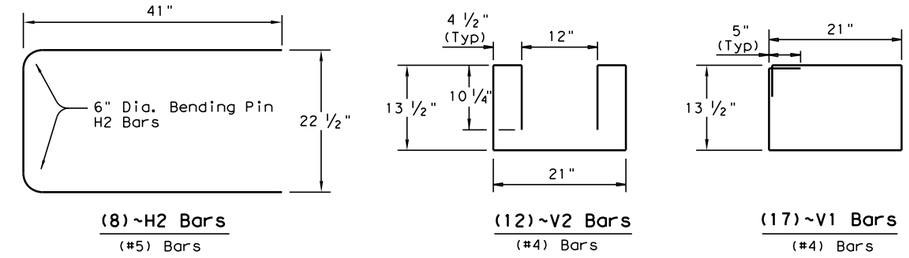


NOTE: CONCRETE ON BOTTOM HALF OF PLAN VIEW IS REMOVED IN ORDER TO SHOW DETAILS

PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



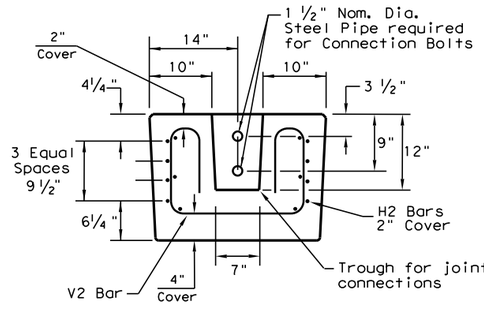
(8)~H2 Bars (#5) Bars

(12)~V2 Bars (#4) Bars

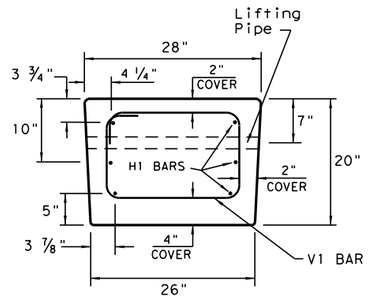
(17)~V1 Bars (#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



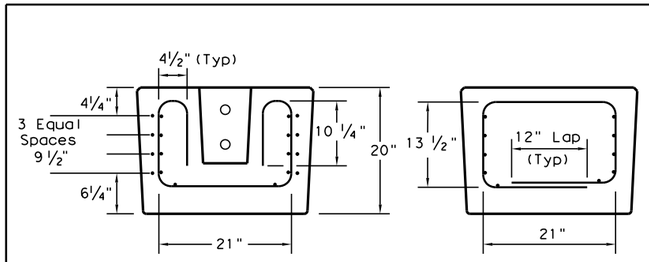
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445,"Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A SECTION B-B

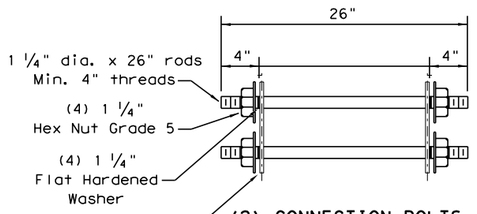
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS ASTM A36

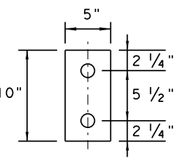


PLATE WASHER 5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		34

DATE: 11/23/2022
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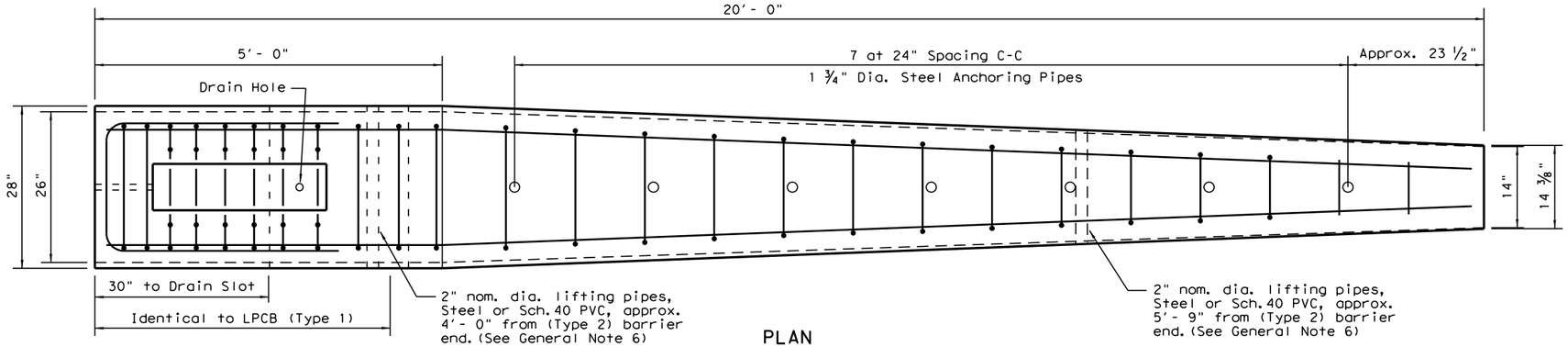
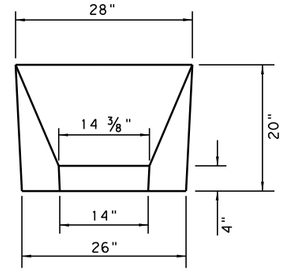
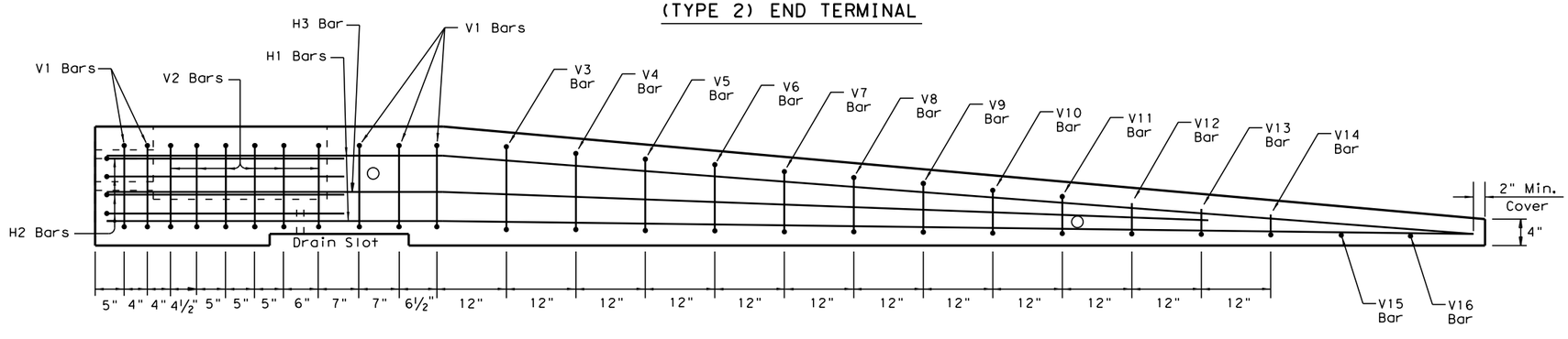
DATE: 11/23/2022
FILE: pw:\\ProjectWiseAMER.jacobs.com:Jacobs_US_B_I_SS4\Documents\WJXN4000_BRY_Bridge_Program\WJXN4000\91730059_Mallard Rd\700 CADD\STND\TCP\lpcb13.dgn



PLAN
(TYPE 2) END TERMINAL



APPROACH VIEW

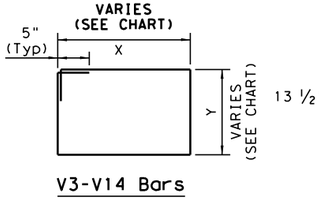


ELEVATION
(TYPE 2) END TERMINAL

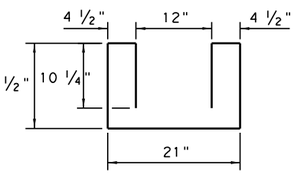
Note:
Anchoring pipes not shown in Elevation View

TYPE 2 - NOTES

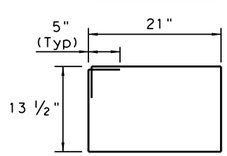
1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.



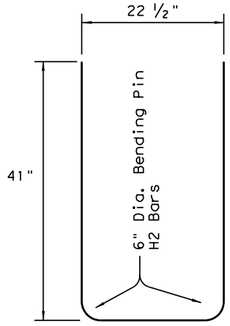
V3-V14 Bars



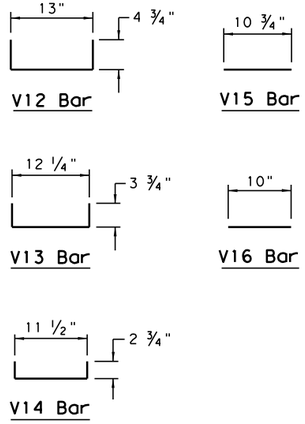
(6)~V2 Bars



(5)~V1 Bars



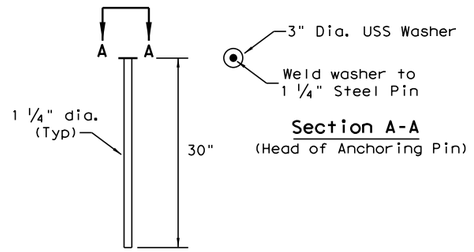
(4)~H2 Bars
(#5) Bars



Note: All V Bars are (#4)

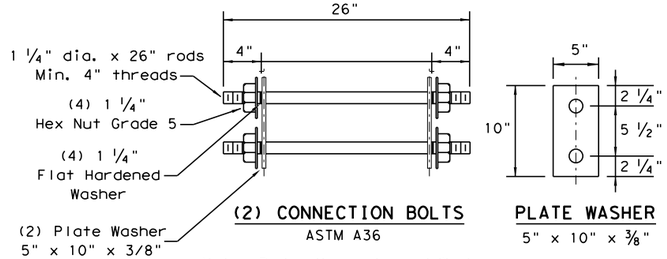
BAR (#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL



Section A-A
(Head of Anchoring Pin)

(7) Anchor Pins
ASTM A36 Steel
(See Note 3)

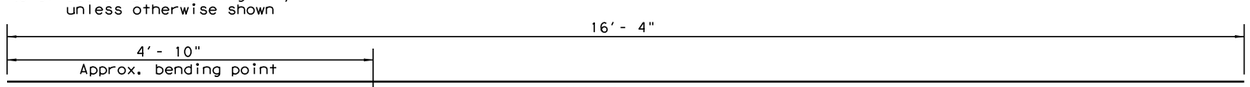


(2) CONNECTION BOLTS
ASTM A36

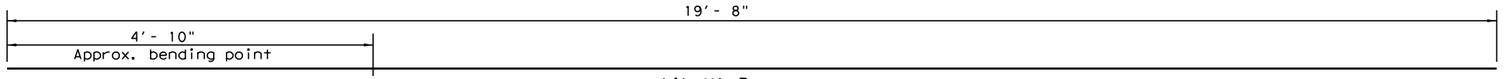
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

Note: Use 2" Dia. Bending Pin, unless otherwise shown



(2)~H3 Bars
(#5) Bar



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

(TYPE 2) APPROX. QUANTITIES	20 FT. SECTION	
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		35

DATE: 11/22/2022 6:00:11 PM
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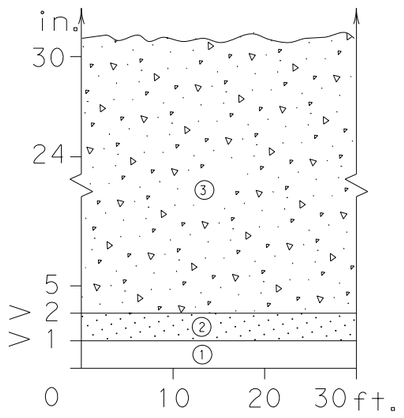
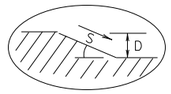
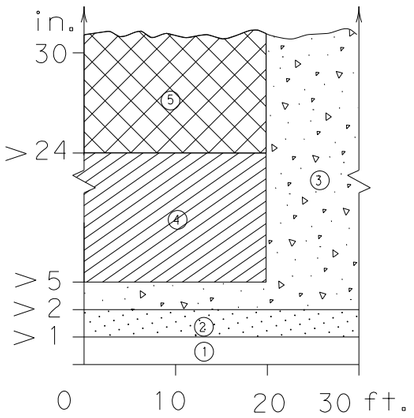
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

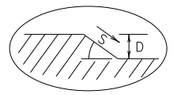


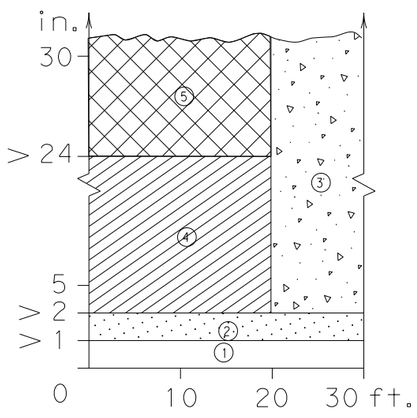
Edge Condition I
S = (3:1) (or flatter)



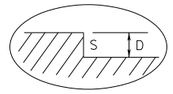


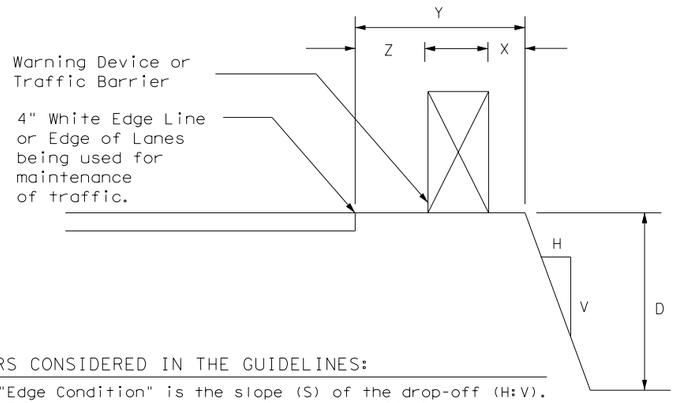
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

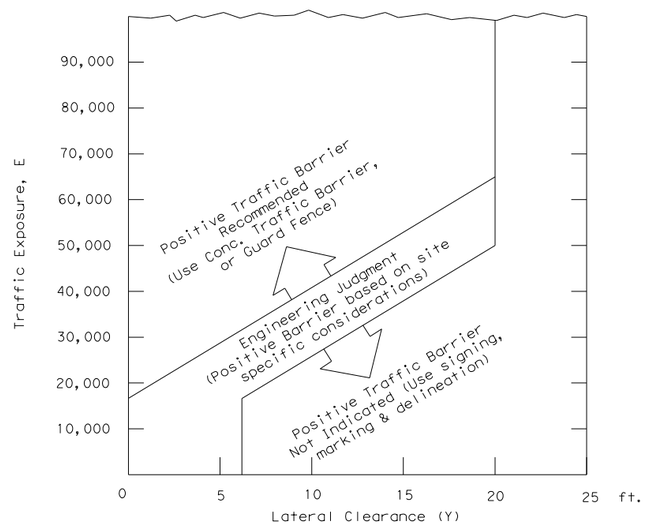
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED
PROFESSIONAL ENGINEER

Date 11/22/2022

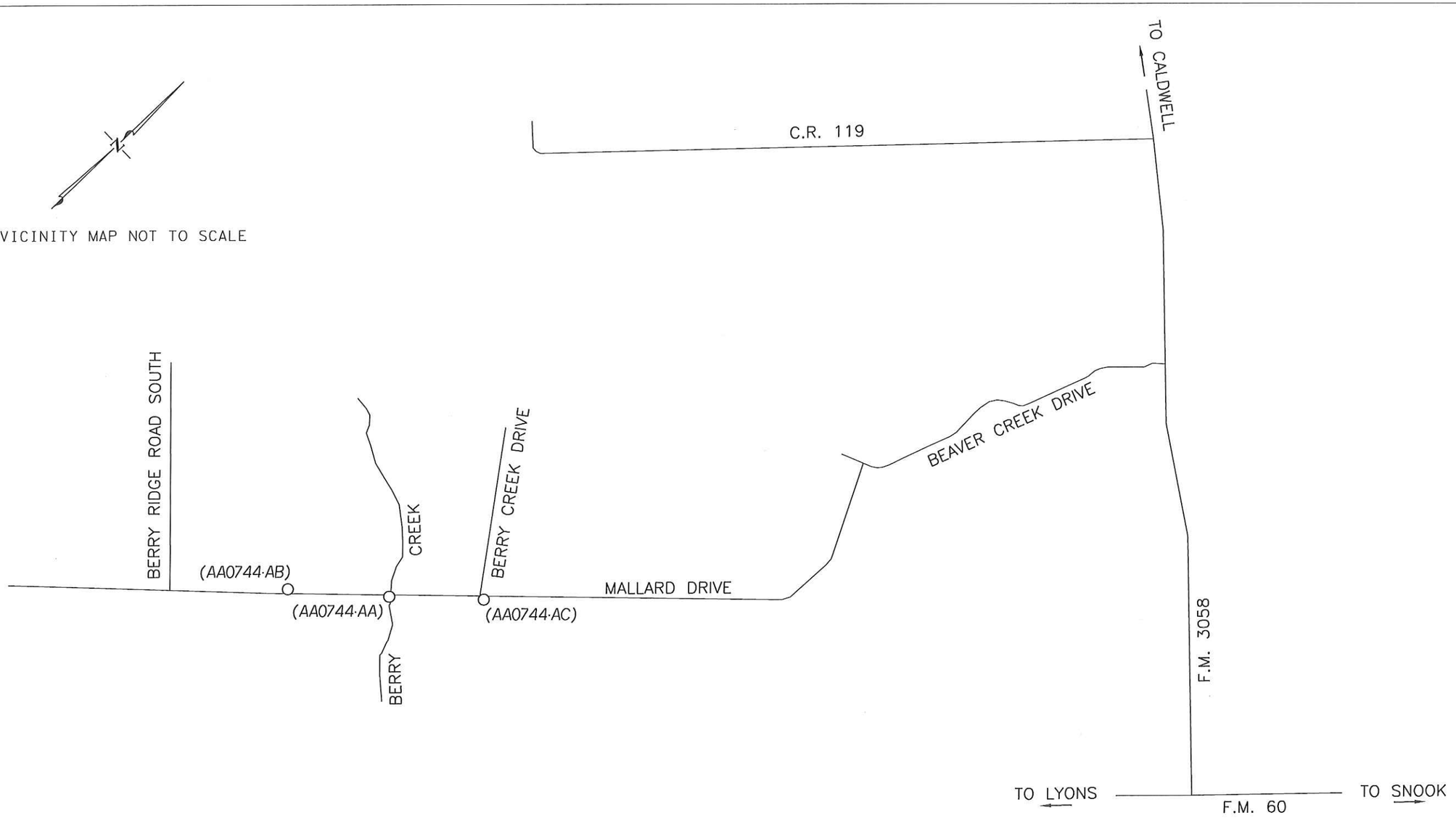
Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		36

VICINITY MAP NOT TO SCALE



POINT ID	LATITUDE (GLOBAL)	LONGITUDE (GLOBAL)	NORTHING (GRID)	EASTING (GRID)	NORTHING (SURFACE)	EASTING (SURFACE)	ELEVATION	FEATURE CODE
AA0744-AA	30°26'27.19856"	-96°33'34.76096"	10,144,253.350	3,485,533.386	10,145,064.890	3,485,812.229	253.82'	3½" ALUMINUM DISK IN CONCRETE
AA0744-AB	30°26'23.65598"	-96°33'39.65306"	10,143,881.148	3,485,117.538	10,144,692.659	3,485,396.347	251.00'	3½" ALUMINUM DISK IN CONCRETE
AA0744-AC	30°26'30.62829"	-96°33'30.40180"	10,144,612.580	3,485,902.988	10,145,424.149	3,486,181.8602	271.35'	3½" ALUMINUM DISK IN CONCRETE

M. Stephen Truesdale 21 July 2022

M. STEPHEN TRUESDALE DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 4933
LICENSED STATE LAND SURVEYOR
INLAND GEODETICS, LLC
FIRM REGISTRATION NO. 100591-00
1504 CHISHOLM TRAIL ROAD, SUITE 103
ROUND ROCK, TEXAS 78681

STATE OF TEXAS REGISTERED M. STEPHEN TRUESDALE 4933 PROFESSIONAL LAND SURVEYOR

NOTES:

ALL COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ) EPOCH 2010.00 GEOID 12A DETERMINED BY TXDOT VRS NETWORK (CORS PIDs "TXBT DM4151", "TXC2 DO8863, "TXWA DG9808. ALL DISTANCES AND COORDINATES ARE IN U.S SURVEY FEET WITH A GRID TO GROUND SCALE FACTOR OF 1.00008.

SURVEY CONTROL

NO.	REVISION	BY	DATE

INLAND GEODETICS LLC
PROFESSIONAL LAND SURVEYORS
1504 CHISHOLM TRAIL RD. STE. 103
ROUND ROCK, TX. 78681
PH. (512) 238-1200, FAX (512) 238-1251
FIRM REGISTRATION NO. 100591-00

Texas Department of Transportation

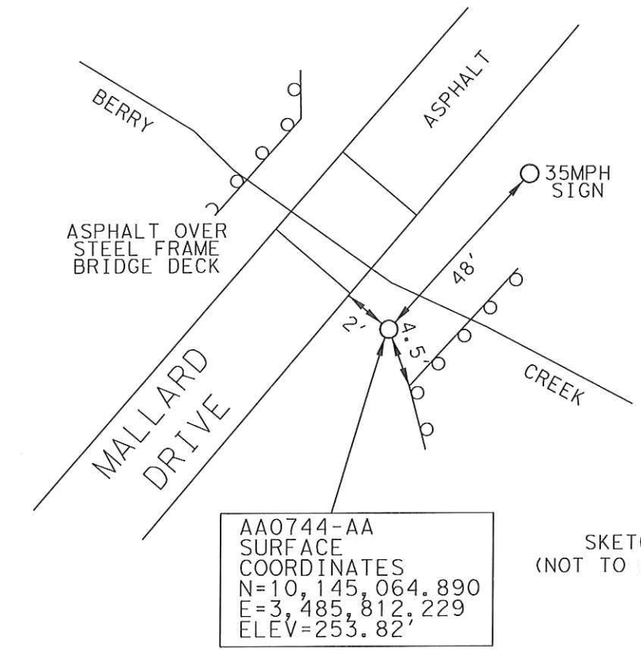
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS	BR 2021(237), ETC.			CR
STATE DIST.	COUNTY	ROW CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BRY	BURLESON	917	30	059	37

S:\JACOBS\MALLARD RD\CONTROL SHEETS\CONTROL-917-30-059-SH1-3.dgn

07/21/2022

CONTROL MONUMENT DESCRIPTION:

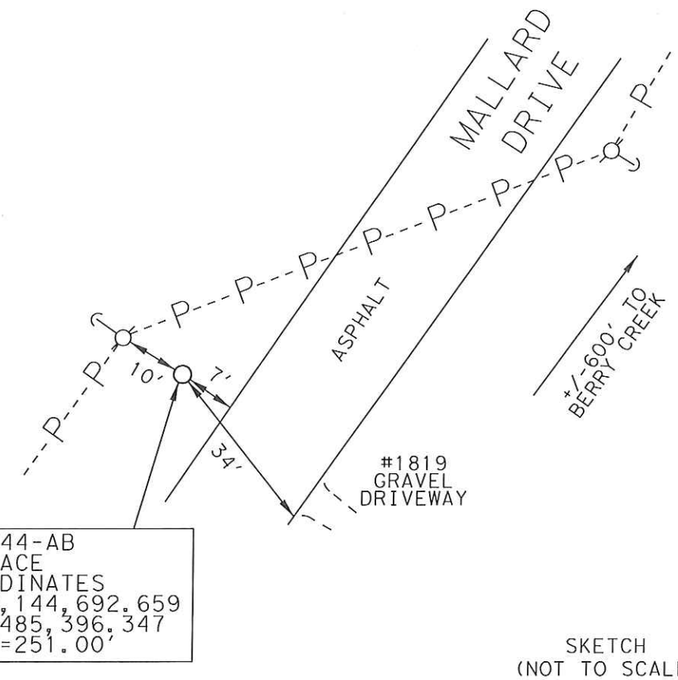
A 3 1/2" ALUMINUM DISK SET IN CONCRETE
STAMPED "AA0744-AA"



SKETCH
(NOT TO SCALE)

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE
STAMPED "AA0744-AB"



SKETCH
(NOT TO SCALE)

AA0744-AA

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE STAMPED "AA0744-AA"
LOCATED ON MALLARD DRIVE, APPROXIMATELY 3.7 MILES NORTH OF THE INTERSECTION OF S.H. 36 AND F.M. 60 IN THE CITY OF LYONS TEXAS.
MON SET IS APPROXIMATELY 2 FEET SOUTHEASTERLY OF THE SOUTH EDGE OF DECKED BRIDGE OVER BERRY CREEK, APPROXIMATELY 4.5 FEET NORTHEAST OF GUARDRAIL ANGLE POINT.

US SURVEY FEET
TEXAS CENTRAL ZONE (4203)
NORTH AMERICAN DATUM OF 1983 (NAD 83)
GEOID 12A MODEL
DATE SET: MAY 07, 2021
TXDOT SURFACE ADJUSTMENT FACTOR: 1.00008.

GRID NORTHING:	10,144,253.350
GRID EASTING:	3,485,533.386
SURFACE NORTHING:	10,145,064.890
SURFACE EASTING:	3,485,812.229
NAVD88 ELEVATION:	253.820'

AA0744-AB

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE STAMPED "AA0744-AB"
LOCATED ON MALLARD DRIVE, APPROXIMATELY 3.7 MILES NORTH OF THE INTERSECTION OF S.H. 36 AND F.M. 60 IN THE CITY OF LYONS TEXAS.
MON SET IS APPROXIMATELY 600 FEET SOUTHWEST OF CENTERLINE OF BERRY CREEK, 7 FEET NORTHWESTERLY OF THE WEST EDGE OF PAVEMENT OF MALLARD DRIVE, APPROXIMATELY 10 FEET SOUTHEAST OF POWER POLE, 34 FEET NORTHWEST OF A DRIVEWAY #1819.

US SURVEY FEET
TEXAS CENTRAL ZONE (4203)
NORTH AMERICAN DATUM OF 1983 (NAD 83)
GEOID 12A MODEL
DATE SET: MAY 07, 2021
TXDOT SURFACE ADJUSTMENT FACTOR: 1.00008.

GRID NORTHING:	10,143,881.148
GRID EASTING:	3,485,117.538
SURFACE NORTHING:	10,144,692.659
SURFACE EASTING:	3,485,396.347
NAVD88 ELEVATION:	251.00'

NOTES:

ALL COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ) EPOCH 2010.00 GEOID 12A DETERMINED BY TXDOT VRS NETWORK (CORS PIDs "TXBT DM4151", "TXC2 DO8863, "TXWA DG9808. ALL DISTANCES AND COORDINATES ARE IN U.S SURVEY FEET WITH A GRID TO GROUND SCALE FACTOR OF 1.00008.

M. Stephen Truesdale
21 July 2022

STATE OF TEXAS
REGISTERED
M. STEPHEN TRUESDALE
4933
PROFESSIONAL
LAND SURVEYOR

SURVEY CONTROL

NO.	REVISION	BY	DATE

INLAND GEODETICS
PROFESSIONAL LAND SURVEYORS
1504 CHISHOLM TRAIL RD. STE. 103
ROUND ROCK, TX. 78681
PH. (512) 238-1200, FAX (512) 238-1251
FIRM REGISTRATION NO. 100591-00

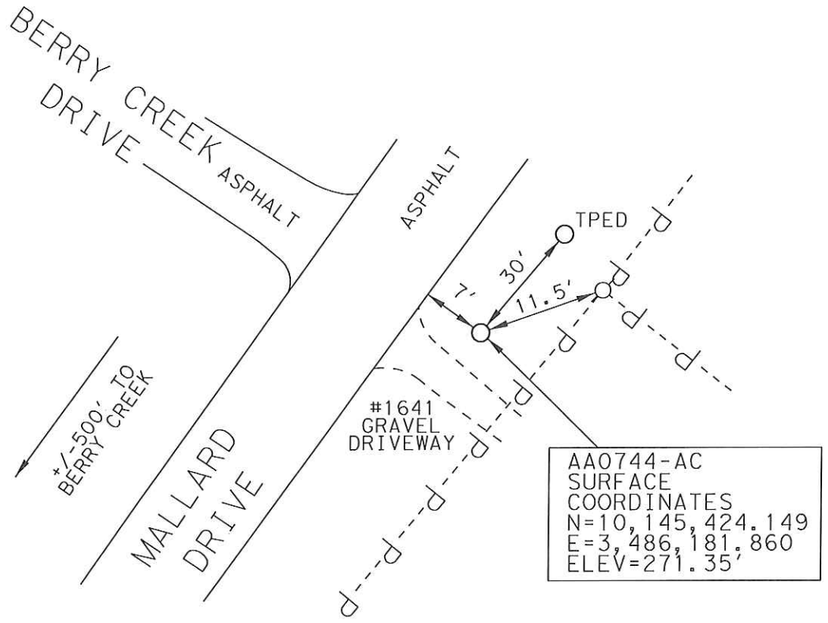
Texas Department of Transportation

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS	BR 2021(237), ETC.			CR
STATE DIST.	COUNTY	ROW CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BRY	BURLESON	917	30	059	38

S:\JACOBS\MALLARD RD\CONTROL SHEETS\CONTROL-917-30-059-SH1-3.dgn
07/21/2022

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE
STAMPED "AA0744-AC"



SKETCH
(NOT TO SCALE)

AA0744-AC

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE STAMPED "AA0744-AC" LOCATED ON MALLARD DRIVE, APPROXIMATELY 3.7 MILES NORTH OF THE INTERSECTION OF S.H. 36 AND F.M. 60 IN THE CITY OF LYONS TEXAS. MON SET IS APPROXIMATELY 500 FEET NORTHEAST OF BERRY CREEK, 7 FEET SOUTHEASTERLY OF THE EDGE OF PAVEMENT OF MALLARD DRIVE, APPROXIMATELY 30 FEET SOUTHWEST OF A TELEPHONE PEDESTAL, 11.5 FEET SOUTHWEST OF A POWER POLE.

US SURVEY FEET
TEXAS CENTRAL ZONE (4203)
NORTH AMERICAN DATUM OF 1983 (NAD 83)
GEOID 12A MODEL
DATE SET: MAY 07, 2021
TXDOT SURFACE ADJUSTMENT FACTOR: 1.00008.

GRID NORTHING:	10,144,612.580
GRID EASTING:	3,485,902.988
SURFACE NORTHING:	10,145,424.149
SURFACE EASTING:	3,486,181.860
NAVD88 ELEVATION:	271.35'

NOTES:

ALL COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ) EPOCH 2010.00 GEOID 12A DETERMINED BY TXDOT VRS NETWORK (CORS PIDs "TXBT DM4151", "TXC2 DO8863, "TXWA DG9808. ALL DISTANCES AND COORDINATES ARE IN U.S SURVEY FEET WITH A GRID TO GROUND SCALE FACTOR OF 1.00008.

M. Stephen Truesdale
21 Jul 2022

STATE OF TEXAS REGISTERED M. STEPHEN TRUESDALE 4933 PROFESSIONAL LAND SURVEYOR

SURVEY CONTROL

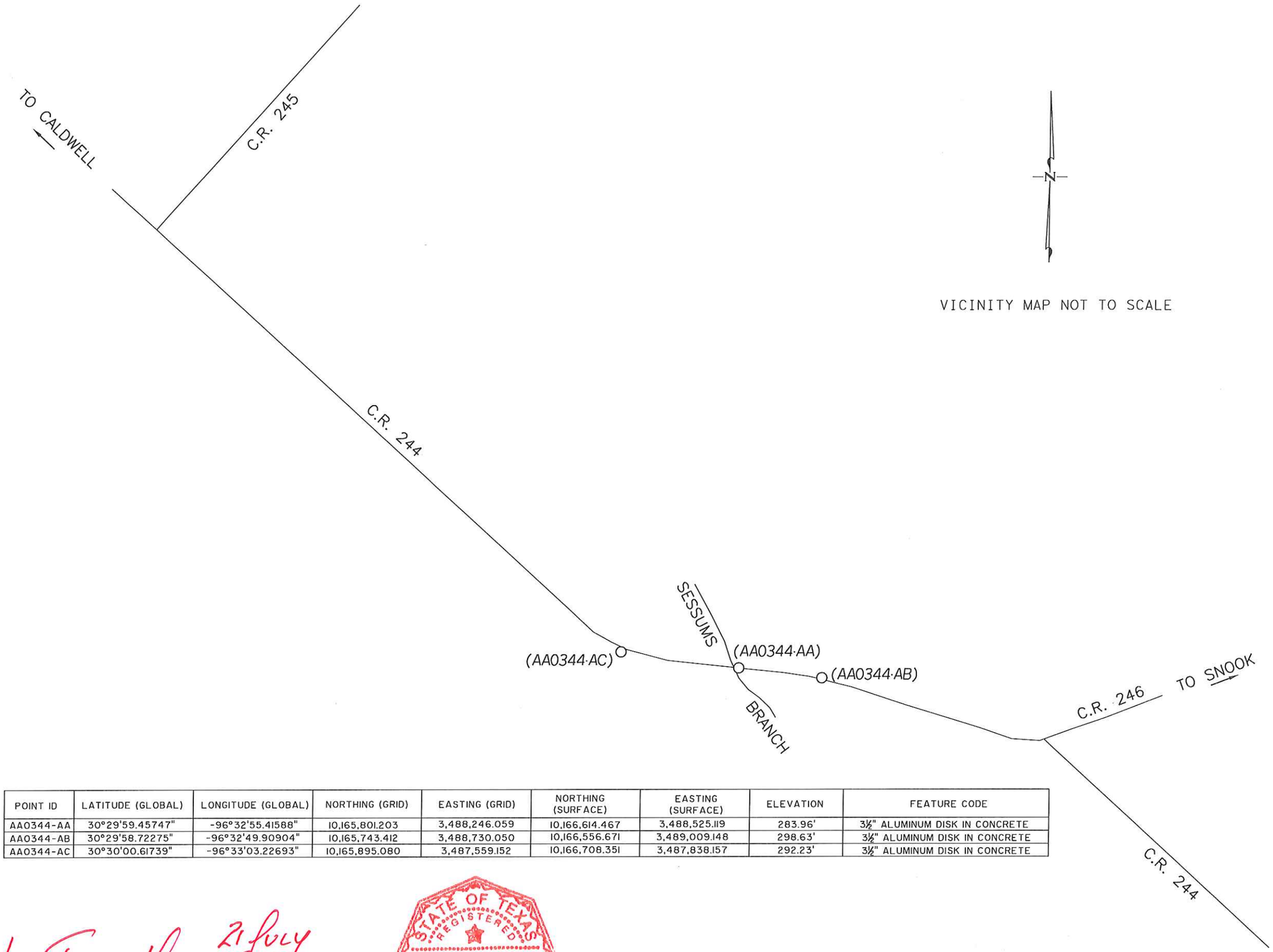
NO.	REVISION	BY	DATE

INLAND GEODETICS LLC
PROFESSIONAL LAND SURVEYORS
1504 CHISHOLM TRAIL RD. STE. 103
ROUND ROCK, TX. 78681
PH. (512) 238-1200, FAX (512) 238-1251
FIRM REGISTRATION NO. 100591-00

Texas Department of Transportation

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS	BR 2021(237), ETC.			CR
STATE DIST.	COUNTY	ROW CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BRY	BURLESON	917	30	059	39

S:\JACOBS\MALLARD RD\CONTROL SHEETS\CONTROL-917-30-059-SH1-3.dgn
07/21/2022



VICINITY MAP NOT TO SCALE

NOTES:

ALL COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ) EPOCH 2010.00 GEOID 12A DETERMINED BY TXDOT VRS NETWORK (CORS PIDs "TXBT DM4151", "TXC2 DO8863, "TXWA DG9808. ALL DISTANCES AND COORDINATES ARE IN U.S SURVEY FEET WITH A GRID TO GROUND SCALE FACTOR OF 1.00008.

POINT ID	LATITUDE (GLOBAL)	LONGITUDE (GLOBAL)	NORTHING (GRID)	EASTING (GRID)	NORTHING (SURFACE)	EASTING (SURFACE)	ELEVATION	FEATURE CODE
AA0344-AA	30°29'59.45747"	-96°32'55.41588"	10,165,801.203	3,488,246.059	10,166,614.467	3,488,525.119	283.96'	3½" ALUMINUM DISK IN CONCRETE
AA0344-AB	30°29'58.72275"	-96°32'49.90904"	10,165,743.412	3,488,730.050	10,166,556.671	3,489,009.148	298.63'	3½" ALUMINUM DISK IN CONCRETE
AA0344-AC	30°30'00.61739"	-96°33'03.22693"	10,165,895.080	3,487,559.152	10,166,708.351	3,487,838.157	292.23'	3½" ALUMINUM DISK IN CONCRETE

M. Stephen Truesdale — 21 July 2022

M. STEPHEN TRUESDALE — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR NO. 4933
LICENSED STATE LAND SURVEYOR
INLAND GEODETICS, LLC
FIRM REGISTRATION NO. 100591-00
1504 CHISHOLM TRAIL ROAD, SUITE 103
ROUND ROCK, TEXAS 78681

STATE OF TEXAS · REGISTERED · M. STEPHEN TRUESDALE · 4933 · PROFESSIONAL · LAND SURVEYOR

SURVEY CONTROL

NO.	REVISION	BY	DATE

INLAND GEODETICS, LLC
PROFESSIONAL LAND SURVEYORS
1504 CHISHOLM TRAIL RD. STE. 103
ROUND ROCK, TX. 78681
PH. (512) 238-1200, FAX (512) 238-1251
FIRM REGISTRATION NO. 100591-00

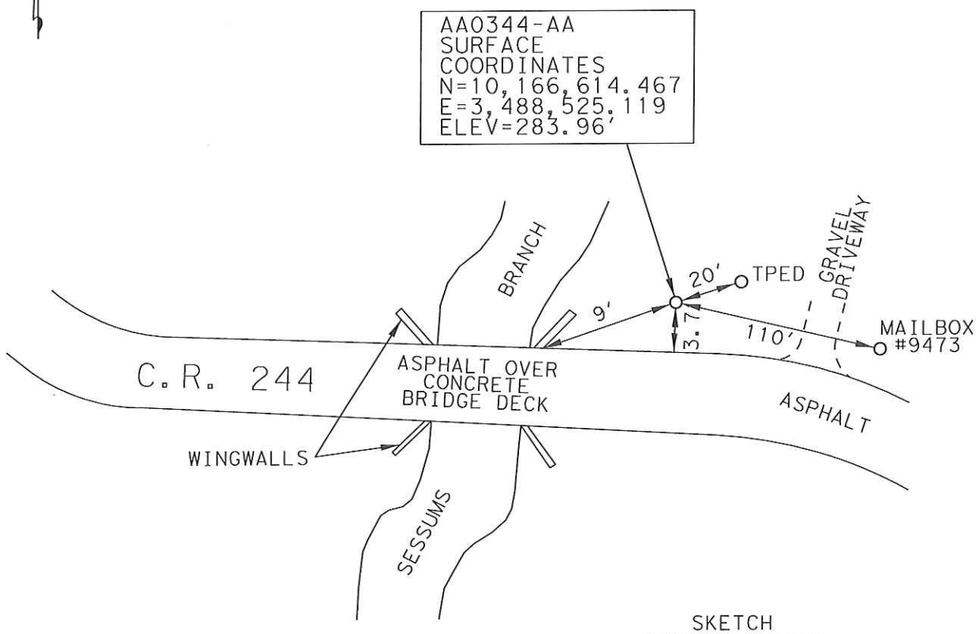
Texas Department of Transportation

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS	BR 2021(237), ETC.			CR
STATE DIST.	COUNTY	ROW CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BRY	BURLESON	917	30	060	40

S:\JACOBS\SESSUMS BRIDGE\CONTROL SHEETS\CONTROL-917-30-060-SH1-3.dgn
07/21/2022

CONTROL MONUMENT DESCRIPTION:

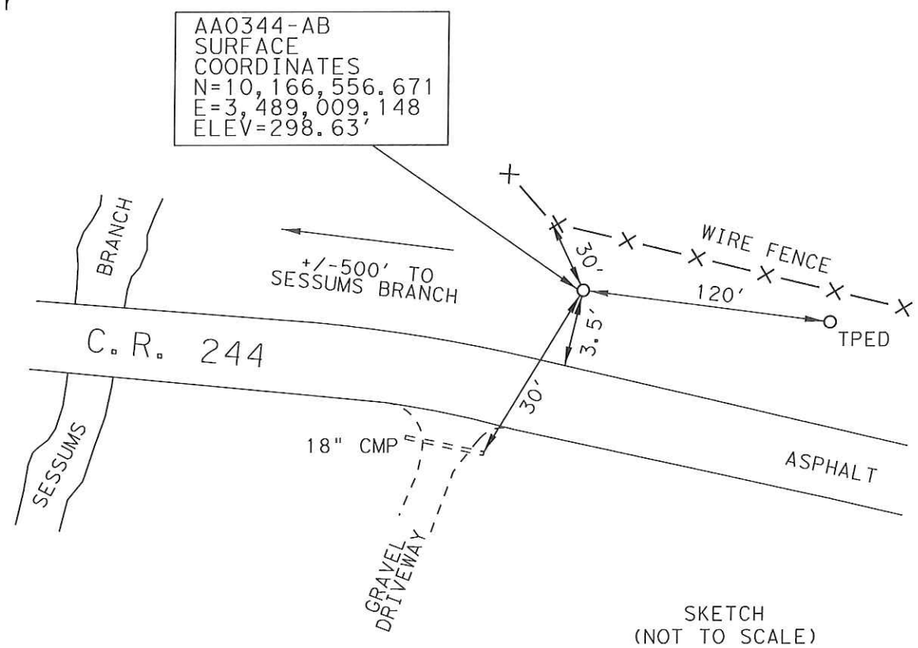
A 3 1/2" ALUMINUM DISK SET IN CONCRETE
STAMPED "AA0344-AA"



SKETCH
(NOT TO SCALE)

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE
STAMPED "AA00344-AB"



SKETCH
(NOT TO SCALE)

NOTES:

ALL COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ) EPOCH 2010.00 GEOID 12A DETERMINED BY TXDOT VRS NETWORK (CORS PIDs "TXBT DM4151", "TXC2 DO8863, "TXWA DG9808. ALL DISTANCES AND COORDINATES ARE IN U.S SURVEY FEET WITH A GRID TO GROUND SCALE FACTOR OF 1.00008.

M. Stephen Truesdale
21 July 2022

STATE OF TEXAS
REGISTERED
M. STEPHEN TRUESDALE
4933
PROFESSIONAL
LAND SURVEYOR

AA0344-AA

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE STAMPED "AA0344-AA" LOCATED ON COUNTY ROAD 244, APPROXIMATELY 9 MILES EAST OF THE INTERSECTION OF S.H. 36 AND S.H. 21 IN THE CITY OF CALDWELL TEXAS. MON SET IS APPROXIMATELY 23 FEET EAST OF SESSUMS BRANCH, 3.7 FEET NORTH OF THE EDGE OF PAVEMENT OF C.R. 244, APPROXIMATELY 110 FEET WEST OF MAILBOX NUMBERED 9473. APPROXIMATELY 20 FEET WEST OF A TPED AND 9 FEET NORTH OF THE SOUTH END OF THE NORTHEAST WING WALL OF SESSUMS BRANCH.

US SURVEY FEET
TEXAS CENTRAL ZONE (4203)
NORTH AMERICAN DATUM OF 1983 (NAD 83)
GEOID 12A MODEL
DATE SET: JUNE 28, 2021
TXDOT SURFACE ADJUSTMENT FACTOR: 1.00008.

GRID NORTHING:	10,165,801.203
GRID EASTING:	3,488,246.059
SURFACE NORTHING:	10,166,614.467
SURFACE EASTING:	3,488,525.119
NAVD88 ELEVATION:	283.96'

AA0344-AB

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE STAMPED "AA0344-AB" LOCATED ON COUNTY ROAD 244, APPROXIMATELY 9 MILES EAST OF THE INTERSECTION OF S.H. 36 AND S.H. 21 IN THE CITY OF CALDWELL TEXAS. MON SET IS APPROXIMATELY 500 FEET EAST OF SESSUMS BRANCH, 3.5 FEET NORTH OF THE EDGE OF PAVEMENT OF C.R. 244, APPROXIMATELY 120 FEET WEST OF A TPED. APPROXIMATELY 30 FEET NORTH OF A 18 INCH CULVERT AND 30 FEET SOUTH OF AN ANGLE POINT IN THE NORTH WIRE FENCELINE.

US SURVEY FEET
TEXAS CENTRAL ZONE (4203)
NORTH AMERICAN DATUM OF 1983 (NAD 83)
GEOID 12A MODEL
DATE SET: JUNE 28, 2021
TXDOT SURFACE ADJUSTMENT FACTOR: 1.00008.

GRID NORTHING:	10,165,743.412
GRID EASTING:	3,488,730.050
SURFACE NORTHING:	10,166,556.671
SURFACE EASTING:	3,489,009.148
NAVD88 ELEVATION:	298.63'

SURVEY CONTROL

NO.	REVISION	BY	DATE

INLAND GEODETICS
PROFESSIONAL LAND SURVEYORS
1504 CHISHOLM TRAIL RD. STE. 103
ROUND ROCK, TX. 78681
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FIRM REGISTRATION NO. 100591-00

Texas Department of Transportation

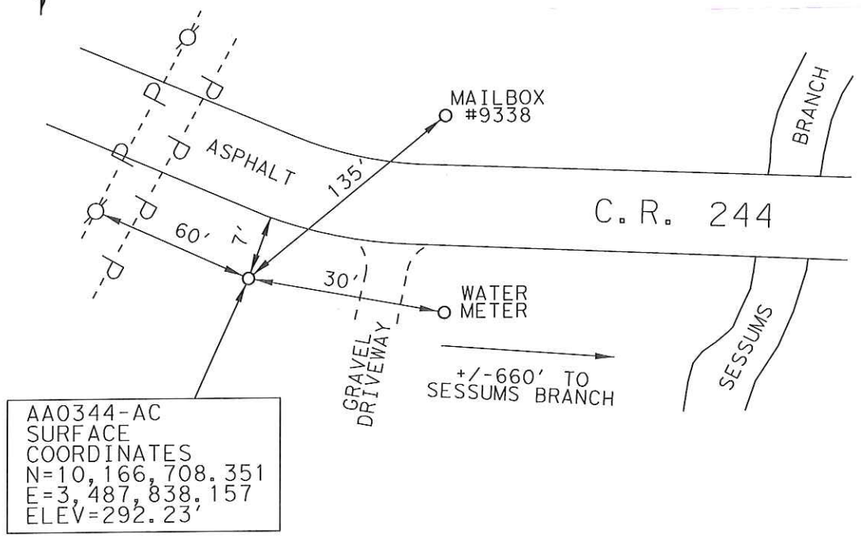
FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS	BR 2021(237), ETC.			CR
STATE DIST.	COUNTY	ROW CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BRY	BURLESON	917	30	060	41

S:\JACOBS\SESSUMS BRIDGE\CONTROL SHEETS\CONTROL-917-30-060-SH1-3.dgn

07/21/2022

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE
STAMPED "AA0344-AC"



SKETCH
(NOT TO SCALE)

AA0344-AC

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE STAMPED "AA0344-AC" LOCATED ON COUNTY ROAD 244, APPROXIMATELY 9 MILES EAST OF THE INTERSECTION OF S.H. 36 AND S.H. 21 IN THE CITY OF CALDWELL TEXAS. MON SET IS APPROXIMATELY 660 WEST OF SESSUMS BRANCH, 7 FEET SOUTH OF THE EDGE OF PAVEMENT OF C.R. 244, APPROXIMATELY 135 FEET SOUTHWEST OF MAILBOX NUMBERED 9338. APPROXIMATELY 60 FEET EAST OF DOUBLE OVERHEAD ELECTRIC CABLES CROSSING C.R. 244.

US SURVEY FEET
TEXAS CENTRAL ZONE (4203)
NORTH AMERICAN DATUM OF 1983 (NAD 83)
GEOID 12A MODEL
DATE SET: JUNE 28, 2021
TXDOT SURFACE ADJUSTMENT FACTOR: 1.00008.

GRID NORTHING:	10,165,895.080
GRID EASTING:	3,487,559.152
SURFACE NORTHING:	10,166,708.351
SURFACE EASTING:	3,487,838.157
NAVD88 ELEVATION:	292.23'

NOTES:

ALL COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, TEXAS CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ) EPOCH 2010.00 GEOID 12A DETERMINED BY TXDOT VRS NETWORK (CORS PIDs "TXBT DM4151", "TXC2 DO8863, "TXWA DG9808. ALL DISTANCES AND COORDINATES ARE IN U.S SURVEY FEET WITH A GRID TO GROUND SCALE FACTOR OF 1.00008.

M. Stephen Truesdale
21 July 2022

STATE OF TEXAS
REGISTERED
M. STEPHEN TRUESDALE
4933
PROFESSIONAL
LAND SURVEYOR

SURVEY CONTROL

NO.	REVISION	BY	DATE

INLAND GEODETICS LLC
PROFESSIONAL LAND SURVEYORS
1504 CHISHOLM TRAIL RD. STE. 103
ROUND ROCK, TX. 78681
PH. (512) 238-1200, FAX (512) 238-1251
FIRM REGISTRATION NO. 100591-00

Texas Department of Transportation

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS	BR 2021(237), ETC.			CR
STATE DIST.	COUNTY	ROW CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BRY	BURLESON	917	30	060	42

S:\JACOBS\SESSUMS BRIDGE\CONTROL SHEETS\CONTROL-917-30-060-SH1-3.dgn
07/21/2022

Beginning chain MALLARD description

Point MALLARD1 X 3,485,517.5227 Y 10,144,788.9296 Sta 39+50.00

Course from MALLARD1 to PC MALLARD_3 N 45° 14′ 30.93" E Dist 222.6477

			Curve Data			
Curve MALLARD_3						
P.I. Station		42+11.00	X	3,485,702.8552	Y	10,144,972.7035
Delta	=	8° 36′ 04.14" (LT)				
Degree	=	11° 14′ 04.08"				
Tangent	=	38.3522				
Length	=	76.5604				
Radius	=	510.0000				
External	=	1.4400				
Long Chord	=	76.4885				
Mid. Ord.	=	1.4360				
P.C. Station		41+72.65	X	3,485,675.6218	Y	10,144,945.6992
P.T. Station		42+49.21	X	3,485,725.7437	Y	10,145,003.4771
C.C.			X	3,485,316.5233	Y	10,145,307.8431
Back	= N	45° 14′ 30.93" E				
Ahead	= N	36° 38′ 26.79" E				
Chord Bear	= N	40° 56′ 28.86" E				

			Curve Data			
Curve MALLARD_4						
P.I. Station		42+87.56	X	3,485,748.6322	Y	10,145,034.2507
Delta	=	8° 36′ 04.14" (RT)				
Degree	=	11° 14′ 04.08"				
Tangent	=	38.3522				
Length	=	76.5604				
Radius	=	510.0000				
External	=	1.4400				
Long Chord	=	76.4885				
Mid. Ord.	=	1.4360				
P.C. Station		42+49.21	X	3,485,725.7437	Y	10,145,003.4771
P.T. Station		43+25.77	X	3,485,775.8656	Y	10,145,061.2551
C.C.			X	3,486,134.9641	Y	10,144,699.1111
Back	= N	36° 38′ 26.79" E				
Ahead	= N	45° 14′ 30.93" E				
Chord Bear	= N	40° 56′ 28.86" E				

Course from PT MALLARD_4 to PC MALLARD_7 N 45° 14′ 30.93" E Dist 102.4537

			Curve Data			
Curve MALLARD_7						
P.I. Station		44+68.64	X	3,485,877.3148	Y	10,145,161.8512
Delta	=	9° 03′ 42.98" (RT)				
Degree	=	11° 14′ 04.08"				
Tangent	=	40.4153				
Length	=	80.6619				
Radius	=	510.0000				
External	=	1.5989				
Long Chord	=	80.5779				
Mid. Ord.	=	1.5939				
P.C. Station		44+28.22	X	3,485,848.6165	Y	10,145,133.3942
P.T. Station		45+08.88	X	3,485,910.1370	Y	10,145,185.4330
C.C.			X	3,486,207.7151	Y	10,144,771.2503
Back	= N	45° 14′ 30.93" E				
Ahead	= N	54° 18′ 13.91" E				
Chord Bear	= N	49° 46′ 22.42" E				

			Curve Data			
Curve MALLARD_8						
P.I. Station		45+50.88	X	3,485,944.2432	Y	10,145,209.9373
Delta	=	9° 24′ 53.62" (LT)				
Degree	=	11° 14′ 04.08"				
Tangent	=	41.9964				
Length	=	83.8037				
Radius	=	510.0000				
External	=	1.7262				
Long Chord	=	83.7094				
Mid. Ord.	=	1.7204				
P.C. Station		45+08.88	X	3,485,910.1370	Y	10,145,185.4330
P.T. Station		45+92.69	X	3,485,973.8815	Y	10,145,239.6907
C.C.			X	3,485,612.5589	Y	10,145,599.6156
Back	= N	54° 18′ 13.91" E				
Ahead	= N	44° 53′ 20.28" E				
Chord Bear	= N	49° 35′ 47.10" E				

Course from PT MALLARD_8 to MALLARD10 N 44° 53′ 20.28" E Dist 202.8731

Point MALLARD10 X 3,486,117.0562 Y 10,145,383.4213 Sta 47+95.56

Ending chain MALLARD description

...\SHT\RDWY\Mallard_HA001.dgn
11/23/2022 12:40:45 PM

STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED PROFESSIONAL ENGINEER

11/23/2022

PRINT DATE	REVISION DATE
11/23/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

HORIZONTAL ALIGNMENT DATA
MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 43

Beginning chain CR244 description
Feature: Geom_Centerline

```
                                    Curve Data
                                   *----------*
Curve CR244_1
P.I.  Station            51+40.17  X      3,488,090.3883  Y     10,166,762.1414
Delta        =       9° 07′ 03.74" (LT)
Degree       =       3° 15′ 32.92"
Tangent      =            140.1747
Length       =            279.7576
Radius       =          1,758.0000
External     =              5.5796
Long Chord   =            279.4625
Mid. Ord.    =              5.5619
P.C.  Station            50+00.00  X      3,487,955.6301  Y     10,166,800.7312
P.T.  Station            52+79.76  X      3,488,229.5589  Y     10,166,745.3933
C.C.                               X      3,488,439.6041  Y     10,168,490.8002
Back        = S  74° 01′ 12.80" E
Ahead       = S  83° 08′ 16.54" E
Chord Bear  = S  78° 34′ 44.67" E

Course from PT CR244_1 to PC CR244_4 S 83° 08′ 16.54" E Dist 382.5603

                                    Curve Data
                                   *----------*
Curve CR244_4
P.I.  Station            56+95.46  X      3,488,642.2828  Y     10,166,695.7255
Delta        =       0° 41′ 25.76" (LT)
Degree       =       1° 02′ 30.27"
Tangent      =              33.1415
Length       =              66.2821
Radius       =          5,500.0000
External     =               0.0998
Long Chord   =              66.2817
Mid. Ord.    =               0.0998
P.C.  Station            56+62.32  X      3,488,609.3788  Y     10,166,699.6852
P.T.  Station            57+28.60  X      3,488,675.2322  Y     10,166,692.1625
C.C.                               X      3,489,266.5167  Y     10,172,160.2868
Back        = S  83° 08′ 16.54" E
Ahead       = S  83° 49′ 42.30" E
Chord Bear  = S  83° 28′ 59.42" E

Course from PT CR244_4 to PC CR244_7 S 83° 49′ 42.30" E Dist 219.4878

                                    Curve Data
                                   *----------*
Curve CR244_7
P.I.  Station            60+52.19  X      3,488,996.9493  Y     10,166,657.3743
Delta        =       7° 02′ 59.91" (RT)
Degree       =       3° 23′ 25.02"
Tangent      =            104.1046
Length       =            207.9465
Radius       =          1,690.0000
External     =              3.2034
Long Chord   =            207.8154
Mid. Ord.    =              3.1973
P.C.  Station            59+48.09  X      3,488,893.4480  Y     10,166,668.5662
P.T.  Station            61+56.03  X      3,489,098.2944  Y     10,166,633.5638
C.C.                               X      3,488,711.7624  Y     10,164,988.3608
Back        = S  83° 49′ 42.30" E
Ahead       = S  76° 46′ 42.39" E
Chord Bear  = S  80° 18′ 12.35" E
```

Ending chain CR244 description

11/23/2022

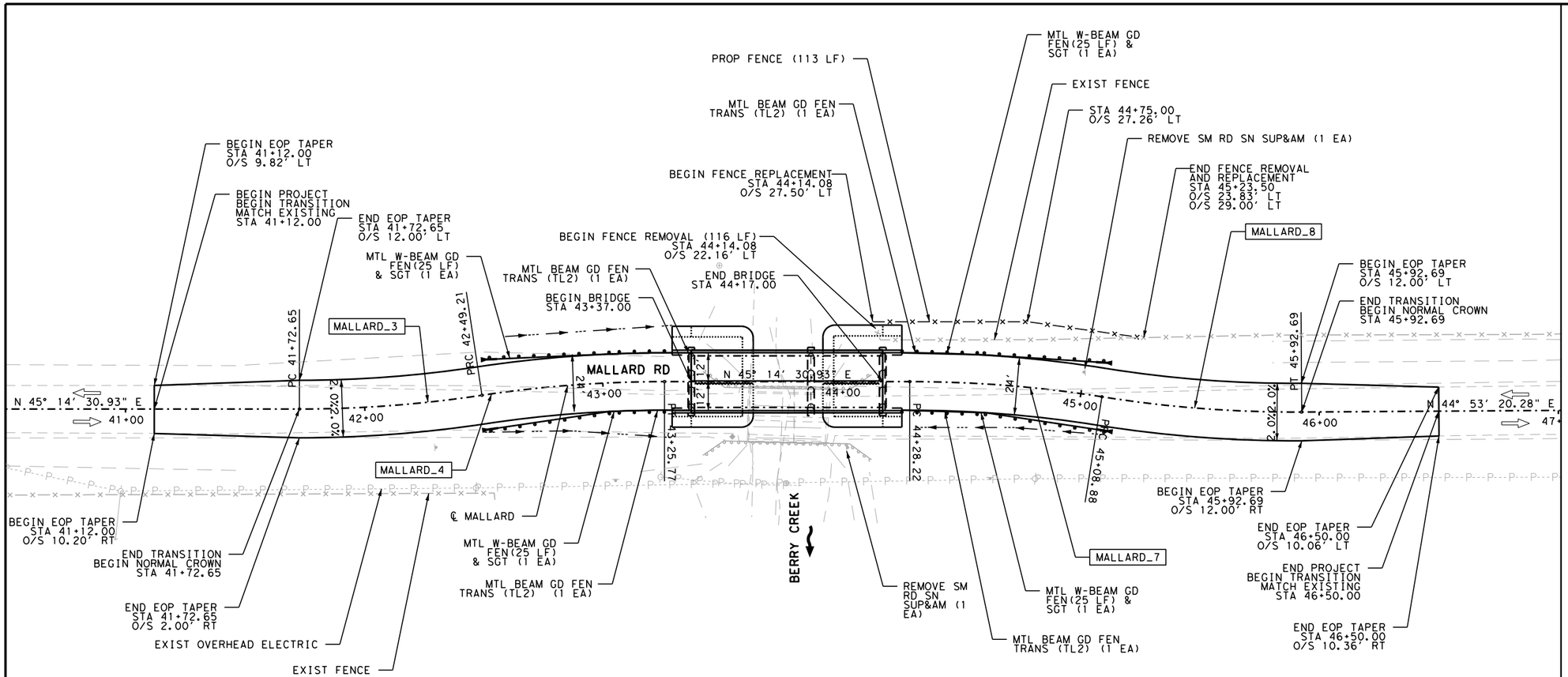
PRINT DATE	REVISION DATE
11/23/2022	

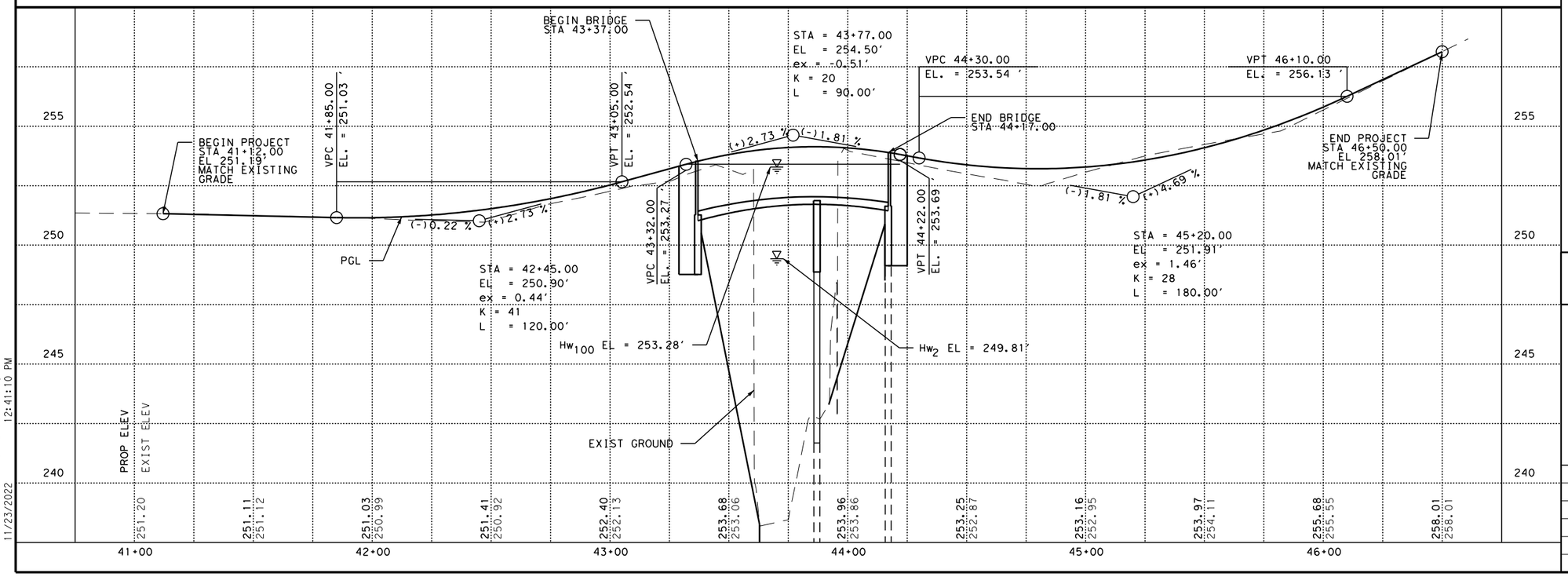
Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

HORIZONTAL ALIGNMENT DATA
CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	**DISTRICT**	**COUNTY**
TEXAS	BRY	BURLESON
CONTROL	**SECTION**	**JOB** / **SHEET NO.**
0917	30	059, ETC. / 44





HORIZONTAL

0 25 50

0 5

VERTICAL

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES IN THE FIELD PRIOR TO BEGINNING ANY TYPE OF WORK.

2. EXISTING ROW IS ASSUMED BASED ON VISIBLE FEATURES SUCH AS FENCE LINES AND/OR BURLESON COUNTY APPRAISAL DISTRICT MAPS.

3. REMOVAL OF TREES LESS THAN 12" DIAMETER WILL BE SUBSIDIARY TO PREP ROW BID ITEM 0100-6002.

LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF CREEK FLOW
- DITCH FLOW LINE
- XXXXX_X — CURVE ID

STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED
PROFESSIONAL ENGINEER

11/23/2022

PRINT DATE	REVISION DATE
11/23/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

PLAN AND PROFILE
MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 45

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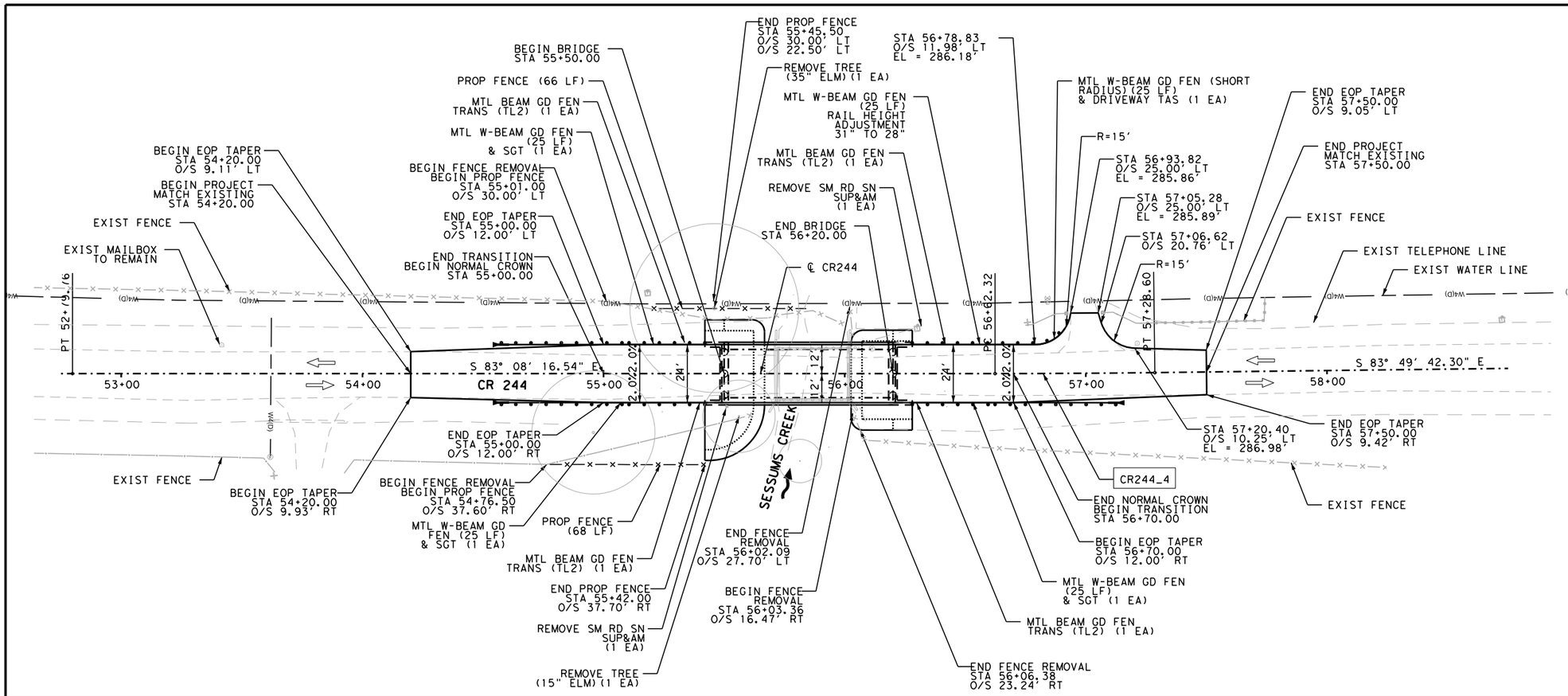

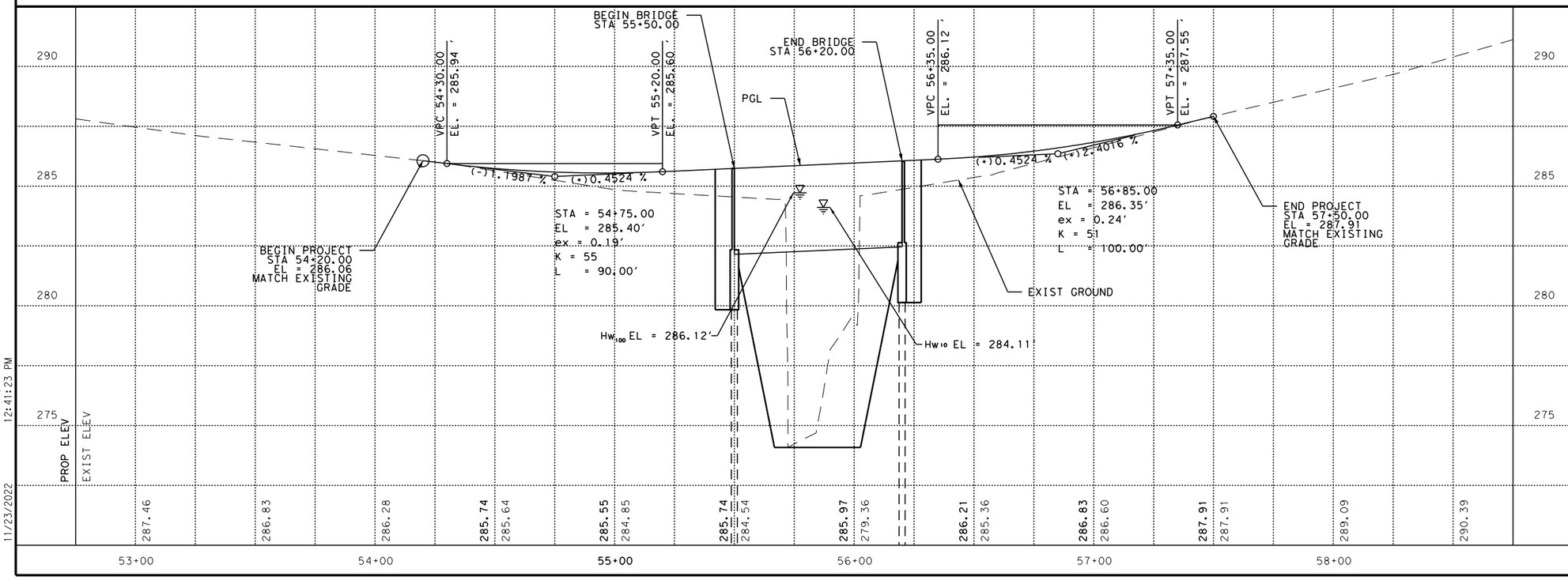

HORIZONTAL
0 25 50
0 5
VERTICAL

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXIST UTILITIES IN THE FIELD PRIOR TO BEGINNING ANY TYPE OF WORK.

2. EXIST ROW IS ASSUMED BASED ON VISIBLE FEATURES SUCH AS FENCE LINES AND/OR BURLESON COUNTY APPRAISAL DISTRICT MAPS.

3. REMOVAL OF TREES LESS THAN 12" DIAMETER WILL BE SUBSIDIARY TO PREP ROW BID ITEM 0100-6002.

LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF CREEK FLOW
- DITCH FLOW LINE
- XXXXX_X — CURVE ID

STATE OF TEXAS
JENNA I. ALCHEVSKY
141671
LICENSED PROFESSIONAL ENGINEER
11/23/2022

PRINT DATE	REVISION DATE
11/23/2022	

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AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

PLAN AND PROFILE
CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 46

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NOTES:

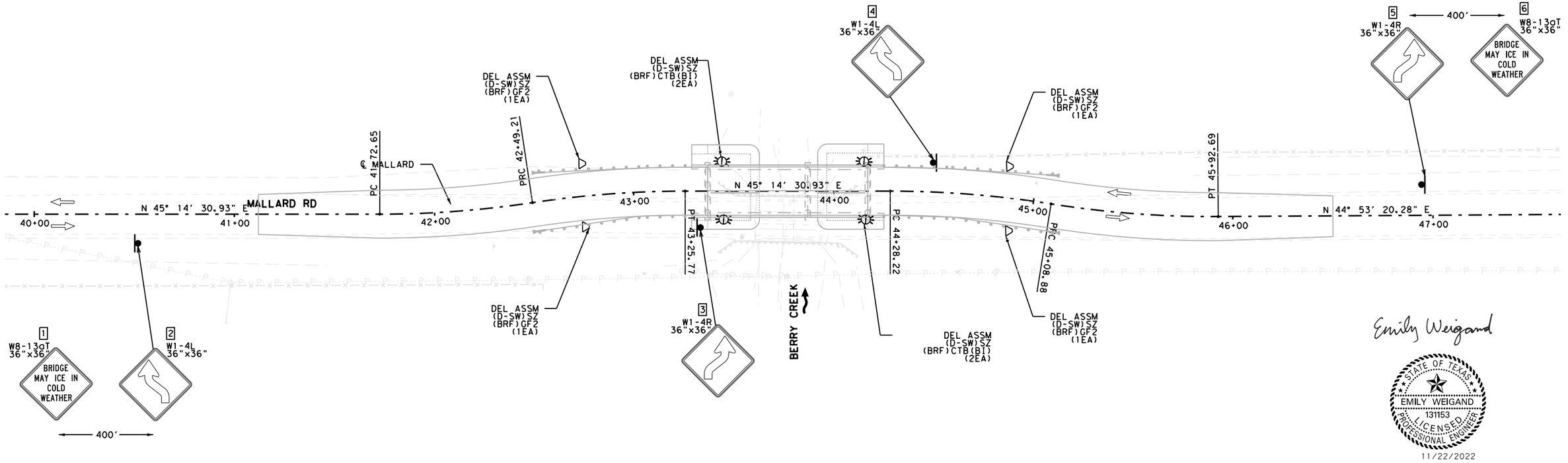
1. CONTRACTOR TO REFER TO D&OM(5)-20 FOR OBJECT MARKER PLACEMENT AND SPACING.

LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF CREEK FLOW
- TYPE CTB DELINEATOR
- TYPE GF2 DELINEATOR
- SMALL SIGN
- SOSS IDENTIFIER

HORIZONTAL 0 25 50 / 0 5

VERTICAL



Emily Weigand

STATE OF TEXAS
EMILY WEIGAND
131153
LICENSED PROFESSIONAL ENGINEER

11/22/2022

PRINT DATE	REVISION DATE
11/22/2022	-

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Texas Department of Transportation
Bryan District

SIGNS AND OBJECT MARKERS MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 47

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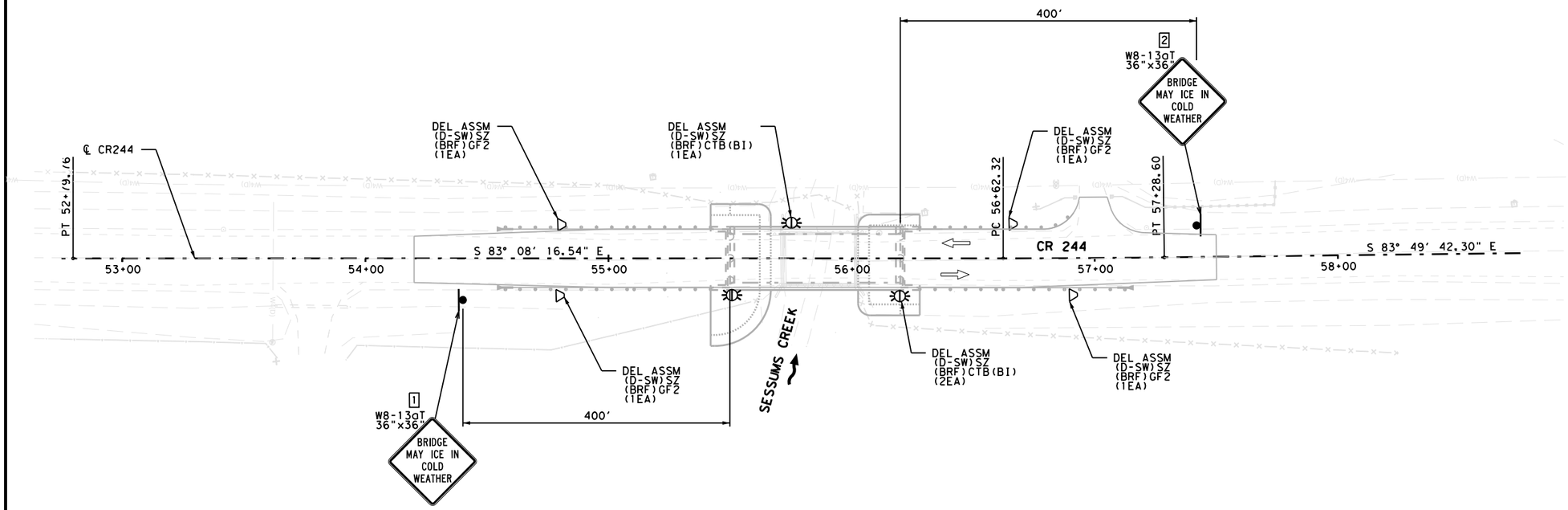
HORIZONTAL
0 25 50
0 5
VERTICAL

NOTES:

1. CONTRACTOR TO REFER TO D&OM(5)-20 FOR OBJECT MARKER PLACEMENT AND SPACING.



LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF CREEK FLOW
- TYPE CTB DELINEATOR
- TYPE GF2 DELINEATOR
- SMALL SIGN
- SOSS IDENTIFIER

Emily Weigand

STATE OF TEXAS
EMILY WEIGAND
131153
LICENSED PROFESSIONAL ENGINEER

11/22/2022

PRINT DATE	REVISION DATE
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Bryan District

SIGNS AND OBJECT MARKERS
CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 48

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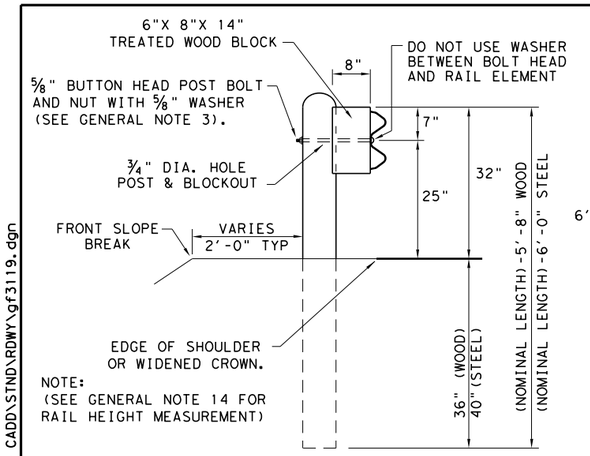
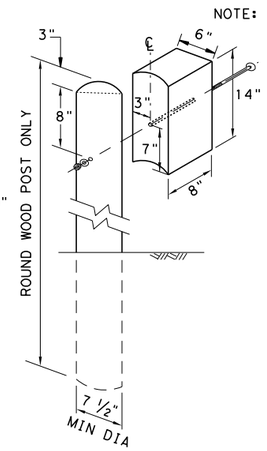
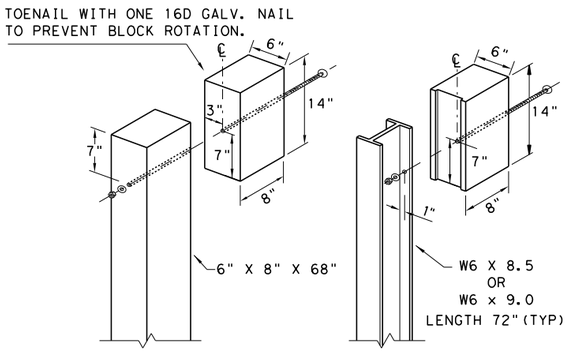


TYPICAL POST PLACEMENT



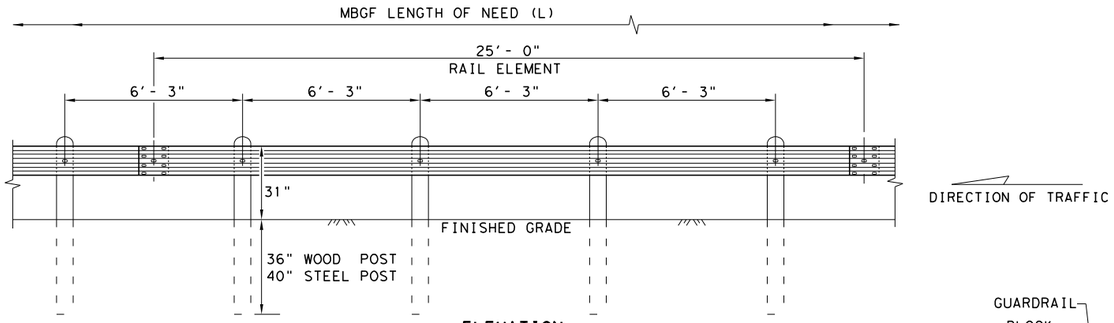
WOOD BLOCK TO
ROUND WOOD POST



WOOD BLOCK TO
RECTANGULAR WOOD POST

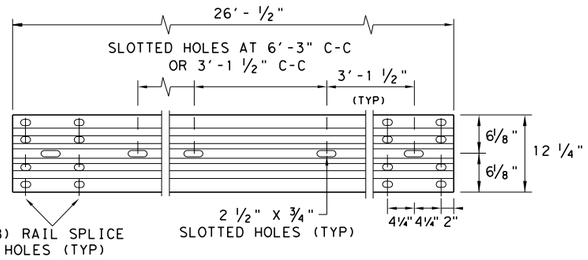
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

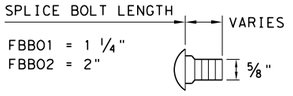
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

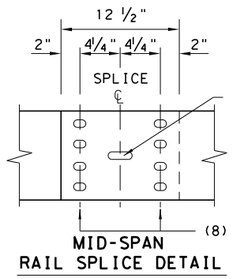
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



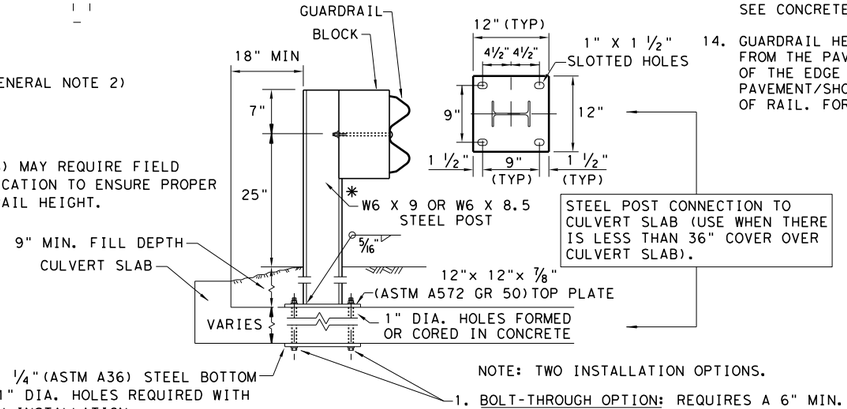
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



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

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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation | Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		49

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GF(31) - LOW SPEED TRANSITION
9'- 4 ½"

CONCRETE BRIDGE RAIL OR CONCRETE TRAFFIC BARRIER

2'-6"

7 ¼"

W-BEAM GUARD FENCE

PLAN VIEW

DIRECTION OF TRAFFIC

(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)

THRIE-BEAM CONNECTOR TO CONCRETE RAIL

37 ½" RAIL SECTION

6'-3" NON-SYMMETRICAL TRANSITION TO W-BEAM (SEE NOTE: 10)

END PAYMENT FOR LOW SPEED TRANSITION.

BEGIN PAYMENT FOR METAL BEAM GUARD FENCE. (SEE GF(31) STANDARD)

2'-6" | 2'-6 ¼" | 3 SPACES 3'-1 ½" | 6'-3" | 3'-1½"

7 ¼"

NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

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

31"

36" (WOOD)
40" (STEEL)

ELEVATION VIEW

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. 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.
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 ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. 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.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE TRANSITION.

2'-6"

20"

50° (TYP)

SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b

37 ½"

THRIE-BEAM RAIL SHORT SECTION 10GA.
PART DESIGNATOR RTM01a

(12) ⅝" X 1 ¼" BUTTON HEAD SPLICE BOLTS: (FBB01)

(8) ⅝" X 1 ¼" BUTTON HEAD SPLICE BOLTS: (FBB01)

6'-3"

LAP DIRECTION

NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSISTION 10GA.
PART DESIGNATOR RWT02a OR RWT02b

(2) ⅝" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
(1) ⅝" FLAT WASHER: (FWC14a) UNDER EACH NUT

(1) ⅝" BUTTON HEAD POST BOLT & NUT: (FBB04)
(1) ⅝" 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.

(6" x 8" x 22") BLOCKOUT REQUIRED AT THIS POST LOCATION

5'-8" (WOOD)
6'-0" (STEEL)
32"
40" (STEEL)
36" (WOOD)

SECTION A-A

(6" x 8" x 14") BLOCKOUT

5'-8" (WOOD)
6'-0" (STEEL)
32"
40" (STEEL)
36" (WOOD)

SECTION B-B

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

3"
6"
8"
3"
7"
14"
8"
6'-0"
DOMED ROUND WOOD POST ONLY
7 ½" MIN DIA

WOOD BLOCK TO ROUND WOOD POST

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

6" X 8" X 68"

WOOD BLOCK TO RECTANGULAR WOOD POST

W6 X 8.5 or W6 x 9.0

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

LOW-SPEED TRANSITION

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

FILE: gf31tr-tl219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0917	30	059, ETC.	CR	
	DIST	COUNTY		SHEET NO.	
	BRY	BURLESON		50	

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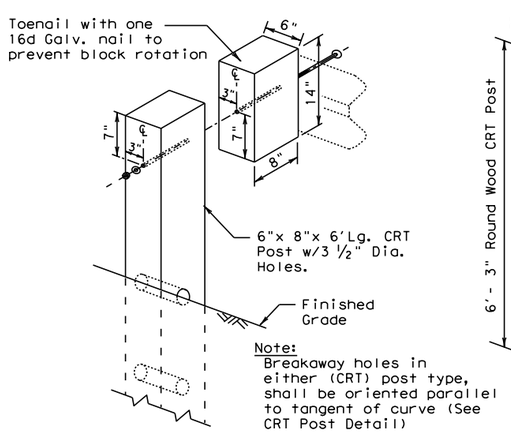
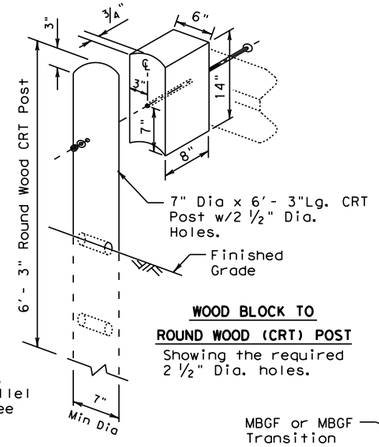
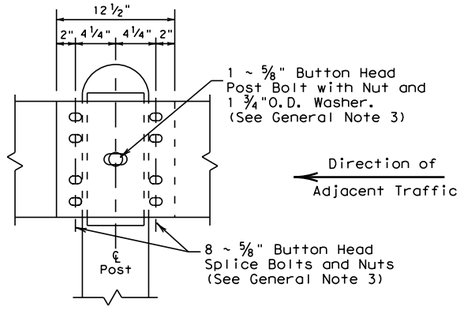


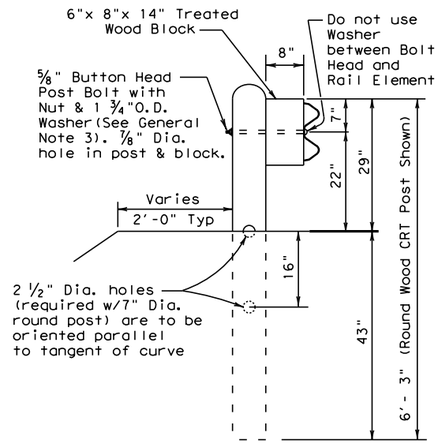
WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3 ½" Dia. holes.



WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 ½" Dia. holes.

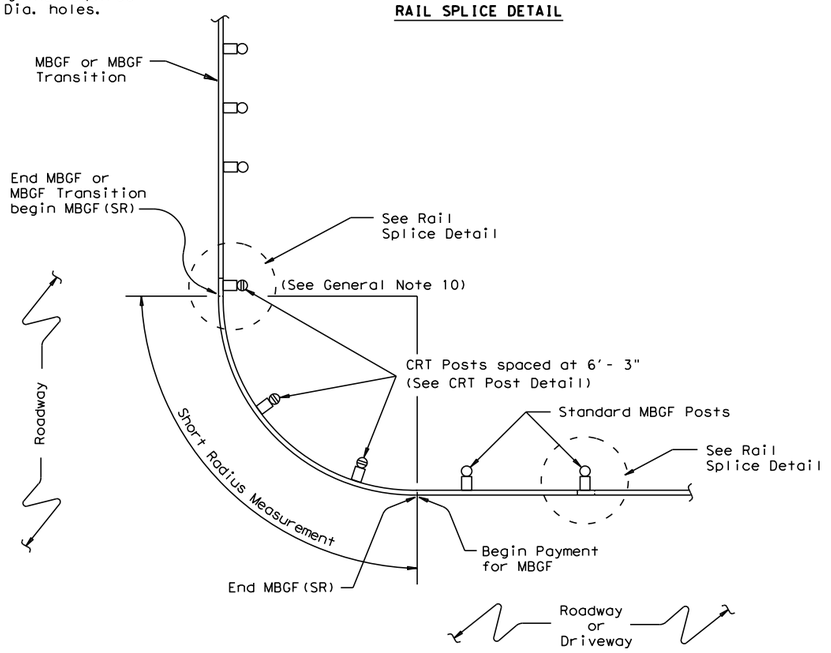


RAIL SPLICE DETAIL



(CRT) POST DETAIL
CONTROLLED RELEASE TERMINAL POST

Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



PLAN VIEW
SHOWING TYPICAL RADIUS

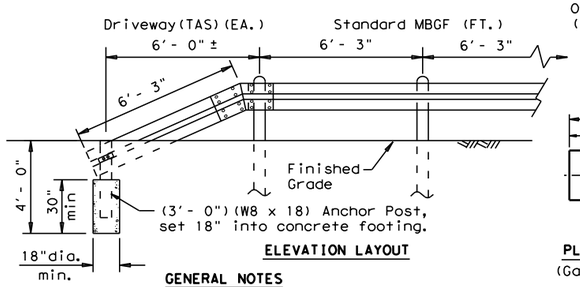
The required radius is shown elsewhere on the plans.

GENERAL NOTES

1. The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
2. Steel posts are not permitted at CRT post positions.
3. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 ½ or 25 foot nominal lengths.
4. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563).
5. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
6. Crown shall be widened to accommodate the Metal Beam Guard Fence.
7. The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Guardrail posts shall not be set in concrete, of any depth.
11. Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
12. The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421,"Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
13. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 posts and/or blocks.

"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.



ELEVATION LAYOUT

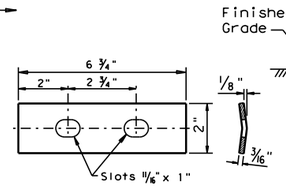
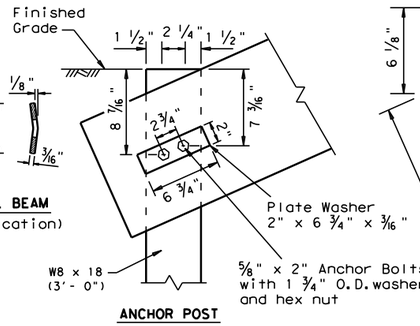
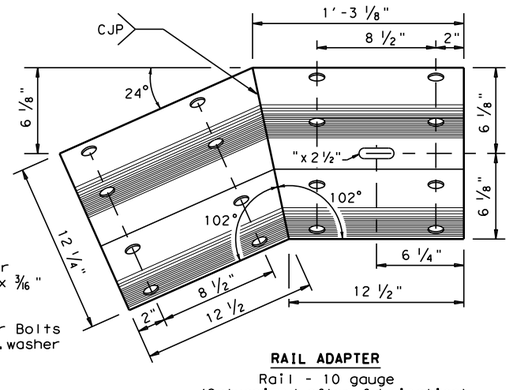


PLATE WASHER FOR METAL BEAM
(Galvanized after fabrication)



ANCHOR POST



RAIL ADAPTER
Rail - 10 gauge
(Galvanized after fabrication)

GENERAL NOTES

1. The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft.(TAS)Terminal Anchor Section, is too long.
2. Terminal anchor post shall be set in Class A concrete.
3. All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE
(SHORT RADIUS)
MBGF(SR)-19

FILE: mbgfsr19.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP	
©TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0917	30	059, ETC.	CR	
	DIST	COUNTY		SHEET NO.	
	BRY	BURLESON		51	

DATE: 11/22/2022 6:15:33 PM
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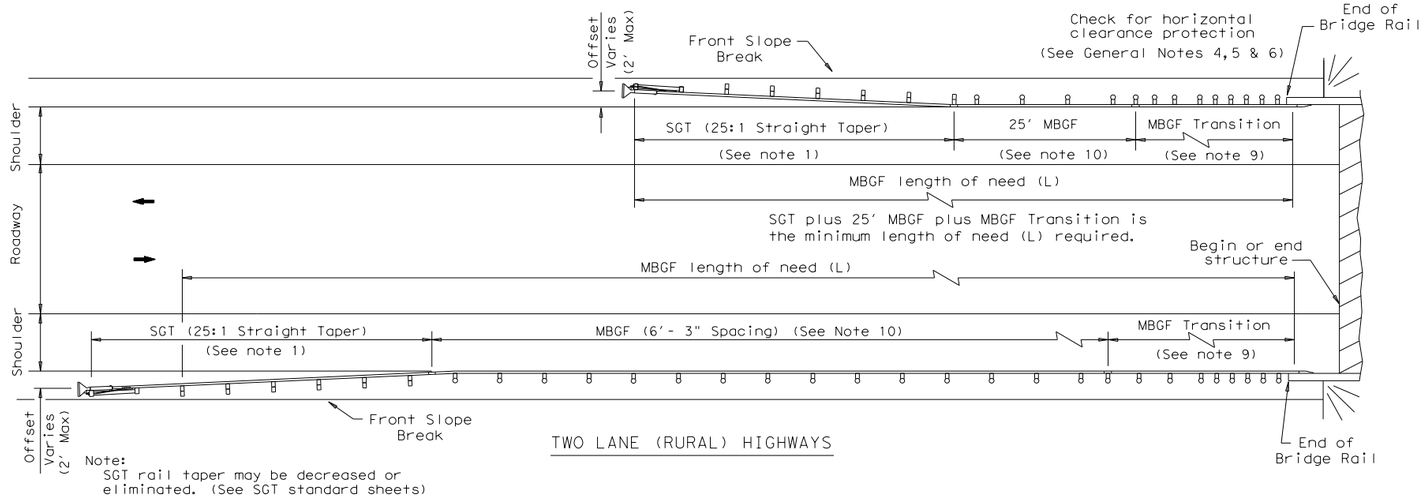
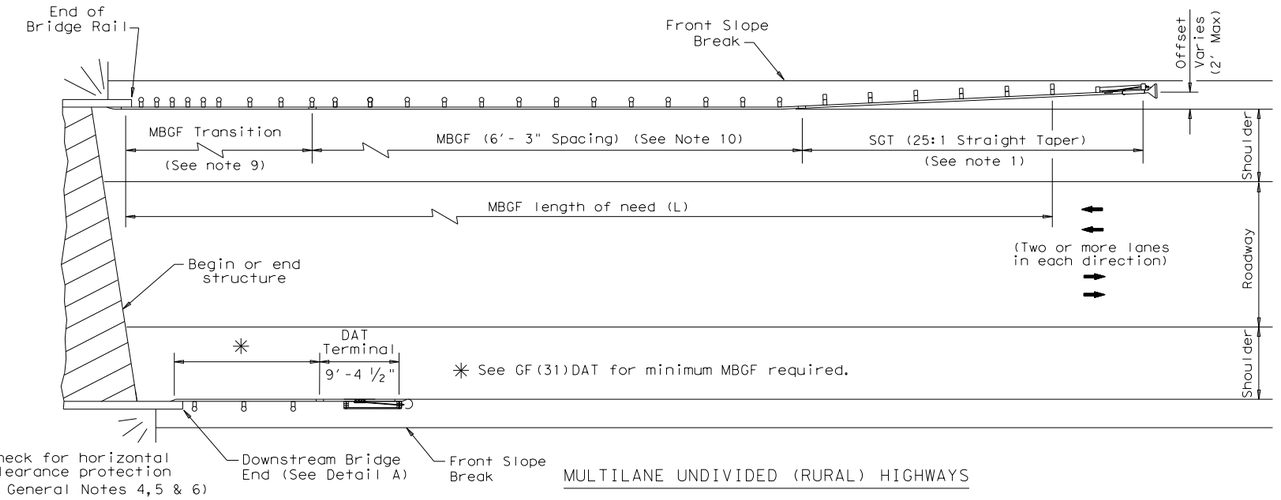
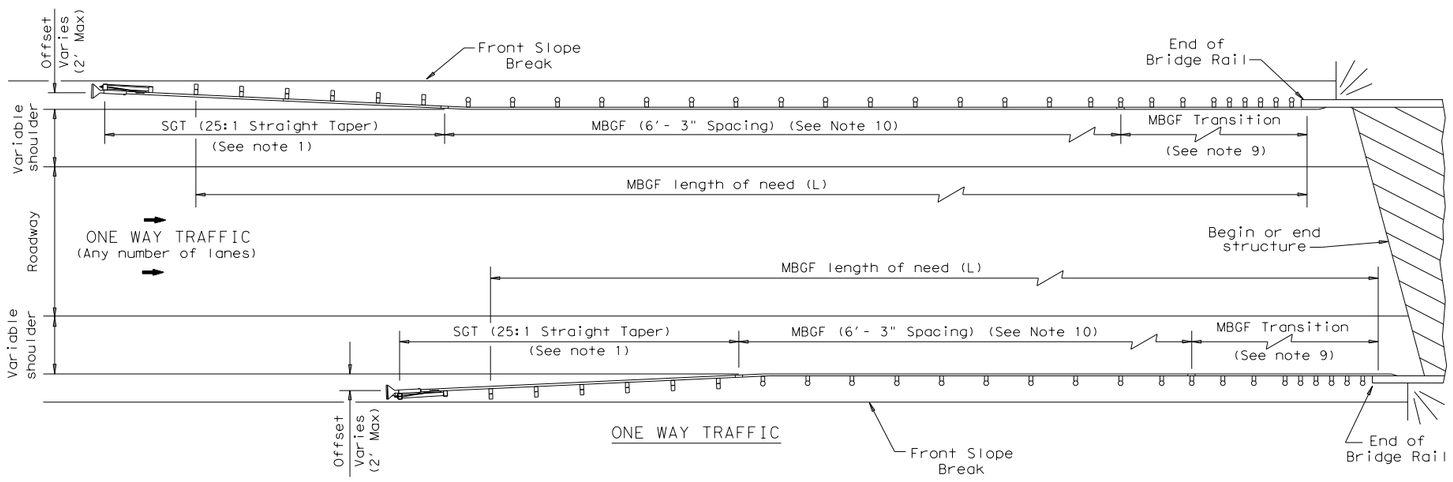


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



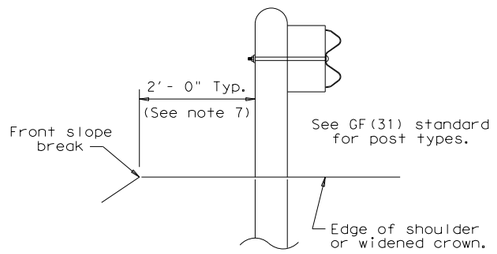
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. 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.
4. 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.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. 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)
7. 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).
8. 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.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		52

DATE: 11/23/2022
FILE: pw:\\Project Wise aMER.jacobs.com Jacobs_US_B_I_SS4\Documents\WJXN4000_BRY_Bridge_Program\WJXN4000\91730059_Mallard Rd\700 CADD\STND\RDWY\sgt10s3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼"

3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE:B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

B B A A

SEE NOTE:C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

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

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

POST 40" DEPTH (TYP 1-8)

6'-1⅜"

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

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

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

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

(2) ANCHOR POST ANGLE PN: 15201G

6'-1⅜" POST DEPTH

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

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

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		53

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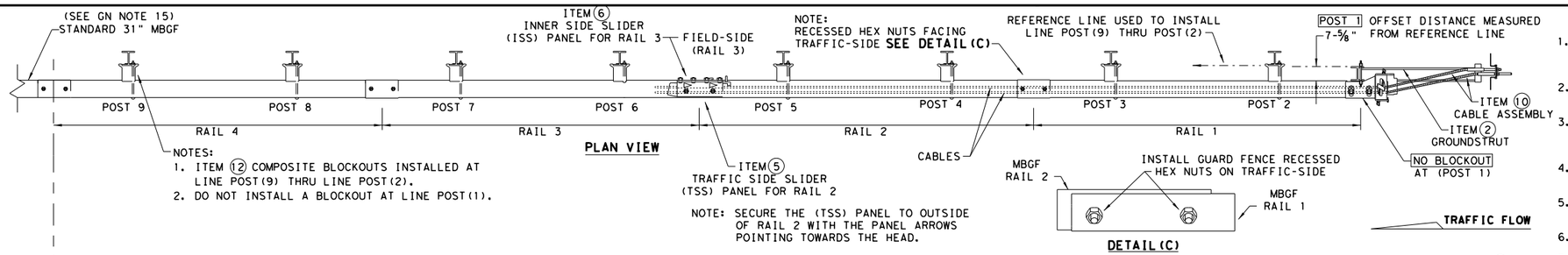

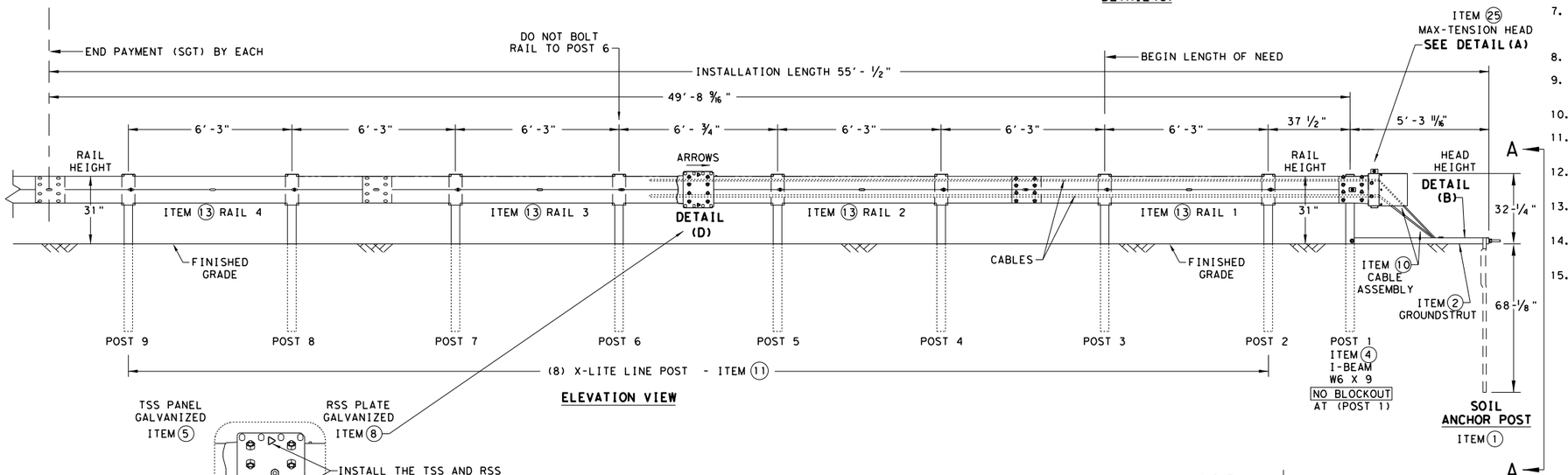

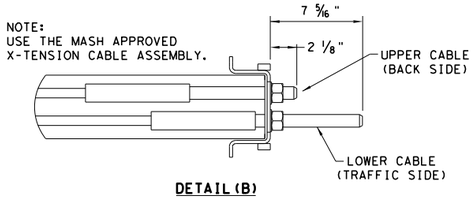

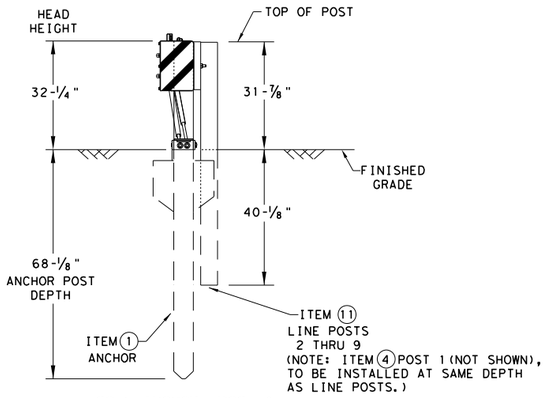

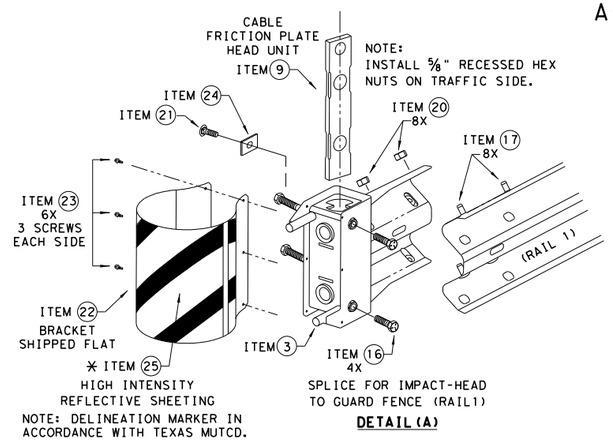

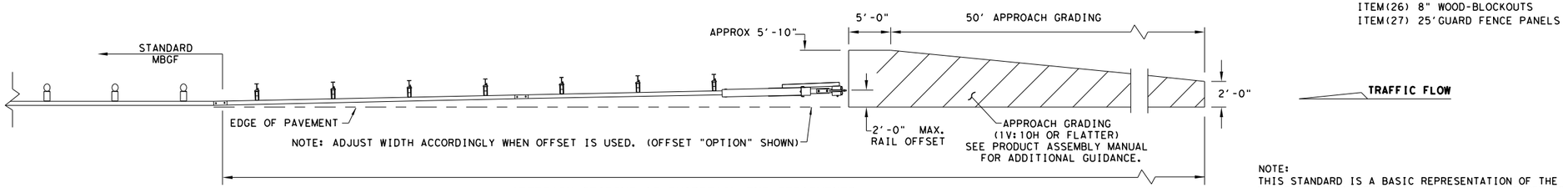

TRAFFIC FLOW

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	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 FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		54

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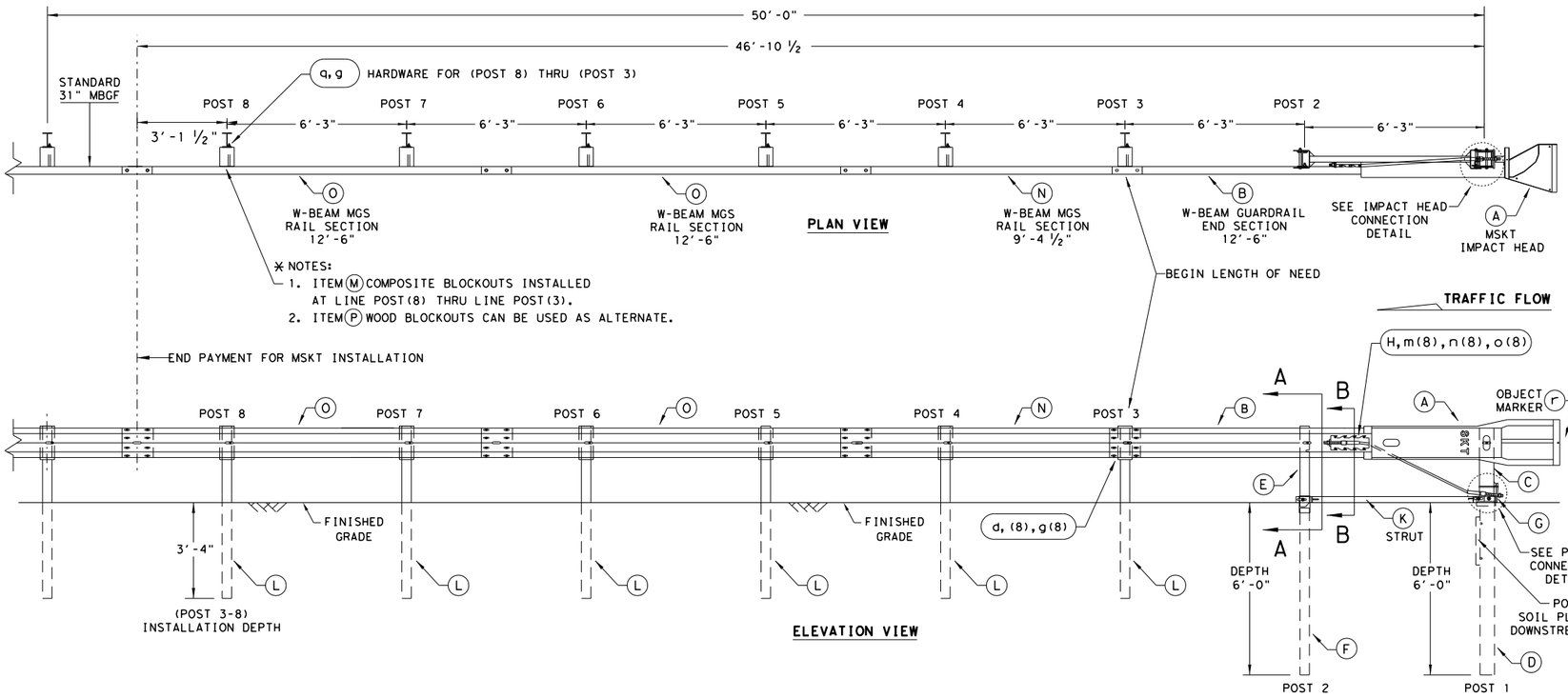
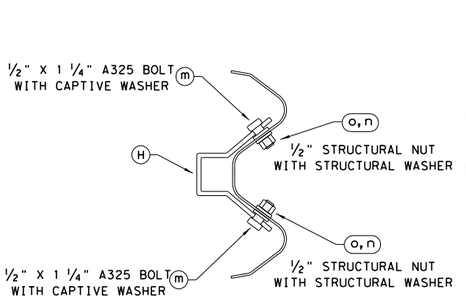
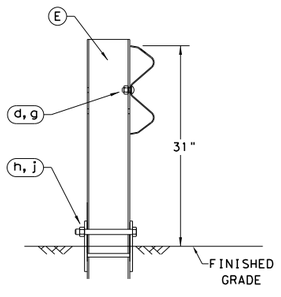
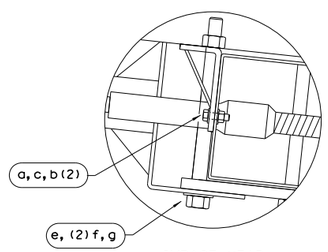
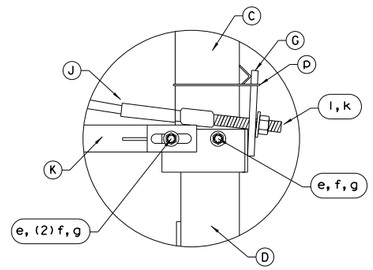


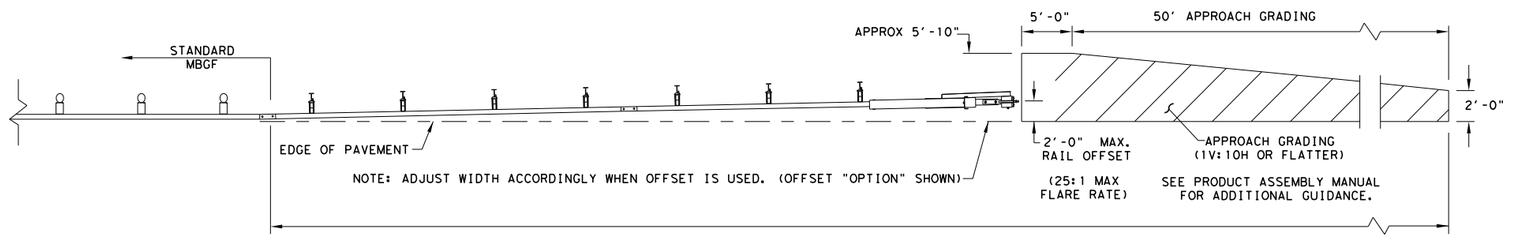
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.











APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" 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 1/16" O.D. x 3/16" 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

SEE NOTES: ✱

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
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	BRY	BURLESON		55

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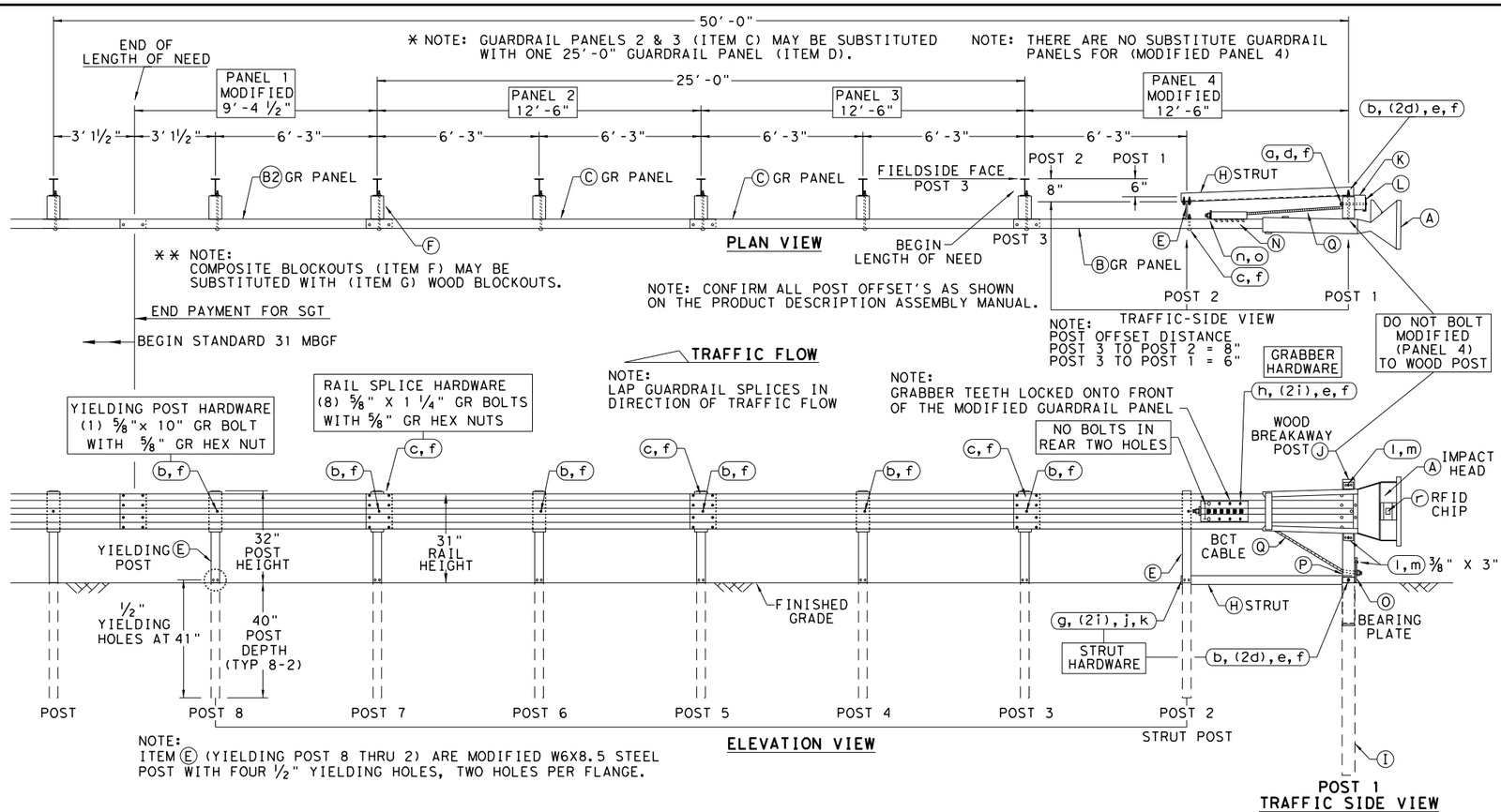
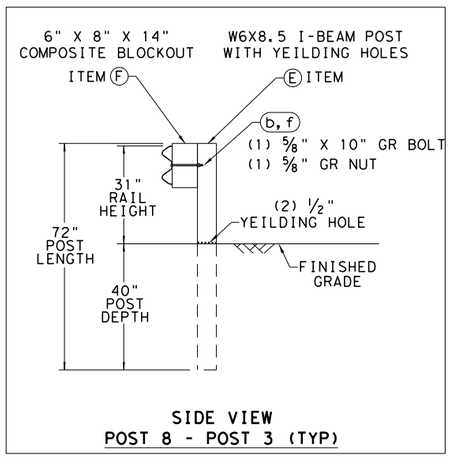


GENERAL NOTES

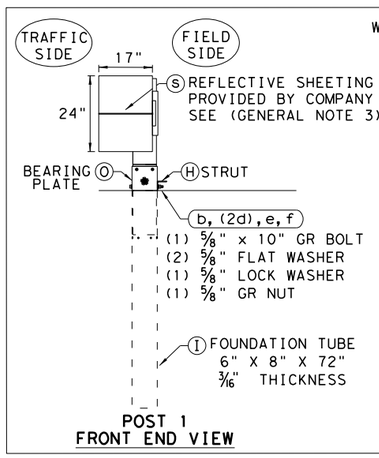
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. 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.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. 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.
11. 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"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	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
		SMALL HARDWARE	
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 A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

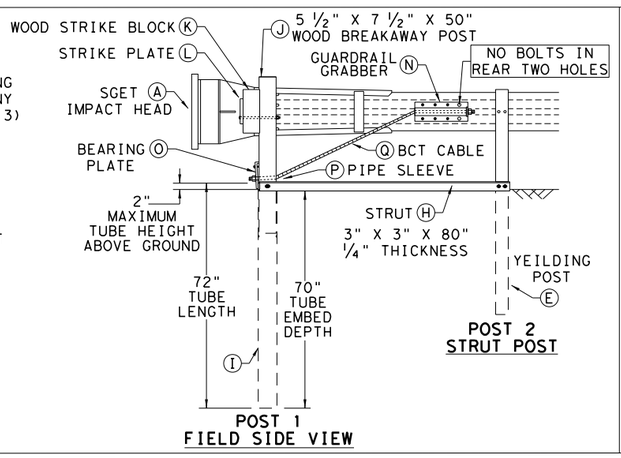
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW
* D
** G



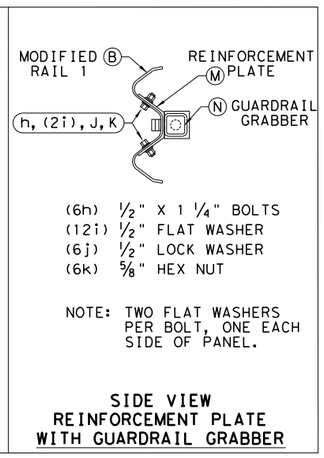
SIDE VIEW
POST 8 - POST 3 (TYP)



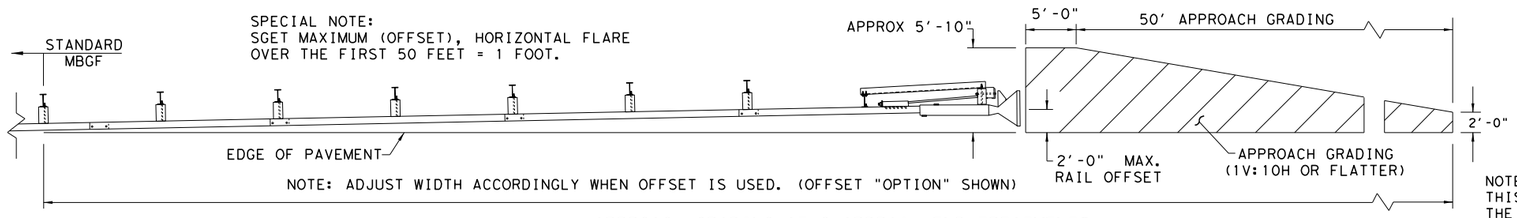
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
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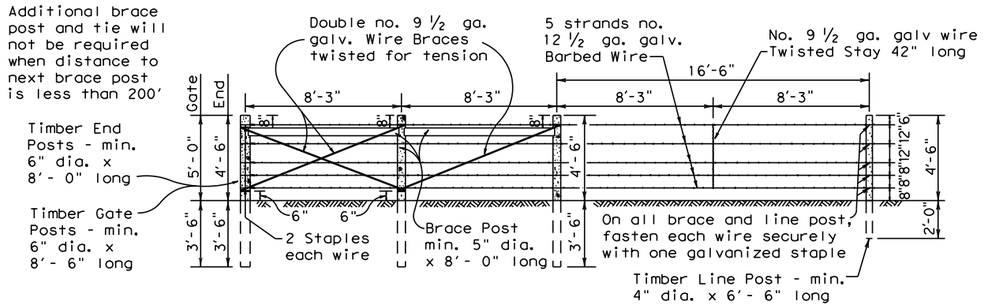
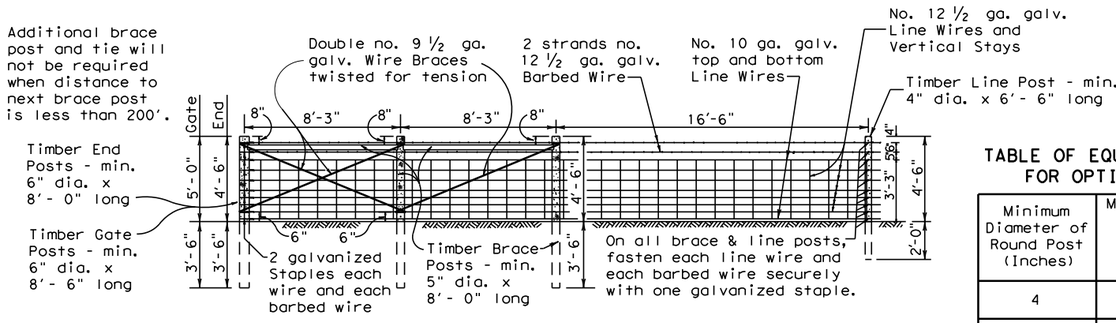


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "A" FENCE

(See General Note 6)



SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS

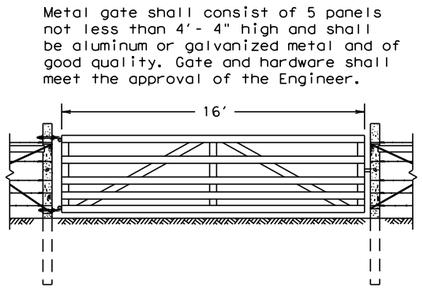
Bracing Detail Used at Ends and Gates

TYPE "B" FENCE

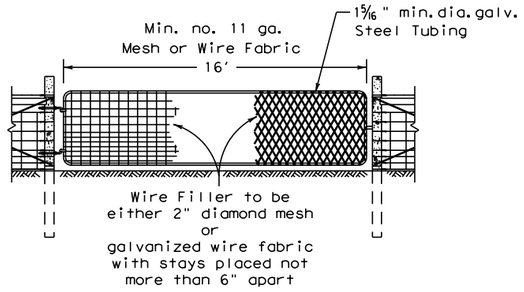
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

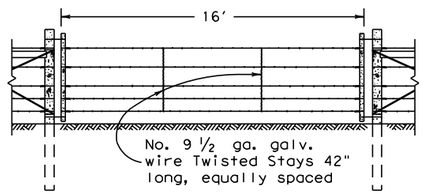
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

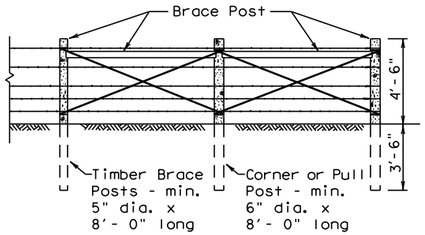


DETAIL TYPE 3 GATE

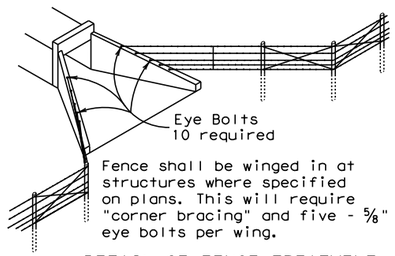
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1'- 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1'- 6" below the ground surface, the holes shall be drilled a minimum of 2'- 0" into the rock or to the depth whichever is the lesser depth.
6. Barbed Wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

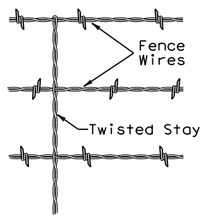
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



CORNER OR PULL POST ASSEMBLY

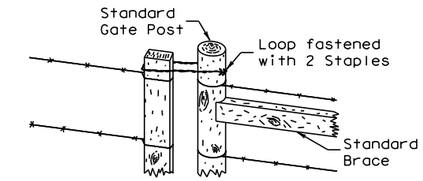


DETAIL OF FENCE TREATMENT AT STRUCTURES

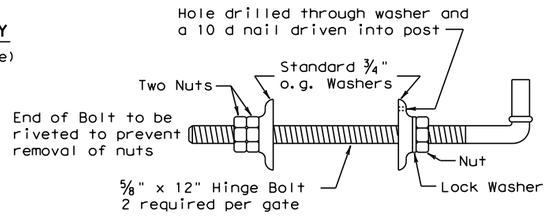


DETAIL OF STAY

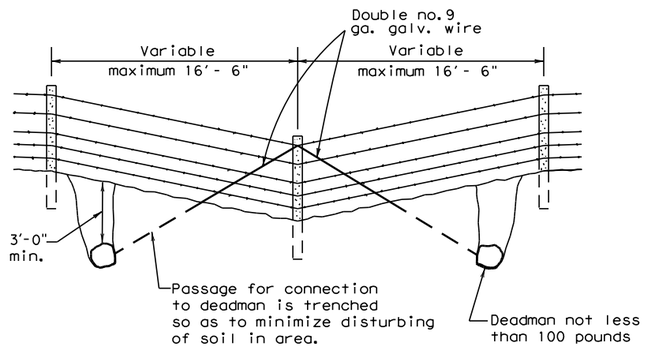
(Barbed wire fence)



DETAIL FASTENER TYPE 3 GATE

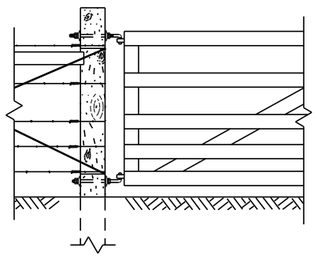


DETAIL OF GATE HINGE BOLT ASSEMBLY

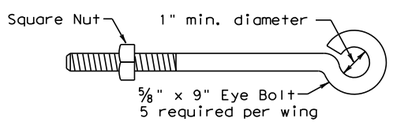


DETAIL OF FENCE SAG

(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF EYE BOLT

Texas Department of Transportation — Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (WOOD POSTS)

WF(1)-10

FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		57

DATE: 11/23/2022
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DATE: 11/22/2022 5:11:54 PM
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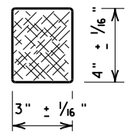
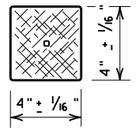
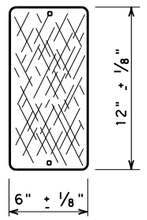
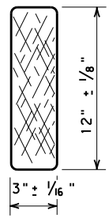
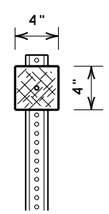
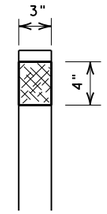
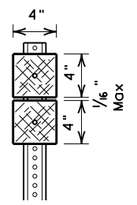
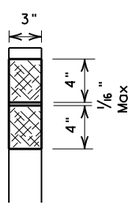
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

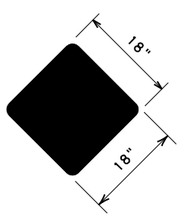
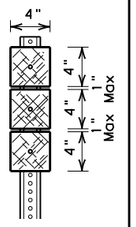
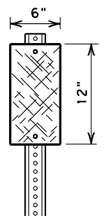
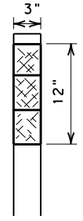
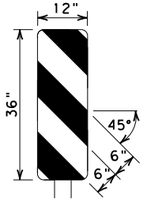
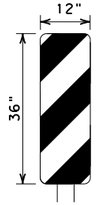
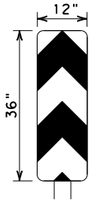
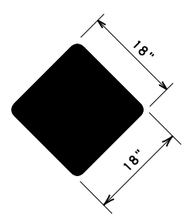
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

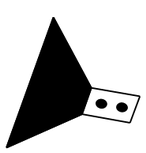
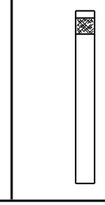
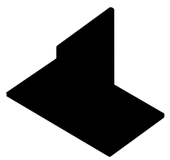
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

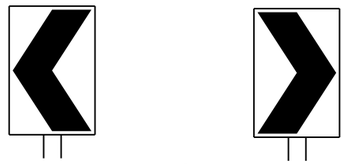
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		 3-Size 2 reflector units	 1-Size 3 reflector unit	 3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting	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

BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE



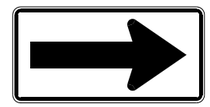
W1-8

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

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

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

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

Texas Department of Transportation | Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BRY	BURLESON		58

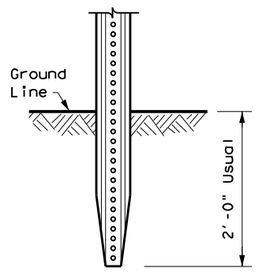
20A

DATE: 11/22/2022 5:12:10 PM
FILE: pw:\\ProjectWiseAMER.jacobs.com:Jacobs_US_B_I_SS4\Documents\WJXN4000.SRTHIBF Ridges Sheet Pile Gap Fill\D&OM(2)-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

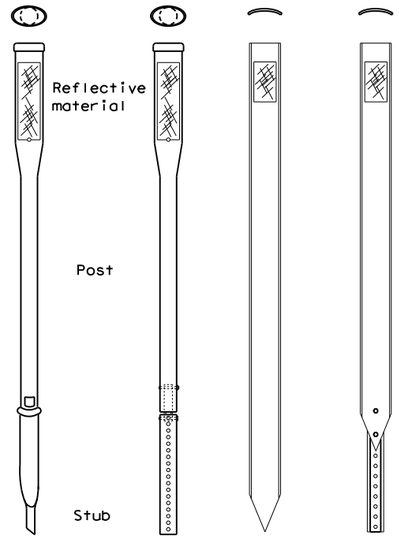


NOTES

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

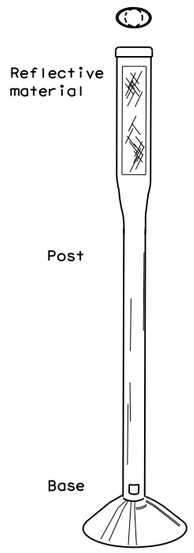
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



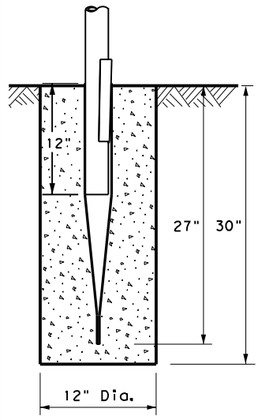
SURFACE MOUNT

NOTES

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

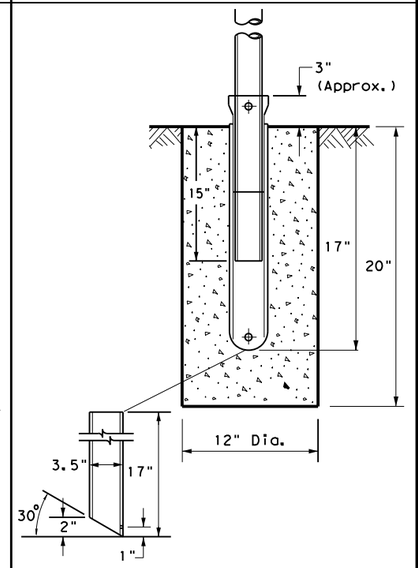
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

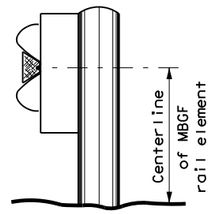
NOTE

1. Install per manufacturer's recommendations.

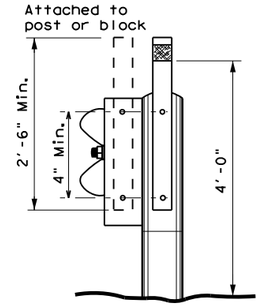
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

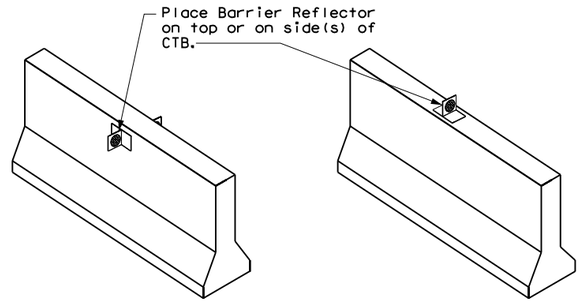
GF1



GF2



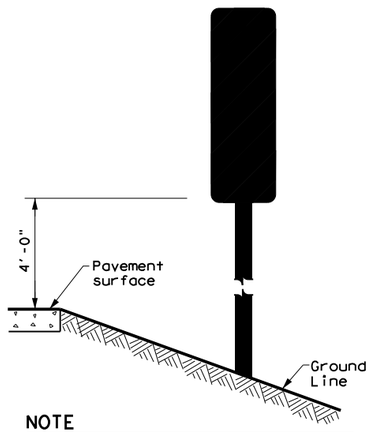
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

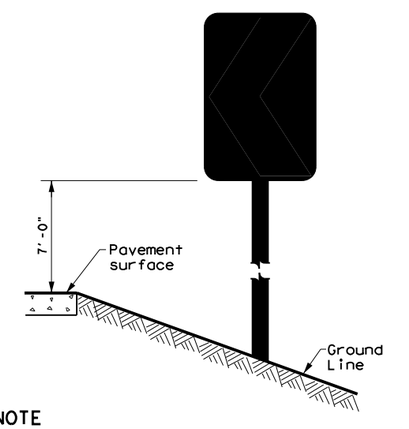
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

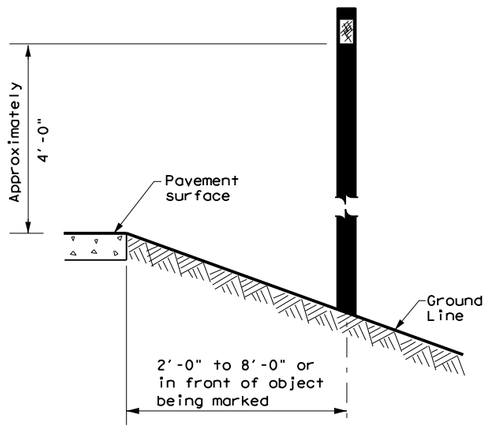
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BRY	BURLESON		59

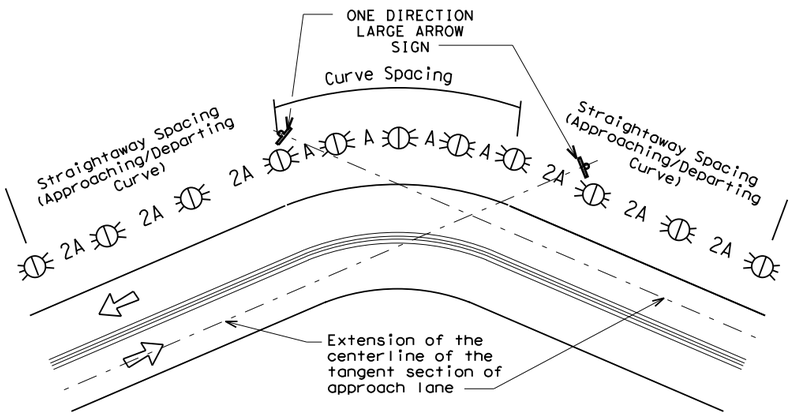
20B

DATE: 11/22/2022 5:12:26 PM
FILE: pw:\\ProjectWiseAMER.jacobs.com:Jacobs_US_B_I_SS4\Documents\WJXN4000_BRYAN\D&OM(3)-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

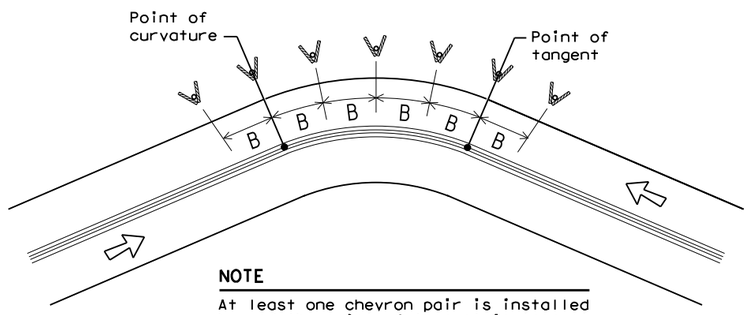
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	BRY	BURLESON		60

20C

DATE: 11/22/2022 5:12:40 PM
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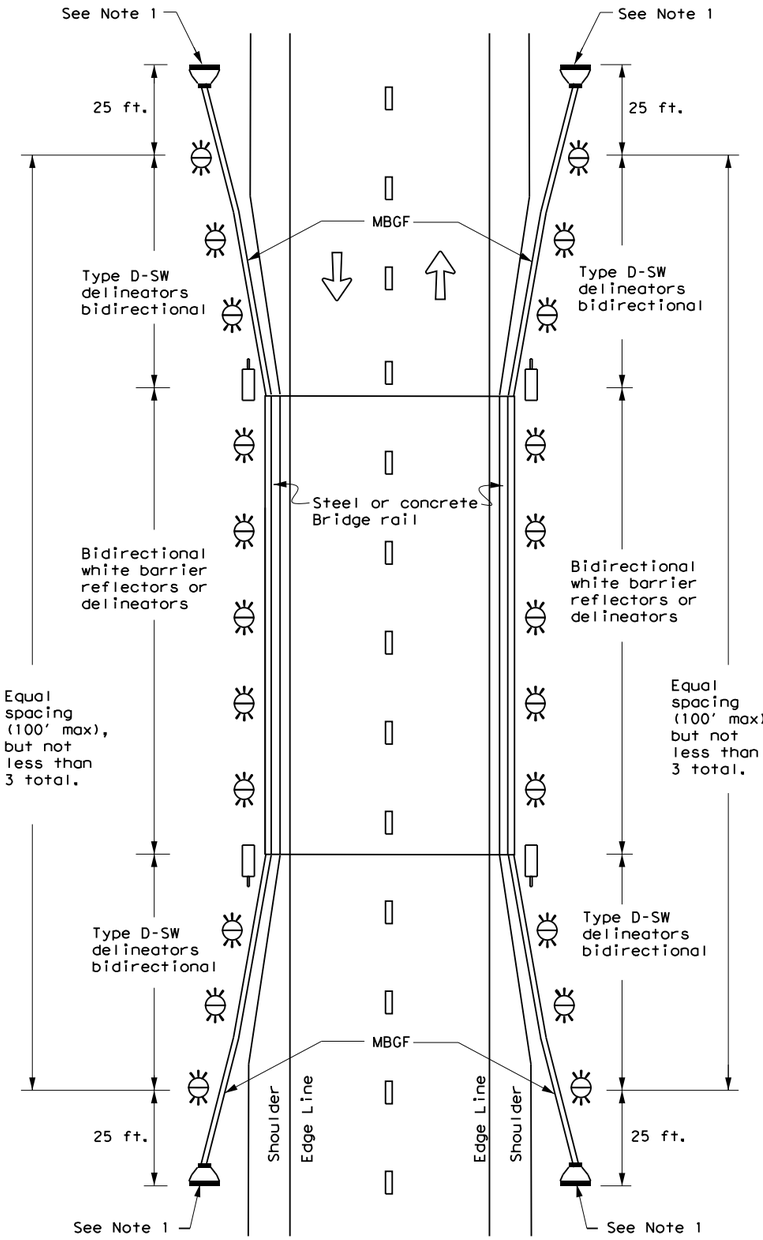
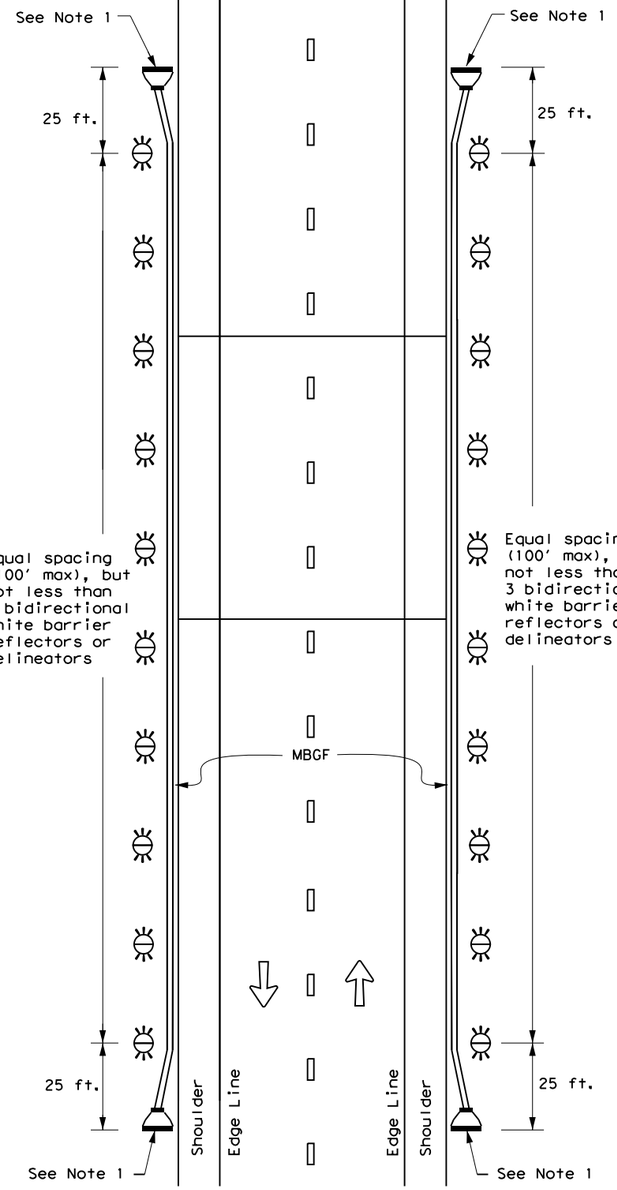
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

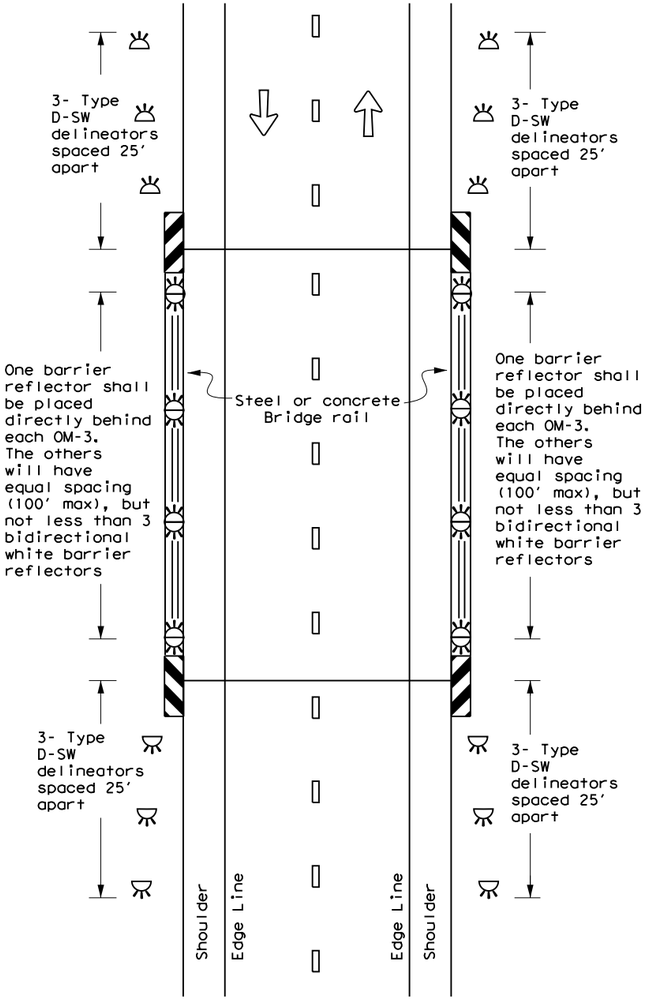
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
7-20	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		61

20E

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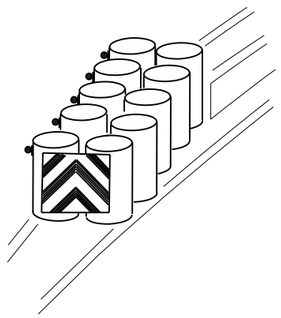
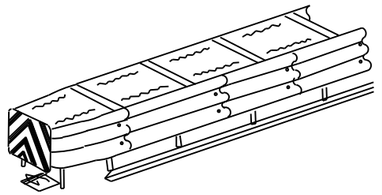
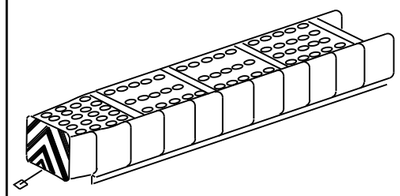
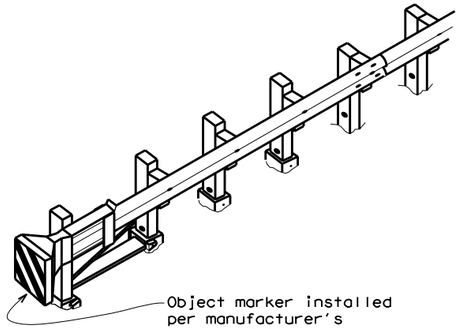
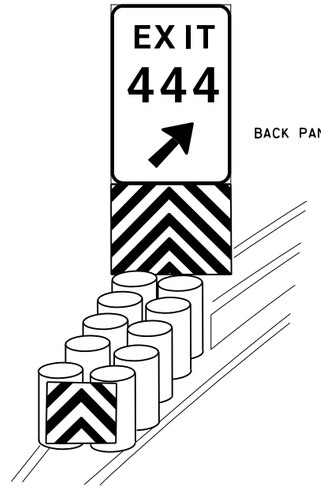
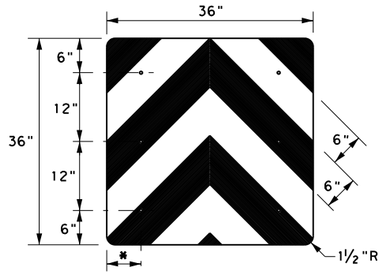


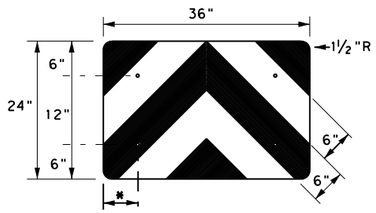




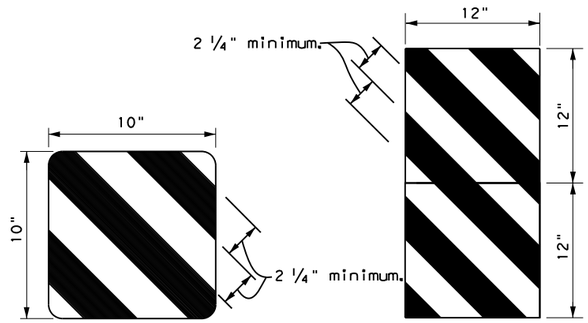




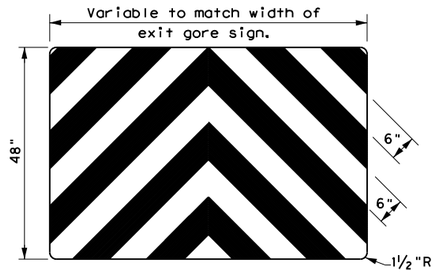


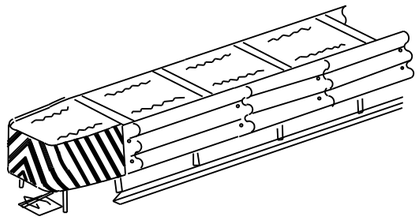


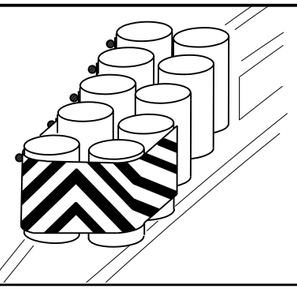
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

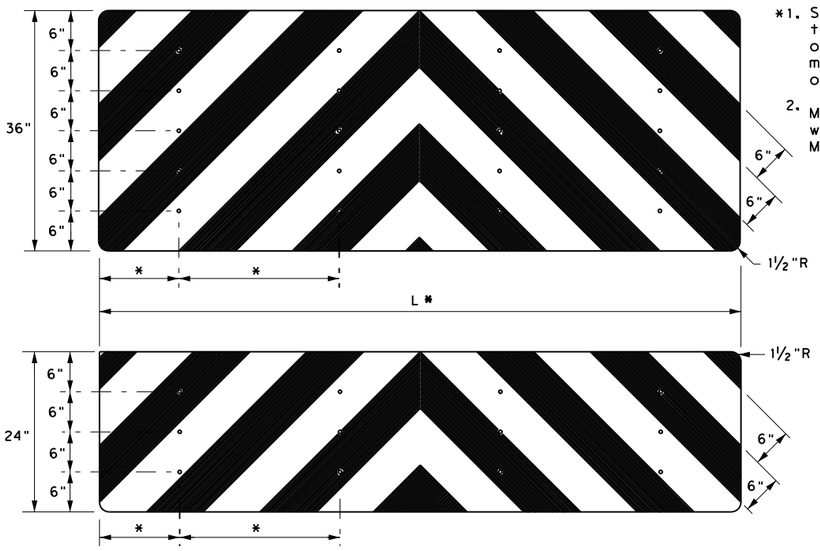


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

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

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

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

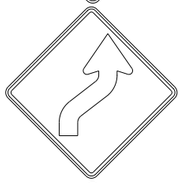
D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	BRY	BURLESON		62
4-98 7-20				

20G

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
47	1	W8-13aT		36"x36"			10BWG	1	SA	T		
47	2,4	W1-4L		36"x36"			10BWG	1	SA	T		
47	3,5	W1-4R		36"x36"			10BWG	1	SA	T		
47	6	W8-13aT		36"x36"			10BWG	1	SA	T		
48	1,2	W8-13aT		36"x36"			10BWG	1	SA	T		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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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)

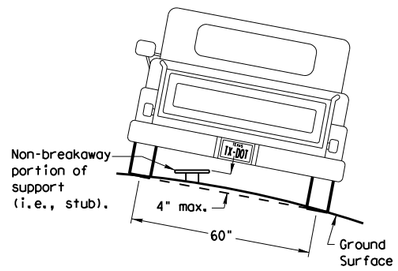
Anchor Type

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))

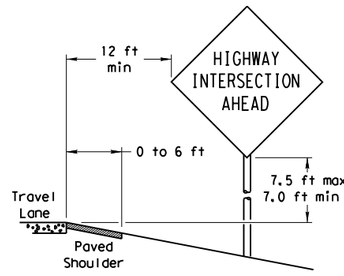
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

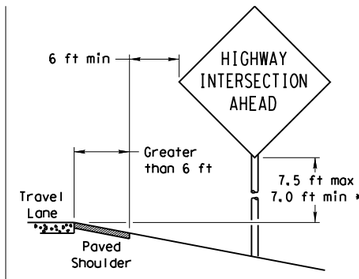
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

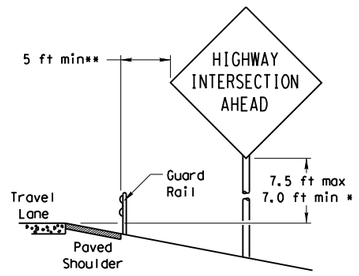
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



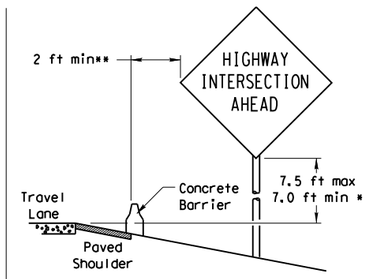
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



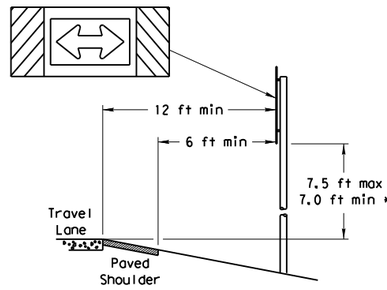
BEHIND GUARDRAIL



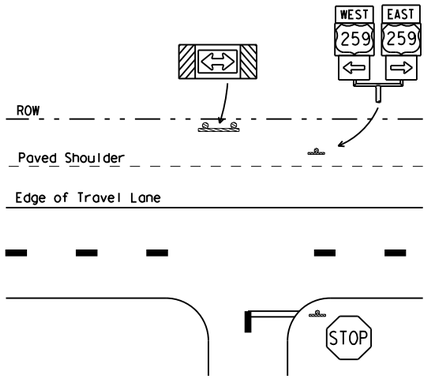
BEHIND CONCRETE BARRIER

****Sign clearance based on distance required for proper guard rail or concrete barrier performance.**

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.



* 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

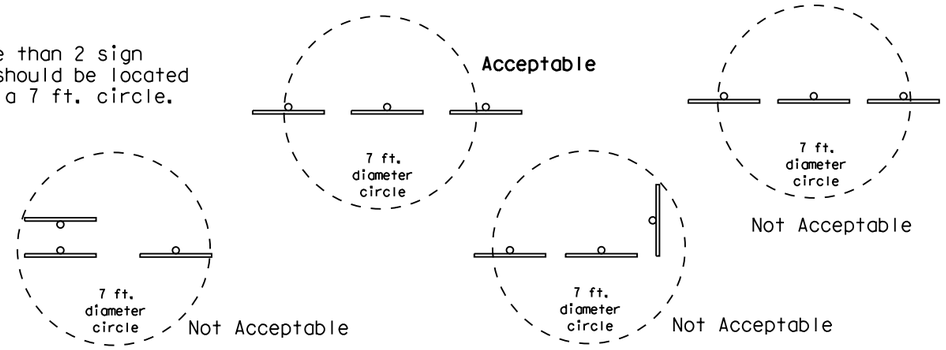
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

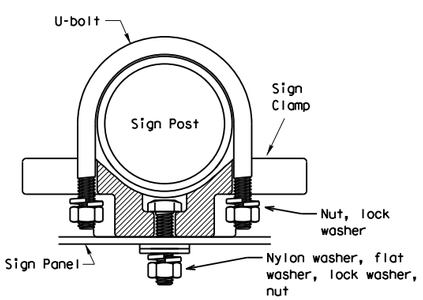
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

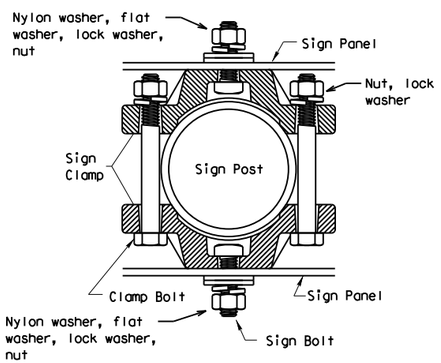


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

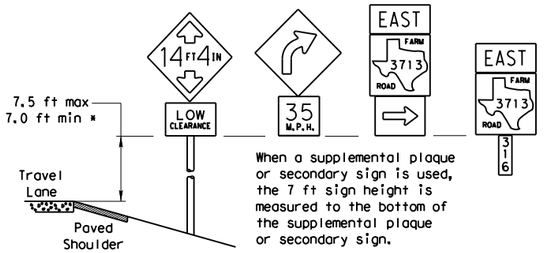
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



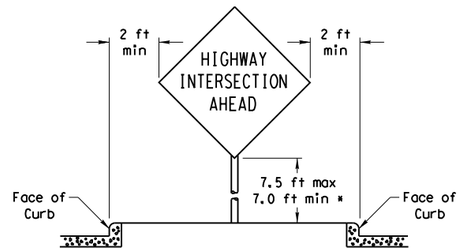
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



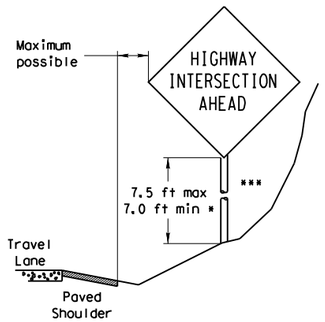
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		64

DATE: 11/22/2022 5:13:21 PM
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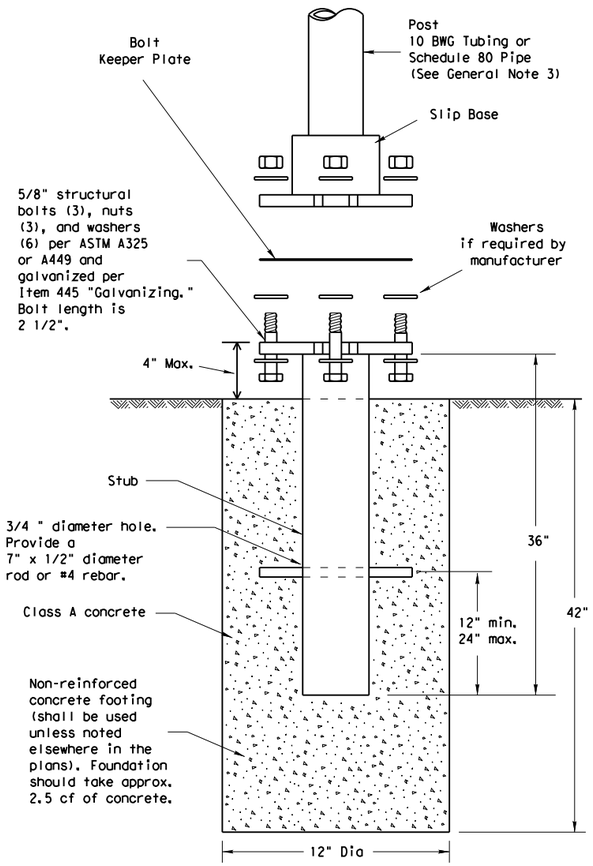
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

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 The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. 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.
2. 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.

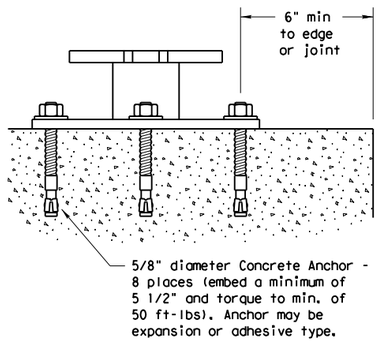
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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
3. 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
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. 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.
2. 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.
3. 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.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. 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.
2. 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



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, "Epoxies 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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0917	30	059, ETC.	CR

DIST	COUNTY	SHEET NO.
BRY	BURLESON	65

DATE: 11/22/2022 5:13:33 PM
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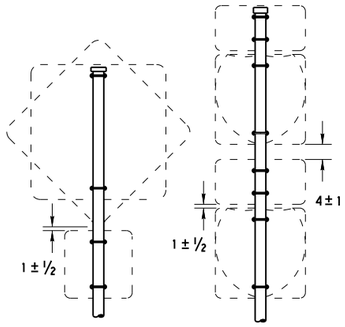
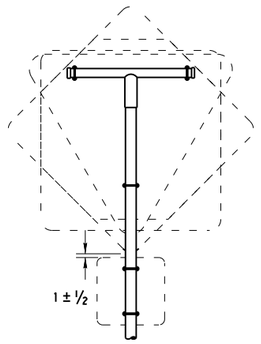


SM RD SGN ASSM TY XXXXX(1)XX(P)



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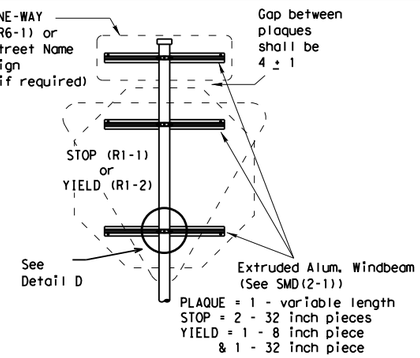
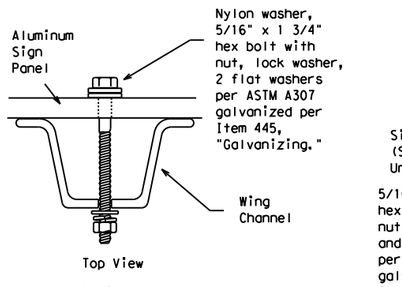
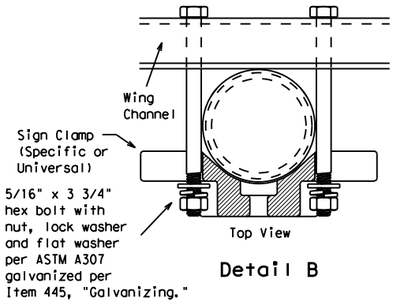


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



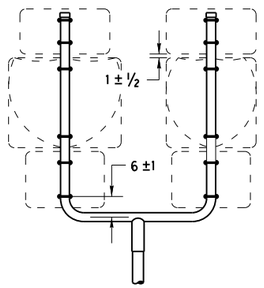
Detail B

GENERAL NOTES:

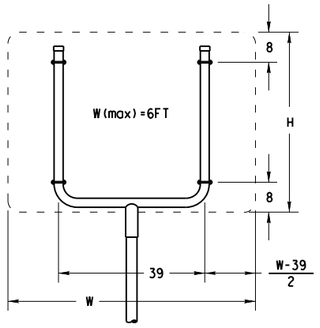
1.

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

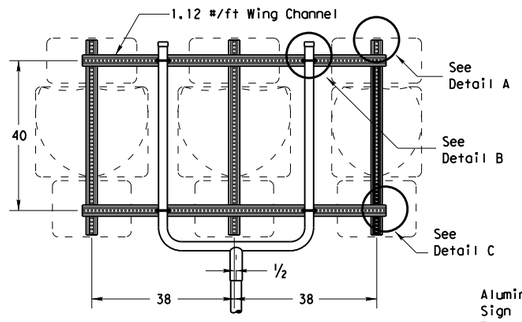
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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.



SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

Drill 7/16" hole (through) after assembly and install bolt, nut, 2 flat washers and lock washer.

3/8" x 3 1/2" heavy hex bolt with nut, lock washer and 2 flat washers per ASTM A307 galvanized per Item 445 "Galvanizing."

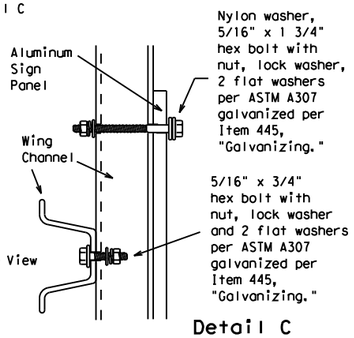
1 1/2"

Extender

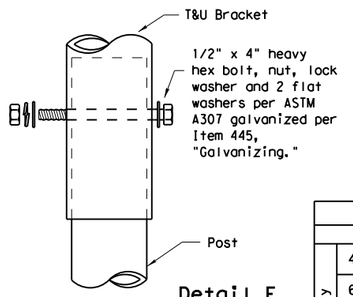
U-Bracket

Detail F

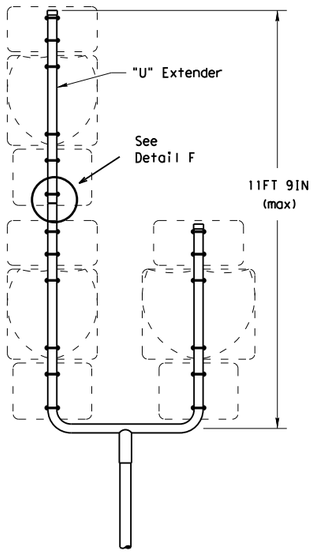
Splices shall only be allowed behind the sign substrate.



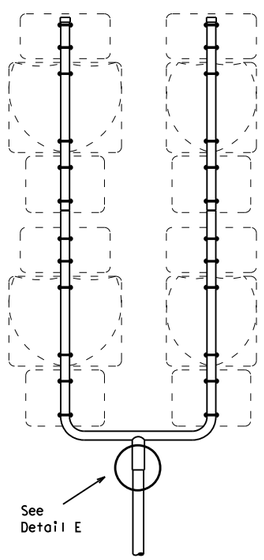
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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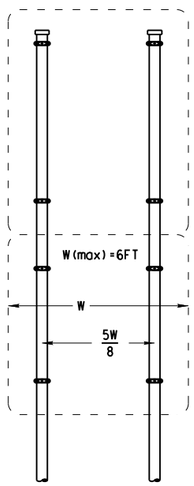
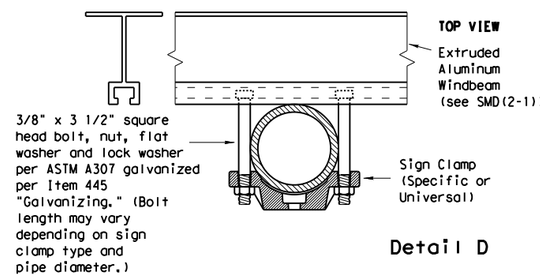
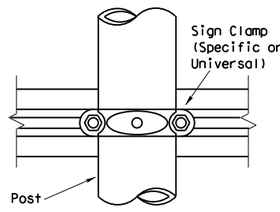


SM RD SGN ASSYM TY XXXXX(2)XX(P)

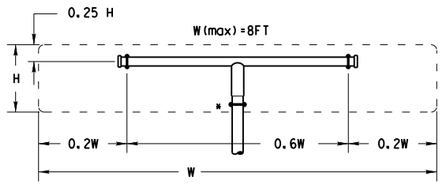
SIDE VIEW



Detail D



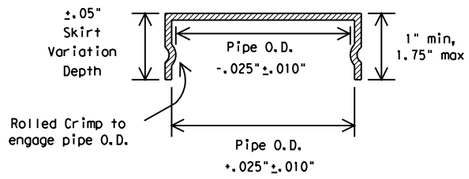
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION 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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		66

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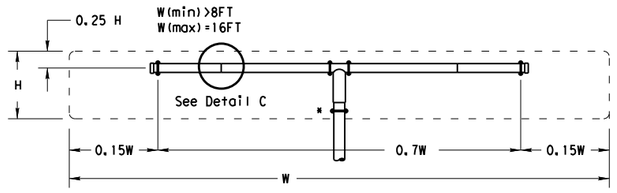
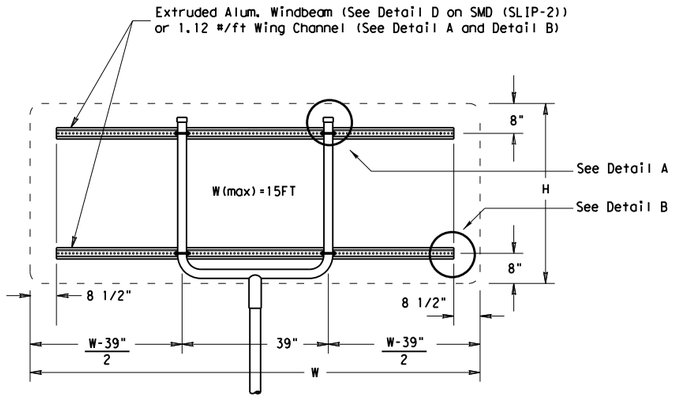
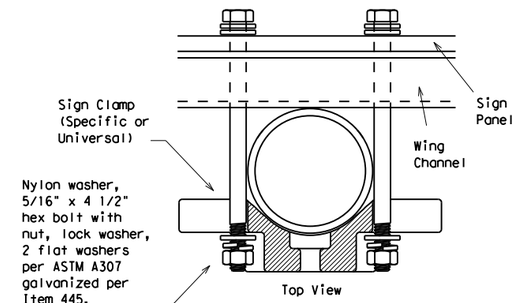


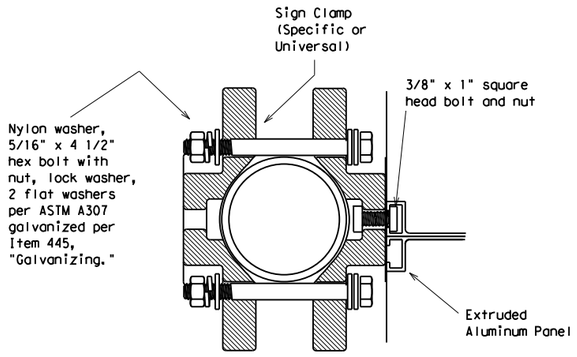
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



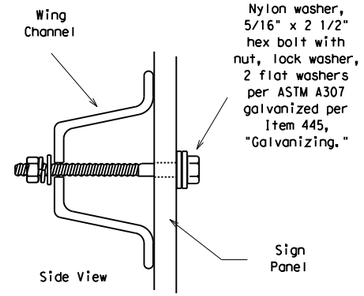
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



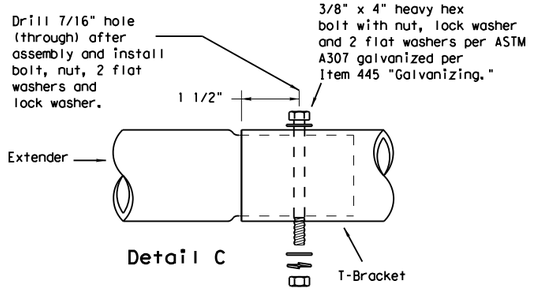
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

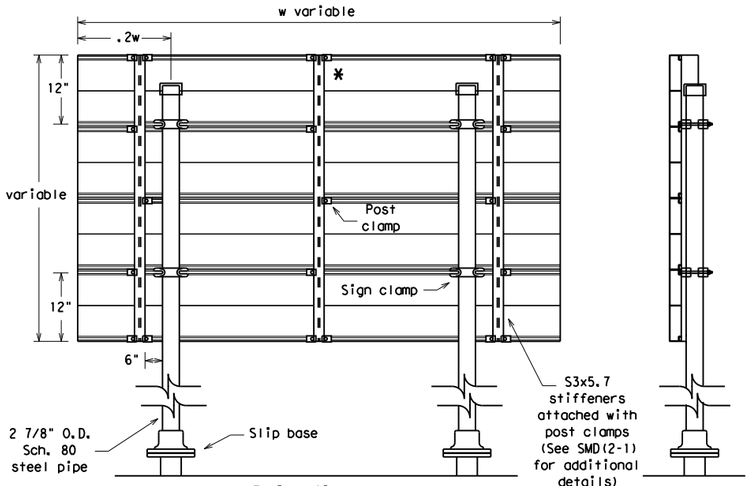


Detail B



Detail C

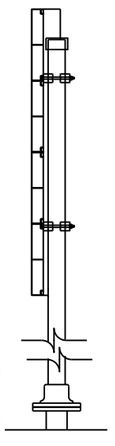
Splices shall only be allowed behind the sign substrate.



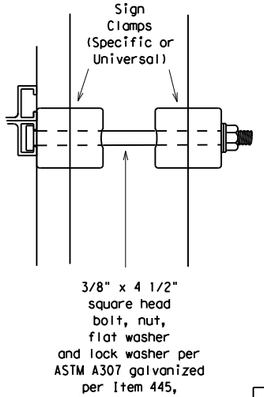
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

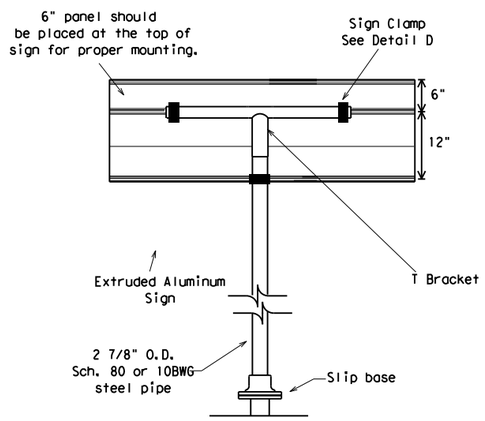
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



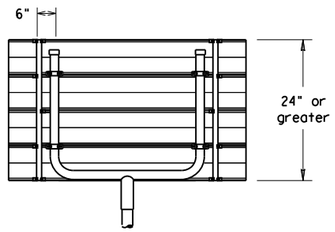
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

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

1.
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. Sign blanks shall be the sizes and shapes shown on the plans.
11. 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.
12. Post open ends shall be fitted with Friction Caps.

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)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

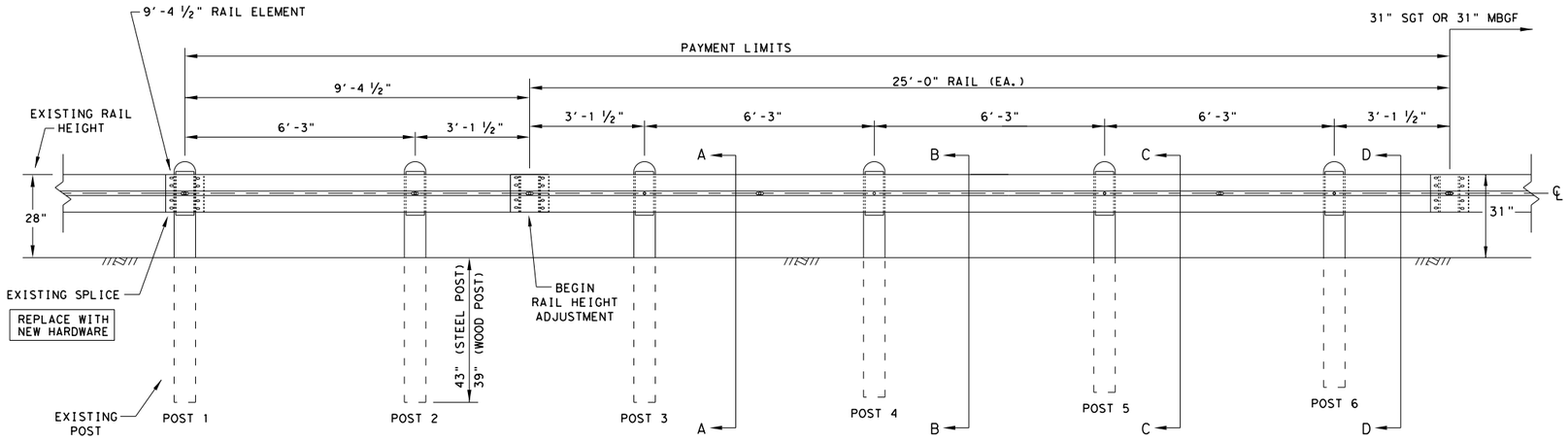
SMD(SLIP-3)-08

REVISIONS
9-08

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

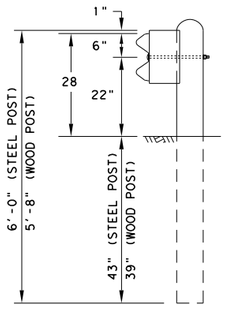
CONT	SECT	JOB	HIGHWAY
0917	30	059, ETC.	CR

DIST	COUNTY	SHEET NO.
BRY	BURLESON	67

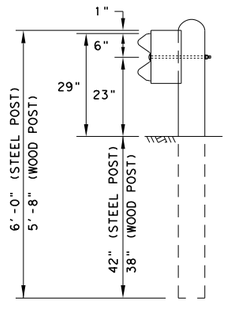


ELEVATION VIEW

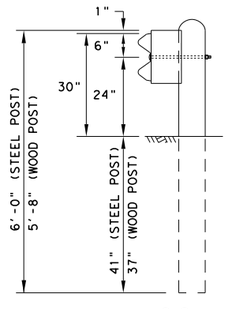
✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



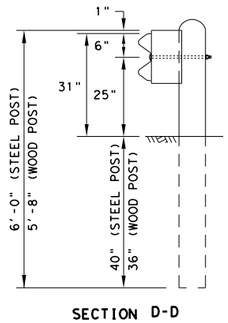
SECTION A-A



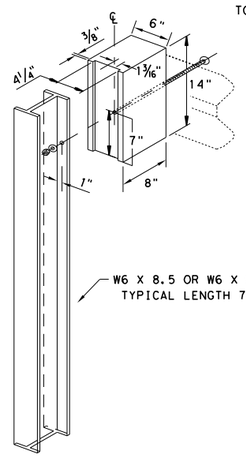
SECTION B-B



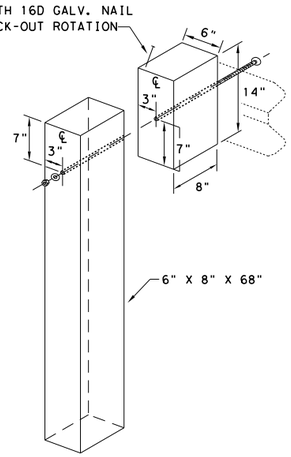
SECTION C-C



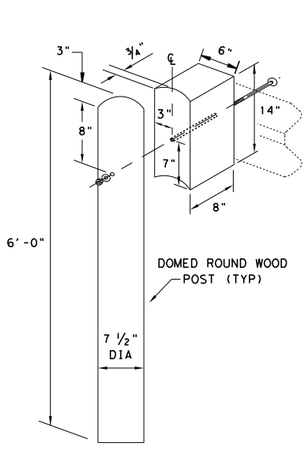
SECTION D-D



ROUTED WOOD BLOCK-OUT TO STEEL POST



WOOD BLOCK TO RECTANGULAR WOOD POST



WOOD BLOCK-OUT TO DOMED ROUND WOOD POST

POST AND BLOCK-OUT TYPES AVAILABLE

FOR WOOD POST

FOR STEEL POST

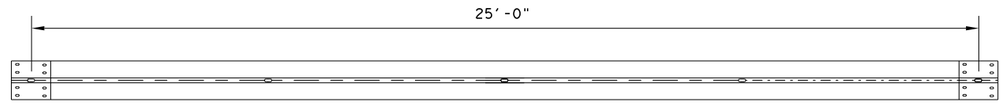
HARDWARE LIST	
QTY	DESCRIPTION
1	9′-4 ½" W-BEAM RAIL ELEMENT 12GA.
1	25′-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
6	7 ½" DIA X 6′-0" DOMED ROUND WOOD POSTS (TYP)
6	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
6	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
6	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
6	⅝" X 18" GUARDRAIL BOLTS WITH NUTS (FBB04)
6	⅝" ROUND WASHERS (ASTM F436) (FWC16a)
6	⅝" X 10" GUARDRAIL BOLTS WITH NUTS (FBB03)
24	⅝" X 1- ¼" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

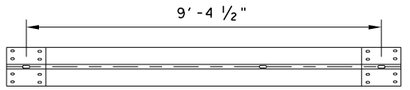
GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE 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 THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25′- 0", OR 12′- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3′- 1 ½" C-C OR 6′-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND ⅝" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE ⅝" X 1- ¼" WITH ⅝" NUTS (ASTM A563).
4. 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.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.



25′-0" (NOM.) W-BEAM RAIL ELEMENT



9′-4 ½" (NOM.) W-BEAM RAIL ELEMENT

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT

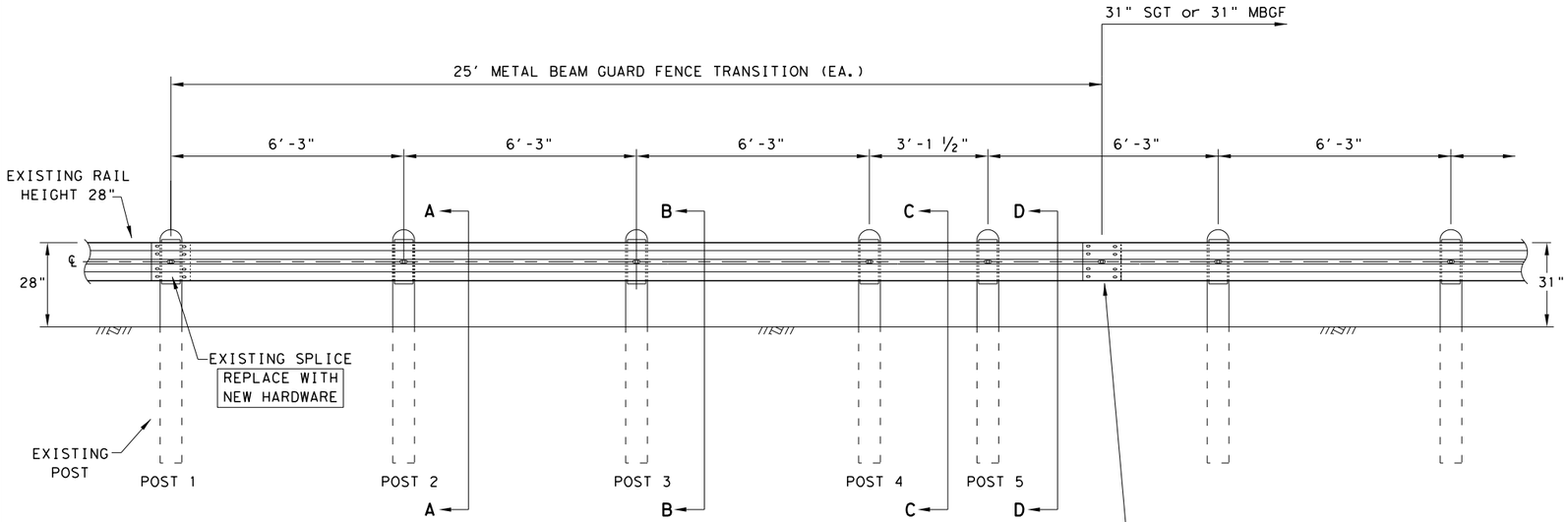
RAIL-ADJ(A)-19

FILE: railadja19	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		68

DATE: 11/28/2022
FILE: pw:\\ProjectWiseAMER.jacobs.com:Jacobs_US_B_I_SS4\Documents\WJXN4000_BRY_Bridge_Program\WJXN4000\91730059_Mallard Rd\700 CADD\STND\ROWY\railadjb19.dgn

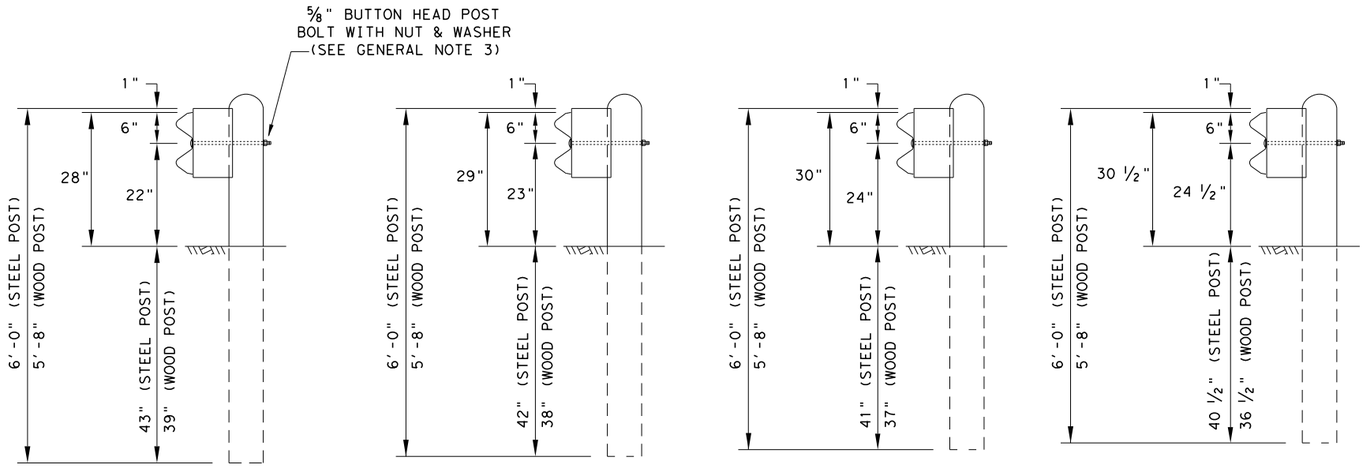
NOTE: (SINGLE) W-BEAM SHALL MATCH THE GAUGE OF THE ADJACENT RUN OF MBGF.

PLAN VIEW



ELEVATION VIEW

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



NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
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3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
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5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

HARDWARE LIST

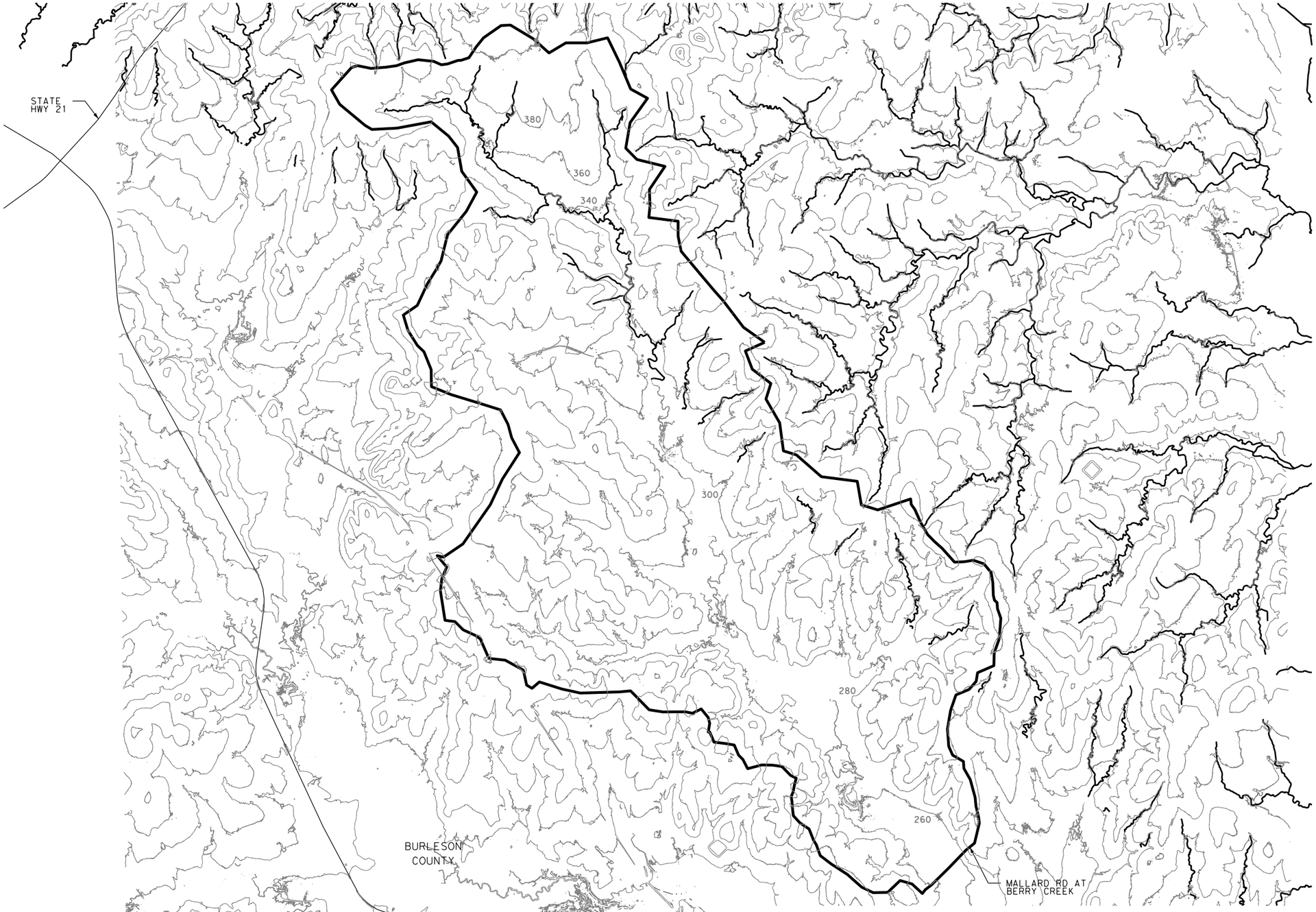
QTY	DESCRIPTION
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
5	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
5	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
5	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
5	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
5	5/8" X 18" GUARDRAIL BOLTS AND NUTS (FBB04)
5	5/8" ROUND WASHERS (ASTM F436)(FWC16a)
5	5/8" X 10" GUARDRAIL BOLTS AND NUTS (FBB03)
16	5/8" X 1- 1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

POST AND BLOCK-OUT TYPES AVAILABLE
FOR WOOD POST
FOR STEEL POST

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT RAIL-ADJ(B)-19

FILE: railadjb19	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0917	30	059, ETC.	CR	
	DIST	COUNTY		SHEET NO.	
	BRY	BURLESON		69	



HORIZONTAL

0 2500 5000 10000

NOTES:

1. DRAINAGE AREA DELINEATED BASED ON USGS TOPOGRAPHIC DATA.

2. REGRESSION METHOD WAS USED TO CALCULATE PEAK FLOWS PER TXDOT HYDRAULIC DESIGN MANUAL (SEPT, 2019)

3. FEMA ZONE A, MAP NO 48051C0325C, EFFECTIVE JANUARY 6, 2011.

OMEGA EM REGRESSION PARAMETERS AND PEAK FLOWS (CFS)

BASIN NAME	PARAMETERS		2YR	5YR	10YR	25YR	50YR	100YR
MALLARD RD AT BERRY CREEK	A (SQ MI)	21.16	1138	2213	3025	4291	5365	6602
	S	0.00180						
	P (IN)	39						
	OMEGA EM	0.013						

11/22/2022

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

DRAINAGE AREA MAP

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 70

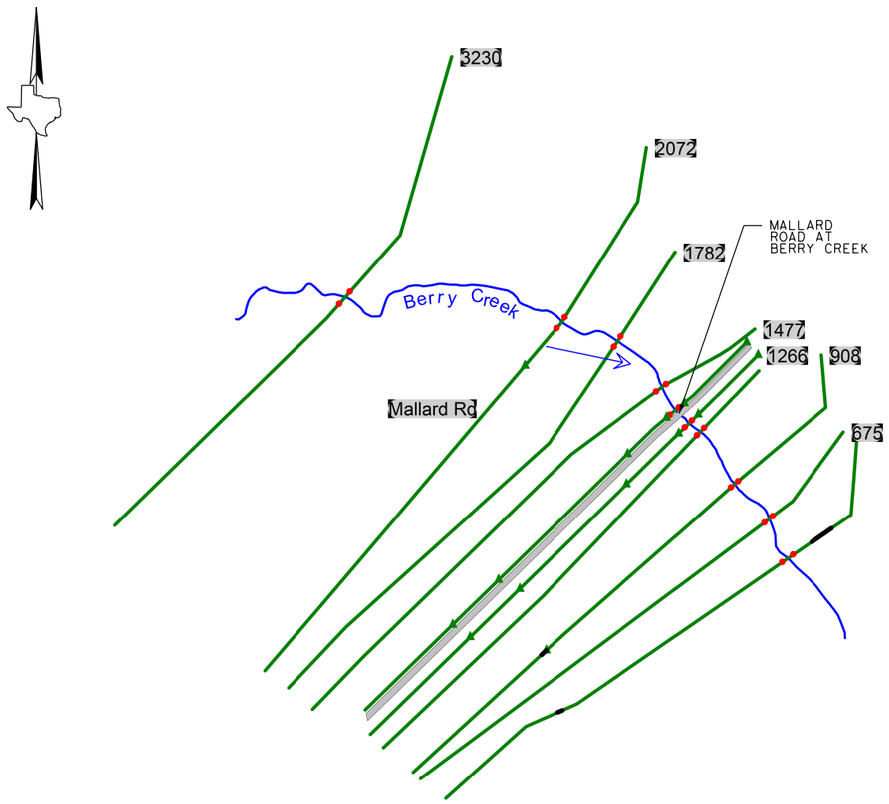
HEC-RAS 2-YEAR COMPARISON

RIVER STATION (FT)	LOCATION	PROPOSED STRUCTURE 2 YR Q CFS	PROPOSED STRUCTURE 2 YR V (CHAN) FPS	PROPOSED STRUCTURE 2 YR WSEL FT	RIVER STATION (FT)	EXISTING STRUCTURE 2 YR Q CFS	EXISTING STRUCTURE 2 YR V (CHAN) FPS	EXISTING STRUCTURE 2 YR WSEL FT
3230		1138	3.41	251.52	3230	1138	3.64	251.36
2072		1138	3.97	250.62	2072	1138	4.13	250.35
1782		1138	4.57	250.26	1782	1138	4.85	249.93
1477		1138	3.99	250.02	1477	1138	4.22	249.65
1353	BR U/S XS	1138	4.51	249.81	1353	1138	4.76	249.43
1300	BERRY CR	Bridge			1300	Bridge		
1266	BR D/S XS	1138	5.44	248.64	1266	1138	5.44	248.64
1200		1138	5.72	248.44	1200	1138	5.72	248.44
908		1138	6.68	247.49	908	1138	6.68	247.49
675		1138	6.70	246.73	675	1138	6.70	246.73
463		1138	5.46	246.36	463	1138	5.46	246.36

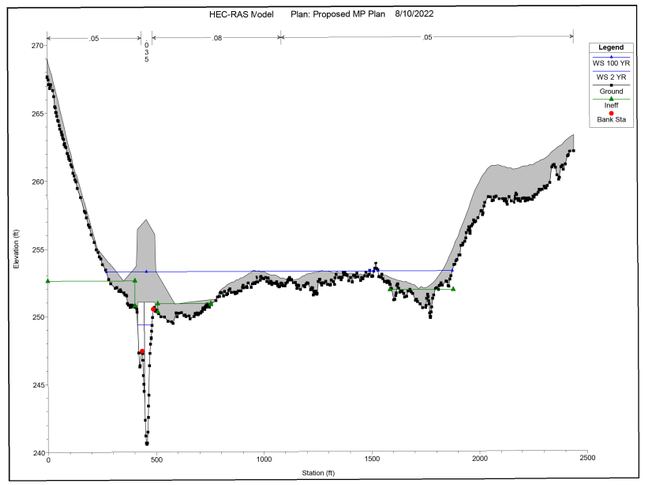
HEC-RAS 100-YEAR COMPARISON

RIVER STATION (FT)	LOCATION	PROPOSED STRUCTURE 100 YR Q CFS	PROPOSED STRUCTURE 100 YR V (CHAN) FPS	PROPOSED STRUCTURE 100 YR WSEL FT	RIVER STATION (FT)	EXISTING STRUCTURE 100 YR Q CFS	EXISTING STRUCTURE 100 YR V (CHAN) FPS	EXISTING STRUCTURE 100 YR WSEL FT
3230		6602	4.00	255.10	3230	6602	3.99	255.11
2072		6602	3.44	254.33	2072	6602	3.41	254.35
1782		6602	4.18	254.11	1782	6602	4.12	254.14
1477		6602	6.25	253.62	1477	6602	6.05	253.69
1353	BR U/S XS	6602	7.05	253.28	1353	6602	6.48	253.44
1300	BERRY CR	Bridge			1300	Bridge		
1266	BR D/S XS	6602	7.31	253.01	1266	6602	7.31	253.01
1200		6602	6.06	252.97	1200	6602	6.06	252.97
908		6602	6.85	252.43	908	6602	6.85	252.43
675		6602	9.51	251.38	675	6602	9.51	251.38
463		6602	6.78	250.91	463	6602	6.78	250.91

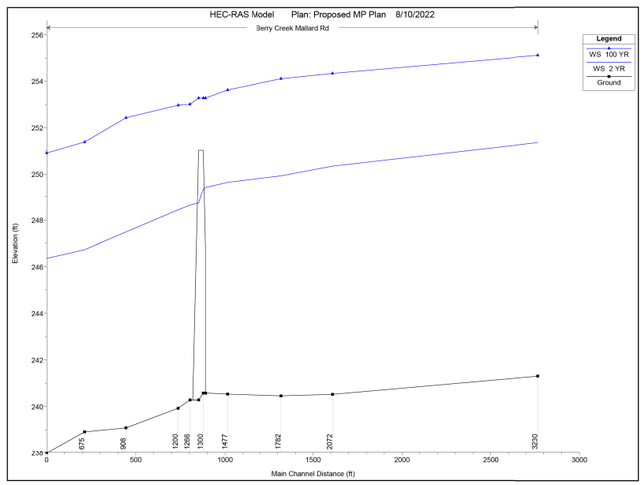
CROSS SECTION LAYOUT MAP



BERRY CR AT MALLARD RD HEC-RAS CROSS SECTION COMPUTATION



BERRY CR AT MALLARD RD HEC-RAS PROFILE COMPUTATION



NOTES:

1. HEC-RAS VER 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS AND DESIGN OF THE BRIDGE. NORMAL DEPTH COMPUTATION USED FOR THE DOWNSTREAM BOUNDARY CONDITION SLOPE = 0.002016 FT/FT FOR EXISTING AND PROPOSE CONDITIONS.

2. BURLESON COUNTY FLOODPLAIN ADMINISTRATOR, KEITH SCHROEDER, WAS INFORMED OF THE PROPOSED PROJECT AND PROVIDED WITH A SUMMARY OF HYDRAULIC IMPACTS ON 08-20-2022.

STATE OF TEXAS
ADAM N. KORANSKY
95988
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

HYDRAULIC DATA SHEET

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021 (237), ETC.	MALLARD RD, ETC.
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 71

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PIER SCOUR CALCULATIONS 5-YEAR

Parameter	Value	Unit
L	10	ft
a	2.5	ft
L/a[1]	4.0	ft/ft
Angle of Attack	0.0	Degrees
K_1	1.0	
K_2	1.0	
K_3	1.1	
Y_1	11.38	ft
V_1	3.9	fps
F_r	0.20	
Y_s(With 50% Reduction Factor)	2.36	ft

PIER SCOUR CALCULATIONS 100-YEAR

Parameter	Value	Unit
L	10	ft
a	2.5	ft
L/a[1]	4.0	ft/ft
Angle of Attack	0.0	Degrees
K_1	1.0	
K_2	1.0	
K_3	1.1	
Y_1	12.70	ft
V_1	4.70	fps
F_r	0.23	
Y_s(With 50% Reduction Factor)	2.59	ft

NOTES:

1. UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) WEB SOIL SURVEY INDICATES LEAN CLAY AS THE DOMINATE SOIL TYPE.

2. D50 VALUES: MINIMUM D50 OF 0.20 MM USED AS RECOMMENDED IN THE TXDOT GEOTECHNICAL MANUAL, CHAPTER 5, SECTION 6.

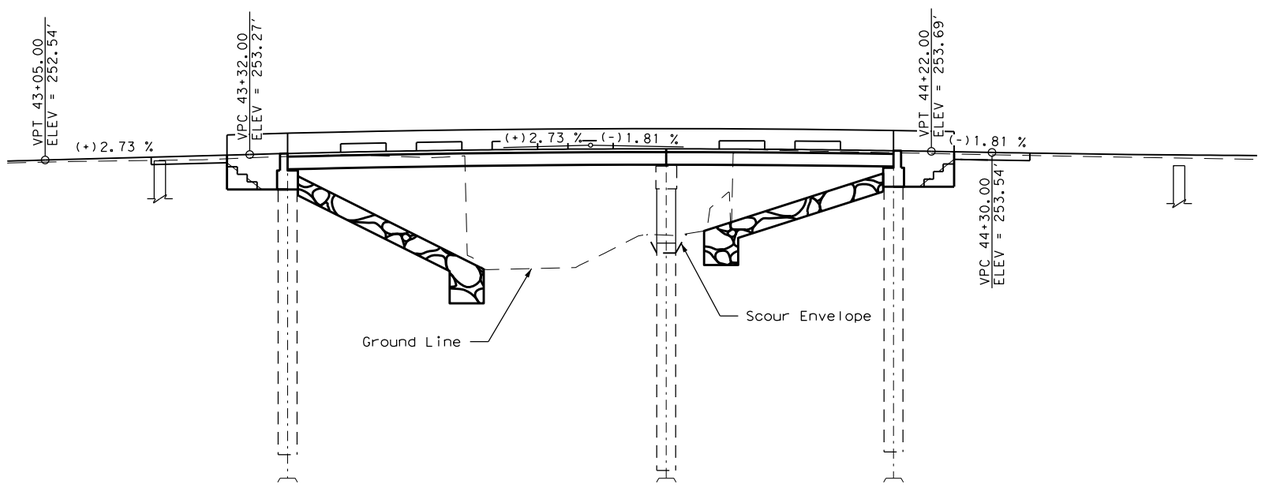
3. ABUTMENT SCOUR RESULTS NOT REPORTED AS RECOMMENDED IN THE TXDOT GEOTECHNICAL MANUAL, CHAPTER 5, SECTION 6.

CONTRACTION SCOUR CALCULATIONS 5-YEAR

PARAMETER	LOB	CHANNEL	ROB	UNIT
AVERAGE DEPTH OF FLOW IN U/S CHANNEL (Y_1)		11.38		FT
APPROACH VELOCITY (V_1)		4.26		FPS
DEPTH IN CONTRACTED SECTION BEFORE SCOUR (Y_0)		3.17		FT
FLOW IN CONTRACTED SECTION (Q_2)		1568.0		CFS
BOTTOM WIDTH OF CONTRACTED SECTION (W_2)		77.50		FT
GRAIN SIZE (D)		0.2000		MM
FLOW IN UPSTREAM CHANNEL (Q_1)		2213.0		CFS
BOTTOM WIDTH OF MAIN CHANNEL (W_1)		17.89		FT
CHANNEL SLOPE		0.002		FT/FT
SHEAR VELOCITY (V*) = $(g.y.S)^{0.5}$		0.83		FPS
WATER TEMPERATURE		60.0		°F
MEDIAN BED MATERIALS FALL VELOCITY[3]		0.06		FPS
V*/T		14.05		-
$K_{1(2)}$		0.69		-
AVERAGE FLOW DEPTH IN CONTRACTED SECTION (Y_2)	N/A	3.08	N/A	FT
CONTRACTION SCOUR ($Y_s = Y_2 - Y_0$)	N/A	0.00	N/A	FT
CRITICAL VELOCITY FOR INCEPTION MOTION (V_c)	0.0	1.5	0.0	FPS
EQUATION	N/A	LIVE	N/A	-

CONTRACTION SCOUR CALCULATIONS 100-YEAR

PARAMETER	LOB	CHANNEL	ROB	UNIT
AVERAGE DEPTH OF FLOW IN U/S CHANNEL (Y_1)		12.70		FT
APPROACH VELOCITY (V_1)		7.05		FPS
DEPTH IN CONTRACTED SECTION BEFORE SCOUR (Y_0)		3.17		FT
FLOW IN CONTRACTED SECTION (Q_2)		1741.0		CFS
BOTTOM WIDTH OF CONTRACTED SECTION (W_2)		77.50		FT
GRAIN SIZE (D)		0.2000		MM
FLOW IN UPSTREAM CHANNEL (Q_1)		6602.0		CFS
BOTTOM WIDTH OF MAIN CHANNEL (W_1)		17.89		FT
CHANNEL SLOPE		0.002		FT/FT
SHEAR VELOCITY (V*) = $(g.y.S)^{0.5}$		0.88		FPS
WATER TEMPERATURE		60.0		°F
MEDIAN BED MATERIALS FALL VELOCITY[3]		0.06		FPS
V*/T		14.85		-
$K_{1(2)}$		0.69		-
AVERAGE FLOW DEPTH IN CONTRACTED SECTION (Y_2)	N/A	1.47	N/A	FT
CONTRACTION SCOUR ($Y_s = Y_2 - Y_0$)	N/A	0.00	N/A	FT
CRITICAL VELOCITY FOR INCEPTION MOTION (V_c)	0.0	1.5	0.0	FPS
EQUATION	N/A	LIVE	N/A	-



ADAM N. KORANSKY
95988
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STATE OF TEXAS
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Bryan District

SCOUR DATA SHEET

MALLARD RD AT BERRY CREEK

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6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 72

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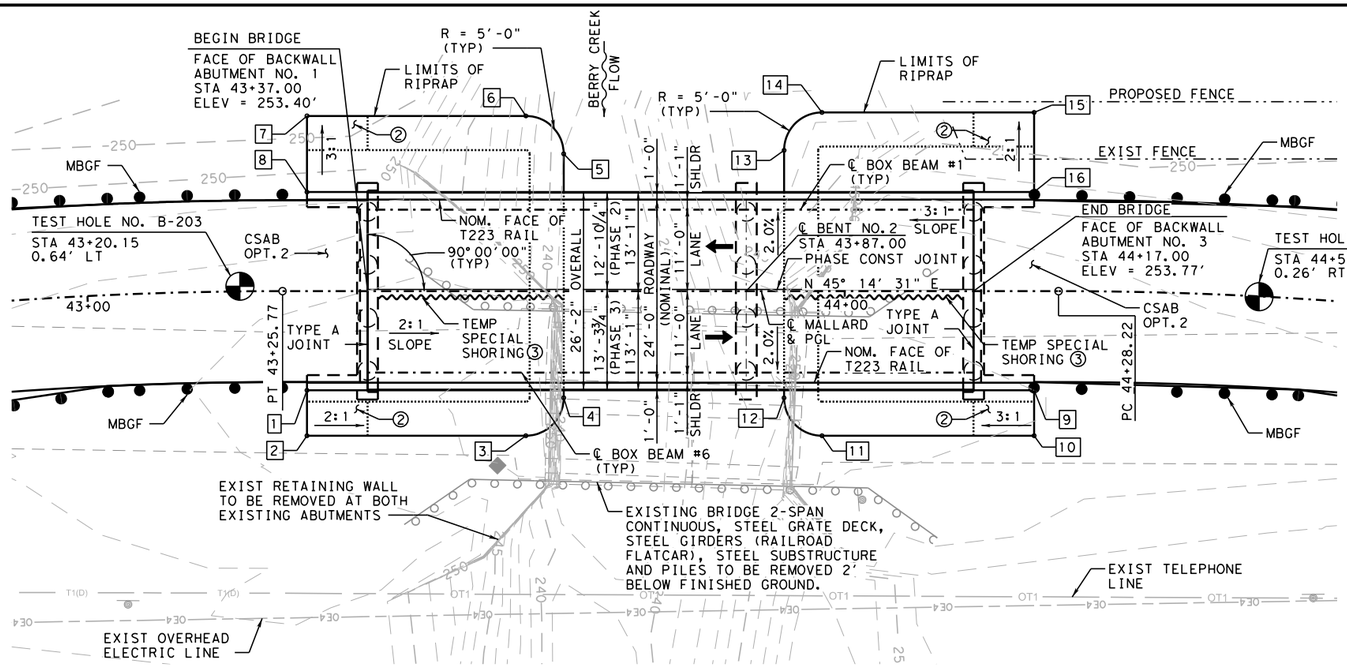


PLAN

RIPRAP CONTROL DATA ①		
POINT	STA	OFFSET (FT)
1	43+29.00	13.08 RT
2	43+29.00	19.08 RT
3	43+57.89	19.08 RT
4	43+62.89	14.08 RT
5	43+62.89	18.13 LT
6	43+57.89	23.13 LT
7	43+29.00	23.13 LT
8	43+29.00	13.08 LT
9	44+25.00	13.09 RT
10	44+25.00	19.08 RT
11	43+96.98	19.08 RT
12	43+91.98	14.08 RT
13	43+91.98	18.59 LT
14	43+96.98	23.59 LT
15	44+25.00	23.59 LT
16	44+25.00	13.08 LT

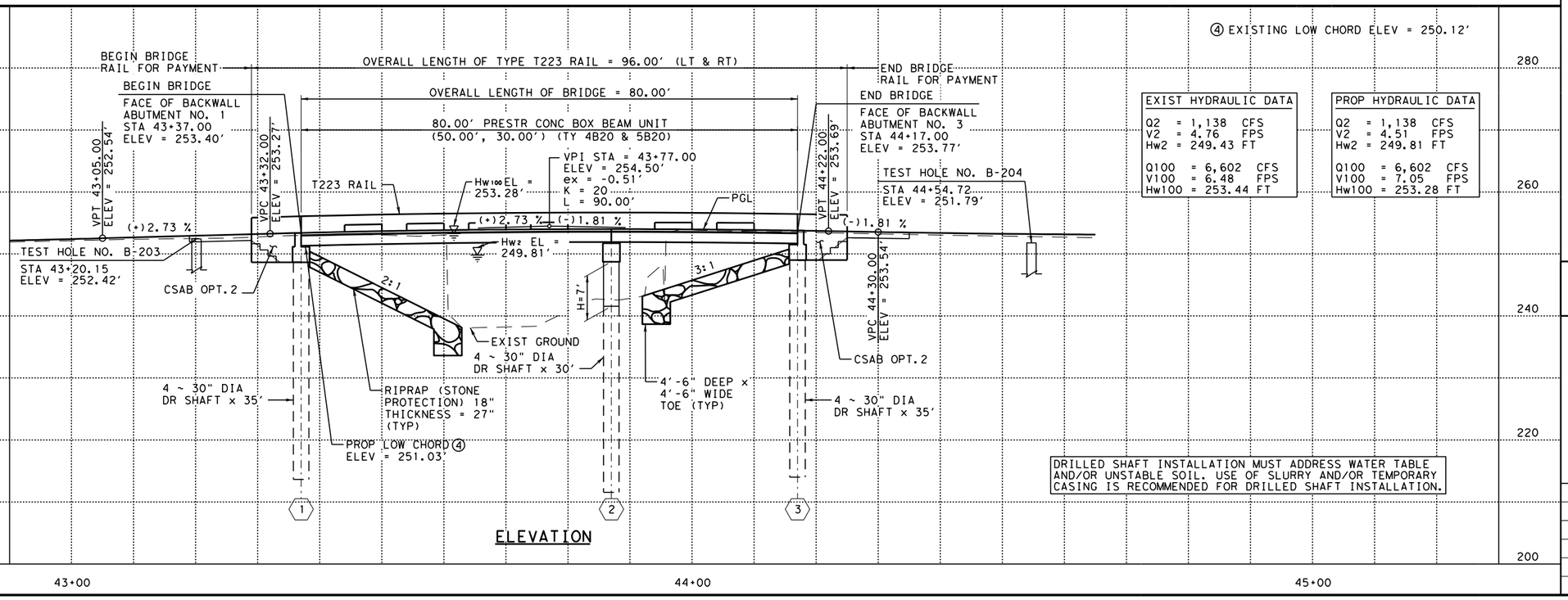
① RIPRAP CONTROL DATA IS APPROXIMATE AND MAY NEED TO BE ADJUSTED IN THE FIELD.

② PLACE GROUT IN THE TOE OF THE RIPRAP ALONG THE ABUTMENT WINGWALL CAP IN ACCORDANCE WITH TxDOT ITEM 432.2.3. THE GROUT MUST FILL ALL RIPRAP STONE VOIDS AT AND BELOW THE BOTTOM OF ABUTMENT WINGWALL CAP. DO NOT PLACE GROUT IN THE RIPRAP TOE BEYOND THE ABUTMENT WINGWALL CAP LIMITS. THE LABOR, MATERIALS, AND INCIDENTALS FOR THE GROUT PLACEMENT WILL BE SUBSIDIARY TO BID ITEM 432-6033, RIPRAP (STONE PROTECTION) (18 IN).

③ SEE TRAFFIC CONTROL PLAN SHEETS FOR TEMP SPECIAL SHORING.

ABUTMENTS AND BENT AT BEARING S 44° 45' 29" E

HL93 LOADING: SUPERSTRUCTURE INV/OPR RATING = 1.00/1.30
SUBSTRUCTURE INV/OPR RATING = SUBSTRUCTURE NOT RATED



ELEVATION

EXIST HYDRAULIC DATA	
Q2	= 1,138 CFS
V2	= 4.76 FPS
Hw2	= 249.43 FT
Q100	= 6,602 CFS
V100	= 6.48 FPS
Hw100	= 253.44 FT

PROP HYDRAULIC DATA	
Q2	= 1,138 CFS
V2	= 4.51 FPS
Hw2	= 249.81 FT
Q100	= 6,602 CFS
V100	= 7.05 FPS
Hw100	= 253.28 FT

DRILLED SHAFT INSTALLATION MUST ADDRESS WATER TABLE AND/OR UNSTABLE SOIL. USE OF SLURRY AND/OR TEMPORARY CASING IS RECOMMENDED FOR DRILLED SHAFT INSTALLATION.

0 5 10 20

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).
2. BRIDGE NOT DESIGNED FOR OVERLAY.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
4. COLUMN HEIGHTS ("H") SHOWN ARE CALCULATED AT THE PROFILE GRADE LINE (PGL), ACTUAL COLUMN HEIGHTS WILL BE MEASURED IN THE FIELD PRIOR TO ORDERING MATERIALS.
5. CONTRACTOR TO VERIFY LOCATION AND STATUS OF ALL UTILITIES NOT IDENTIFIED PRIOR TO CONSTRUCTION.
6. CONTRACTOR MUST FIELD VERIFY ALL EXISTING ABUTMENT AND BENT LOCATIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO FABRICATION OF BOX BEAMS.
7. SEE "CONSTRUCTION PHASING PLAN" SHEET FOR TYPICAL SECTION.
8. SEE "TEST HOLE DATA" SHEET FOR TEST HOLE DATA.

FUNCTIONAL CLASS: RURAL LOCAL
DESIGN SPEED: MEET EXISTING CONDITIONS
ADT: 180 (2020) ; 180 (2040)
EXIST NBI: 17-026-0-AA01-99-001
PROP NBI: 17-026-0-AA07-44-101

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED PROFESSIONAL ENGINEER
11/22/2022

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Bryan District

BRIDGE LAYOUT

MALLARD RD AT BERRY CREEK

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TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 73

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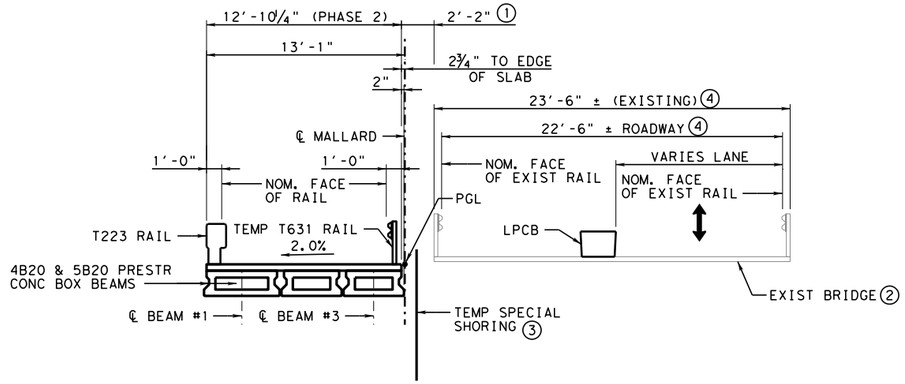
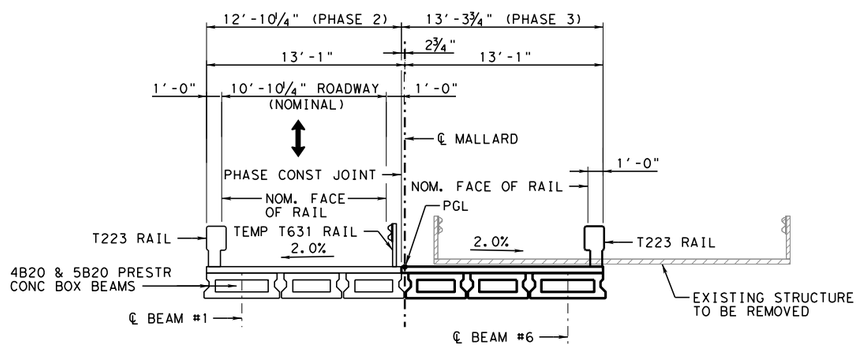
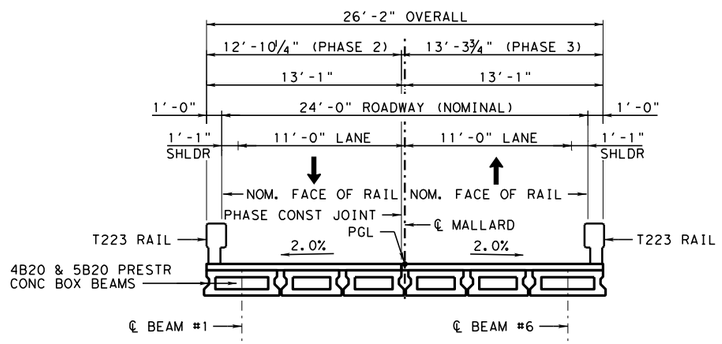


PHASE 2 CONSTRUCTION



PHASE 3 CONSTRUCTION



FINAL PHASE CONSTRUCTION

① ESTIMATED DIMENSION. CONTRACTOR TO FIELD VERIFY DIMENSION PRIOR TO COMMENCING WORK. CONTACT ENGINEER IF DIMENSIONS ARE LESS THAN INDICATED AND PRESENT A CONSTRUCTABILITY ISSUE.

② EXISTING STRINGERS AND RAILROAD FLATCAR GIRDERS NOT SHOWN DUE TO UNAVAILABLE AS-BUILT PLANS.

③ SEE TRAFFIC CONTROL PLAN SHEETS FOR TEMP SPECIAL SHORING.

④ APPROXIMATE DIMENSION BASED ON SURVEY.

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CONSTRUCTION PHASING PLAN

MALLARD RD AT BERRY CREEK

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6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 74

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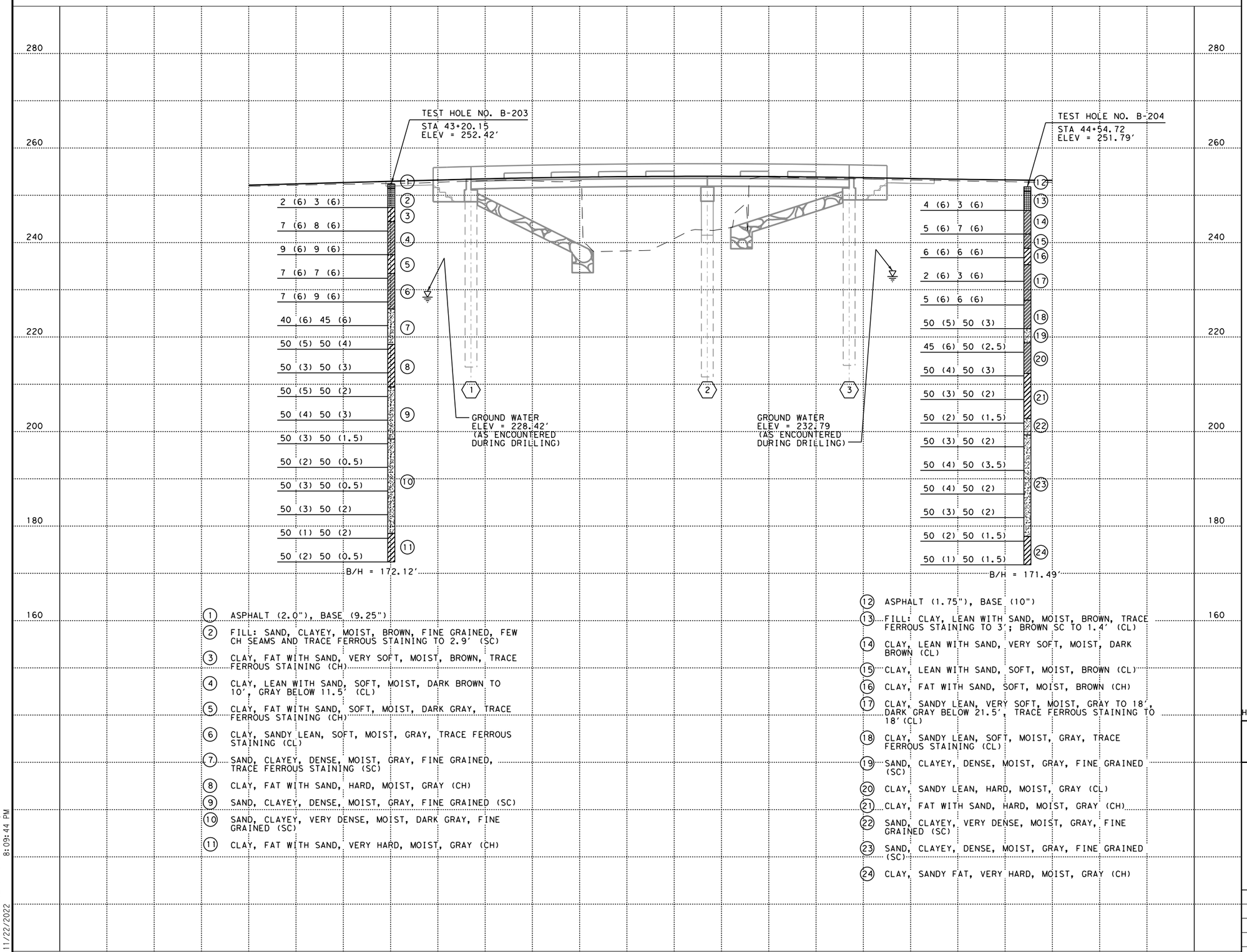

1. ASPHALT (2.0"), BASE (9.25")
2. FILL: SAND, CLAYEY, MOIST, BROWN, FINE GRAINED, FEW CH SEAMS AND TRACE FERROUS STAINING TO 2.9' (SC)
3. CLAY, FAT WITH SAND, VERY SOFT, MOIST, BROWN, TRACE FERROUS STAINING (CH)
4. CLAY, LEAN WITH SAND, SOFT, MOIST, DARK BROWN TO 10', GRAY BELOW 11.5' (CL)
5. CLAY, FAT WITH SAND, SOFT, MOIST, DARK GRAY, TRACE FERROUS STAINING (CH)
6. CLAY, SANDY LEAN, SOFT, MOIST, GRAY, TRACE FERROUS STAINING (CL)
7. SAND, CLAYEY, DENSE, MOIST, GRAY, FINE GRAINED, TRACE FERROUS STAINING (SC)
8. CLAY, FAT WITH SAND, HARD, MOIST, GRAY (CH)
9. SAND, CLAYEY, DENSE, MOIST, GRAY, FINE GRAINED (SC)
10. SAND, CLAYEY, VERY DENSE, MOIST, DARK GRAY, FINE GRAINED (SC)
11. CLAY, FAT WITH SAND, VERY HARD, MOIST, GRAY (CH)
12. ASPHALT (1.75"), BASE (10")
13. FILL: CLAY, LEAN WITH SAND, MOIST, BROWN, TRACE FERROUS STAINING TO 3'; BROWN SC TO 1.4' (CL)
14. CLAY, LEAN WITH SAND, VERY SOFT, MOIST, DARK BROWN (CL)
15. CLAY, LEAN WITH SAND, SOFT, MOIST, BROWN (CL)
16. CLAY, FAT WITH SAND, SOFT, MOIST, BROWN (CH)
17. CLAY, SANDY LEAN, VERY SOFT, MOIST, GRAY TO 18', DARK GRAY BELOW 21.5', TRACE FERROUS STAINING TO 18' (CL)
18. CLAY, SANDY LEAN, SOFT, MOIST, GRAY, TRACE FERROUS STAINING (CL)
19. SAND, CLAYEY, DENSE, MOIST, GRAY, FINE GRAINED (SC)
20. CLAY, SANDY LEAN, HARD, MOIST, GRAY (CL)
21. CLAY, FAT WITH SAND, HARD, MOIST, GRAY (CH)
22. SAND, CLAYEY, VERY DENSE, MOIST, GRAY, FINE GRAINED (SC)
23. SAND, CLAYEY, DENSE, MOIST, GRAY, FINE GRAINED (SC)
24. CLAY, SANDY FAT, VERY HARD, MOIST, GRAY (CH)

TEST HOLE DATA IS A REPRODUCTION OF THE DRILLING LOGS FROM A GEOTECHNICAL INVESTIGATION BY CORSAIR CONSULTING LLC DATED JUNE 17 AND 18, 2021.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED PROFESSIONAL ENGINEER
11/22/2022

HL93 LOADING

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TEST HOLE DATA

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 75

SUMMARY OF ESTIMATED QUANTITIES

	BID ITEM NUMBER	400-6005	416-6003	420-6013	420-6029	420-6037	422-6005	422-6023	425-6001	425-6002	432-6033	450-6006	454-6021	4171-6001
	BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (30 IN) (1)	CL "C" CONC (ABUT)	CL "C" CONC (CAP)	CL "C" CONC (COLUMN)	REINF CONC SLAB (BOX BEAM)	SHEAR KEY	PRESTR CONC BOX BEAM (4B20)	PRESTR CONC BOX BEAM (5B20)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	TYPE A JOINT	INSTALL BRIDGE IDENTIFICATION NUMBERS
		CY	LF	CY	CY	CY	SF	CY	LF	LF	CY	LF	LF	EA
PHASE 2														
PHASE 2	2 ~ ABUTMENTS	30	140	13.4							175	16.0	28	
PHASE 2	1 ~ INTERIOR BENT		60		4.4	2.5								
PHASE 2	1 ~ 80.00' PRESTR CONC BOX BEAM UNIT						1,028	4.2	158.01	79.00		80.0		
PHASE 2														
PHASE 2	PHASE 2 TOTAL	30	200	13.4	4.4	2.5	1,028	4.2	158.01	79.00	175	96.0	28	
PHASE 3														
PHASE 3	2 ~ ABUTMENTS	31	140	13.4							147	16.0	25	
PHASE 3	1 ~ INTERIOR BENT		60		4.4	2.5								
PHASE 3	1 ~ 80.00' PRESTR CONC BOX BEAM UNIT						1,065	6.4	158.01	79.00		80.0		
PHASE 3														
PHASE 3	PHASE 3 TOTAL	31	200	13.4	4.4	2.5	1,065	6.4	158.01	79.00	147	96.0	25	
	TOTAL	61	400	26.8	8.8	5.0	2,093	10.6	316.02	158.00	322	192.0	53	2

(1) CONTRACTOR MUST USE SULFATE RESISTANT CONCRETE FOR DRILLED SHAFTS.

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ESTIMATED QUANTITIES

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CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 76

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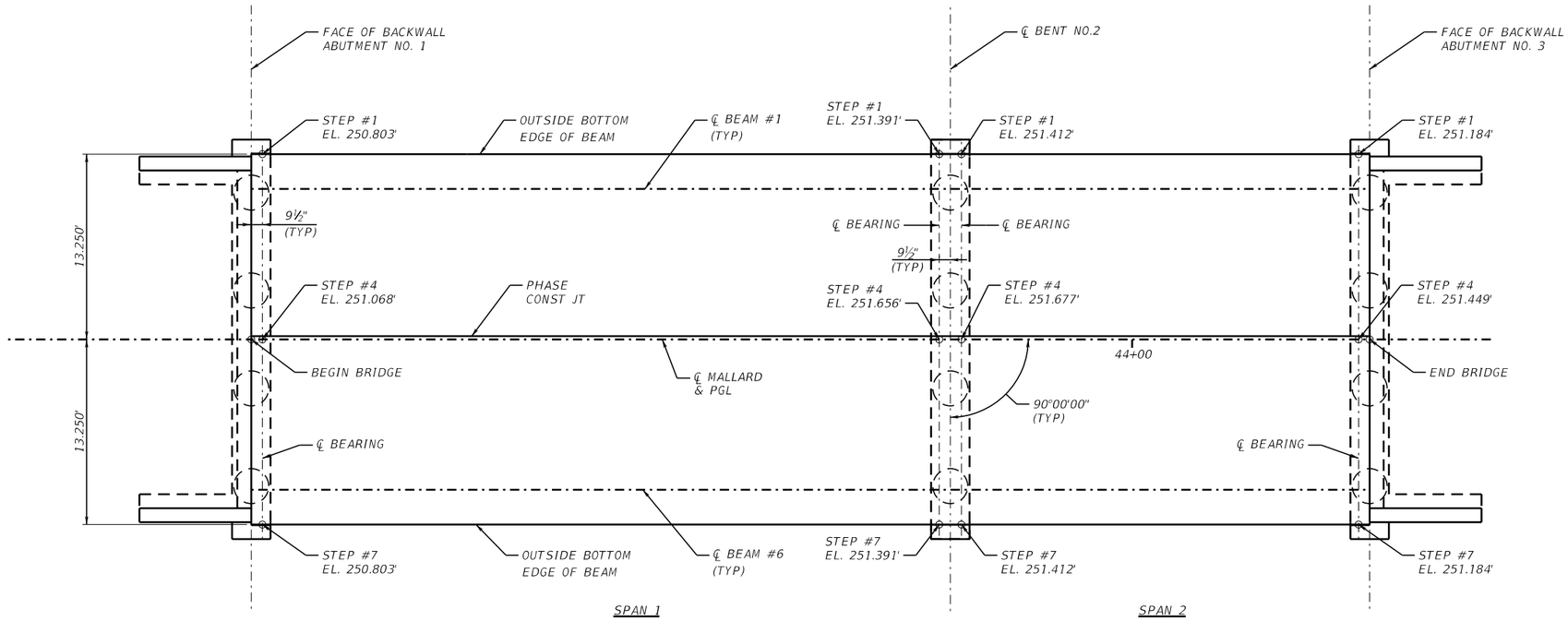

TOP OF CAP ELEVATIONS

(ELEVATIONS SHOWN ARE SAME FOR BOTH LEFT AND RIGHT SIDE OF STEP)

STATE OF TEXAS
WILLIAM A. SHEKARCHI
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TOP OF CAP ELEVATIONS

MALLARD RD AT BERRY CREEK

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STATE	DISTRICT	COUNTY
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CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 77

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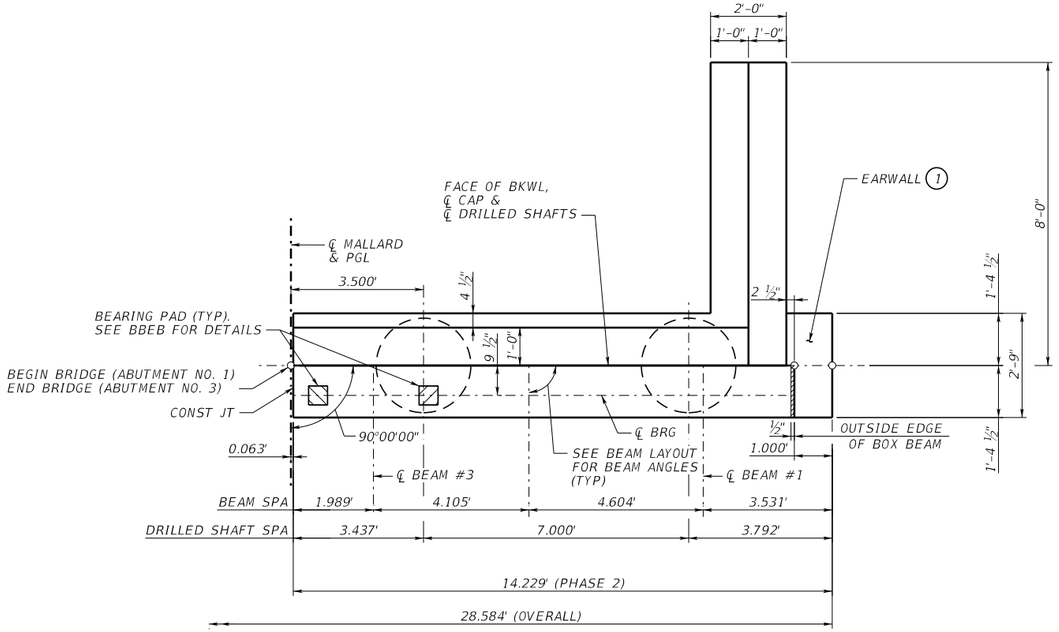
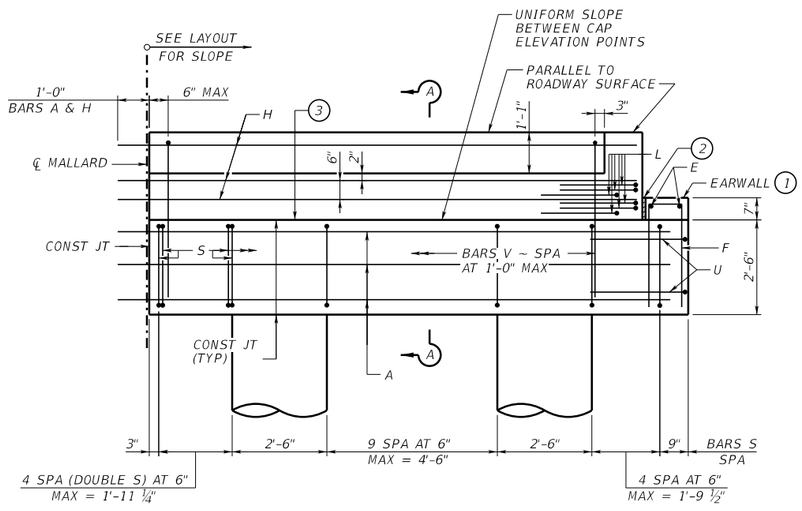


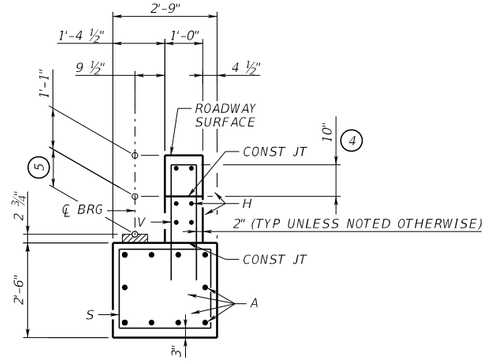
PLAN

(LOOKING BACK STATION)

(ABUTMENT NO. 1 SHOWN, ABUTMENT NO. 3 MIRRORED ABOUT CAP CENTER LINE)



ELEVATION



SECTION A-A

1. DO NOT CAST EARWALL UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.
2. ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BOX BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
3. SURFACE FINISH FOR THE TOP OF CAP WILL BE A TEXTURED WOOD FLOAT FINISH. THE SURFACE MUST BE LEVEL IN THE DIRECTION OF THE CENTERLINE OF BOX BEAM.
4. INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.
5. 1'- ½" AT ABUTMENT NO. 1

   1'- ¼" AT ABUTMENT NO. 3

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

SEE "BRIDGE LAYOUT" FOR HEADER SLOPE, FOUNDATION TYPE, SIZE, AND LENGTH.

SEE "TOP OF CAP ELEVATIONS" SHEET FOR TOP OF CAP ELEVATIONS.

SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.

SEE STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS.

SEE T223 STANDARD FOR RAIL ANCHORAGE IN WINGWALLS.

SEE "MISCELLANEOUS ABUTMENT DETAILS" FOR ADDITIONAL INFORMATION.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

CALCULATED FOUNDATION LOADS = 55 TONS/DR SH

MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE (f'c = 3,600 psi).

PROVIDE GRADE 60 REINFORCING STEEL.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED
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11/22/2022

HL93 LOADING

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ABUTMENT NO. 1 & 3 (PHASE 2)

MALLARD RD AT BERRY CREEK

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TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 78

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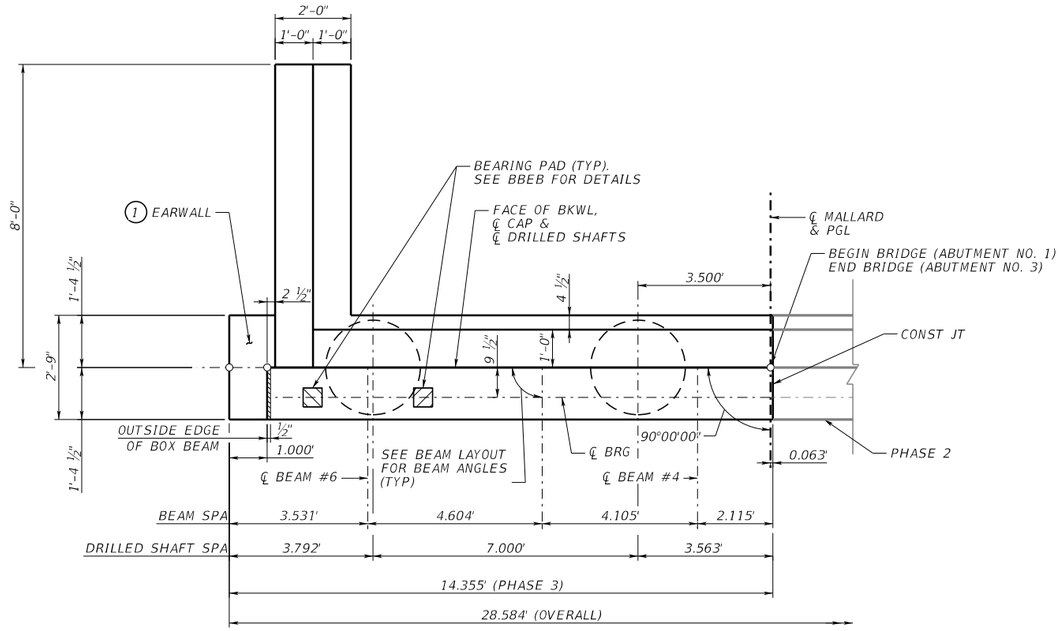


PLAN

(LOOKING BACK STATION)

(ABUTMENT NO. 1 SHOWN, ABUTMENT NO. 3 MIRRORED ABOUT CAP CENTER LINE)

1. DO NOT CAST EARWALL UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.
2. ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BOX BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
3. SURFACE FINISH FOR THE TOP OF CAP WILL BE A TEXTURED WOOD FLOAT FINISH. THE SURFACE MUST BE LEVEL IN THE DIRECTION OF THE CENTERLINE OF BOX BEAM.
4. INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.
5. 1'- ½" AT ABUTMENT NO. 1

   1'- ¼" AT ABUTMENT NO. 3
6. THE CONTRACTOR WILL SPLICE BARS BY WELDING IN ACCORDANCE WITH TxDOT ITEM 448, "STRUCTURAL FIELD WELDING" OR BY USING MECHANICAL COUPLERS IN ACCORDANCE WITH TxDOT ITEM 440, "REINFORCEMENT FOR CONCRETE".

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

SEE "BRIDGE LAYOUT" FOR HEADER SLOPE, FOUNDATION TYPE, SIZE, AND LENGTH.

SEE "TOP OF CAP ELEVATIONS" SHEET FOR TOP OF CAP ELEVATIONS.

SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.

SEE STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS.

SEE T223 STANDARD FOR RAIL ANCHORAGE IN WINGWALLS.

SEE "MISCELLANEOUS ABUTMENT DETAILS" FOR ADDITIONAL INFORMATION.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

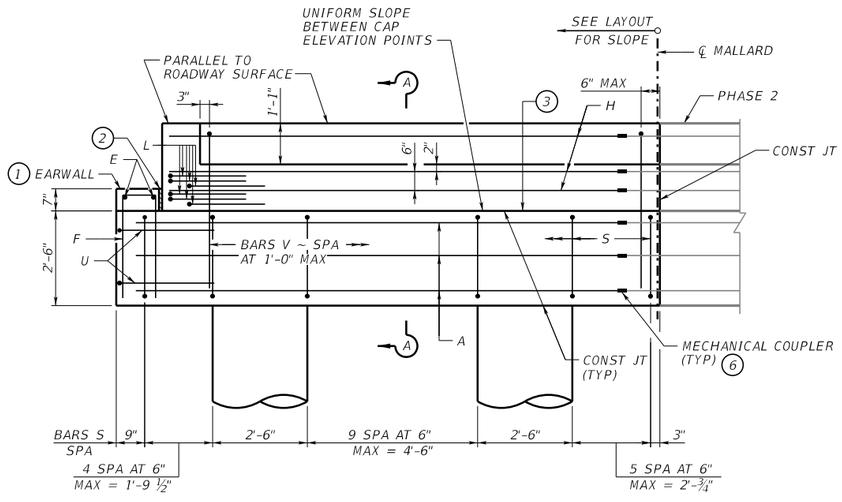
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

CALCULATED FOUNDATION LOADS = 55 TONS/DR SH

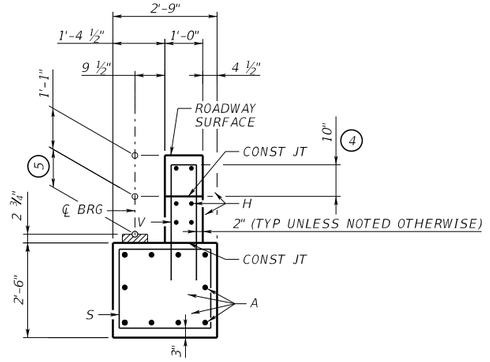
MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE (f'c = 3,600 psi).

PROVIDE GRADE 60 REINFORCING STEEL.



ELEVATION



SECTION A-A

HL93 LOADING

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

ABUTMENT NO. 1 & 3 (PHASE 3)

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 79

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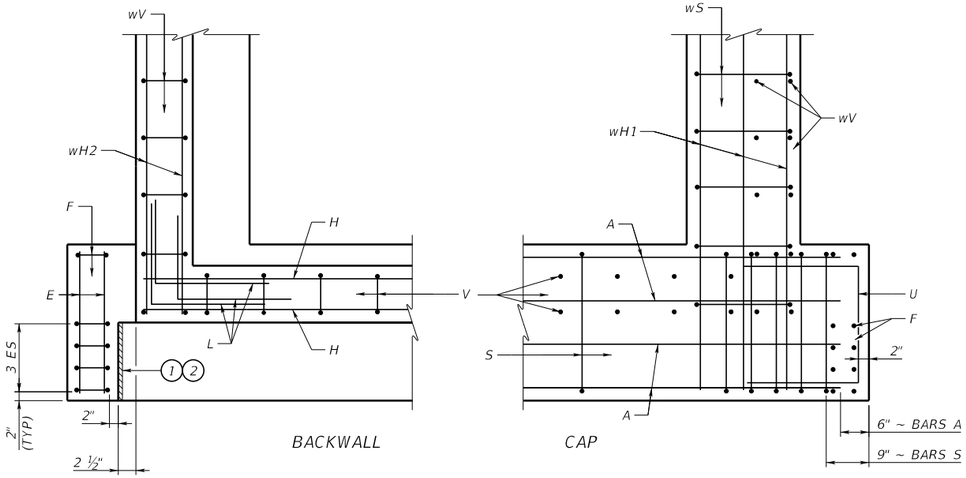

TABLE OF ESTIMATED QUANTITIES (PHASE 2) (4)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	14'-9"	784
E	2	# 5	2'-5"	5
F	5	# 5	6'-1"	32
H	6	# 6	13'-11"	125
L	6	# 6	4'-0"	36
S	25	# 5	10'-0"	261
U	2	# 6	7'-4"	22
V	13	# 5	8'-10"	120
wH1	7	# 6	9'-0"	95
wH2	6	# 6	7'-8"	69
wS	9	# 4	7'-10"	47
wV	9	# 5	8'-10"	83
REINFORCING STEEL			LB	1,679
CLASS "C" CONC (ABUT)			CY	6.7

TABLE OF ESTIMATED QUANTITIES (PHASE 3) (4)

BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	12'-10"	682
E	2	# 5	2'-5"	5
F	5	# 5	6'-1"	32
H	6	# 6	11'-11"	107
L	6	# 6	4'-0"	36
S	21	# 5	10'-0"	219
U	2	# 6	7'-4"	22
V	13	# 5	8'-10"	120
wH1	7	# 6	9'-0"	95
wH2	6	# 6	7'-8"	69
wS	9	# 4	7'-10"	47
wV	9	# 5	8'-10"	83
REINFORCING STEEL			LB	1,517
CLASS "C" CONC (ABUT)			CY	6.7

CORNER DETAILS

(1) DO NOT CAST EARWALL UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

(2) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BOX BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.

(3) 2'- 4 ¼" AT ABUTMENT NO. 1
2'- 4" AT ABUTMENT NO. 3

(4) QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

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SEE "TOP OF CAP ELEVATIONS" SHEET FOR TOP OF CAP ELEVATIONS.

SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.

SEE STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS.

SEE T223 STANDARD FOR RAIL ANCHORAGE IN WINGWALLS.

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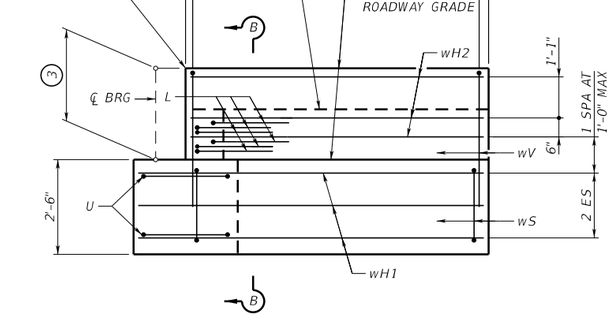
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

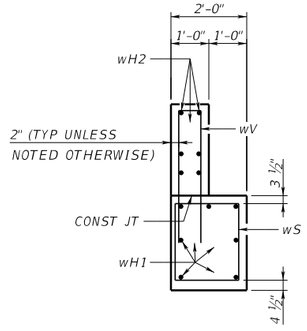
MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE (f'c = 3,600 psi).

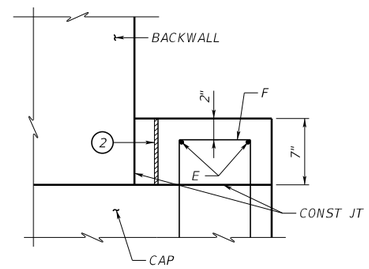
PROVIDE GRADE 60 REINFORCING STEEL.



WINGWALL ELEVATION
(EARWALL OMITTED FOR CLARITY)

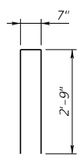


SECTION B-B

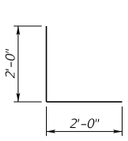


EARWALL ELEVATION DETAILS (1)
(SLOPE TOP OF EARWALL AWAY FROM BEAMS)

HL93 LOADING



BARS F



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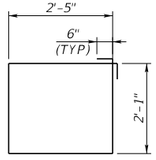

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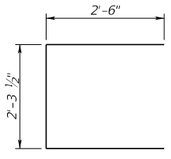

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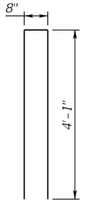
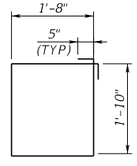


BARS V & wV



BARS wS

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

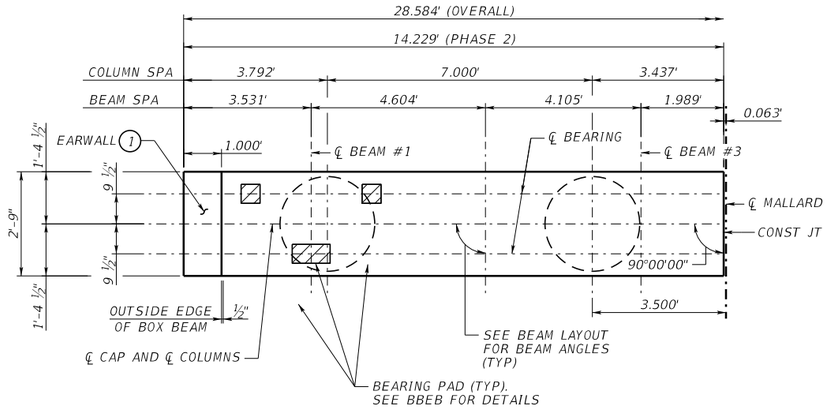
MISCELLANEOUS ABUTMENT DETAILS

MALLARD RD AT BERRY CREEK

PRINT DATE	REVISION DATE
11/22/2022	

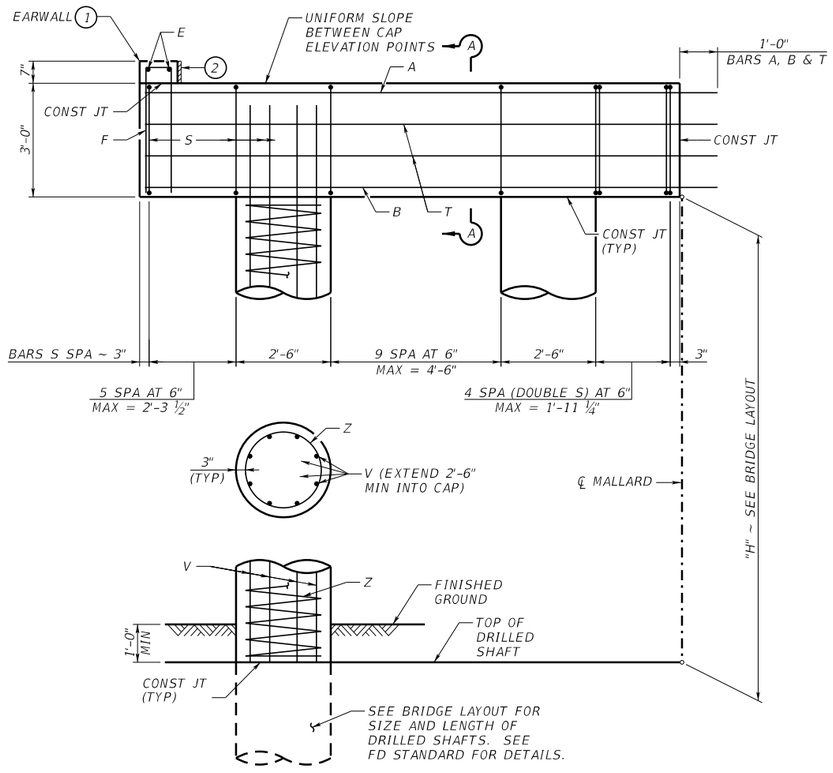
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 80

WILLIAM A. SHEKARCHI
131441
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/22/2022

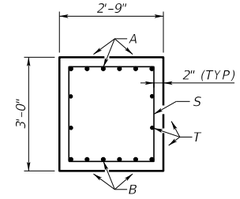


PLAN

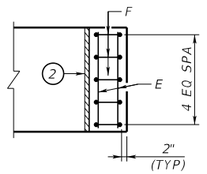
(LOOKING UP STATION)



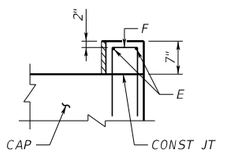
ELEVATION



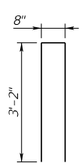
SECTION A-A



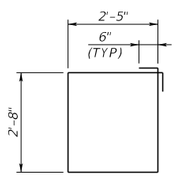
EARWALL PLAN



EARWALL ELEVATION



BARS F



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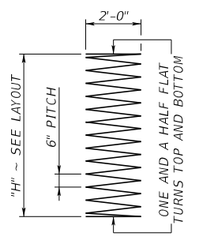

BARS Z

TABLE OF COLUMN QUANTITIES (3)

"H"	BARS V 16-#9		BARS Z 2-#3 SPIRAL		REINF STEEL	CLASS "C" CONC (COL)
HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
7'	9'-6"	517	106'-11"	80	597	2.5

TABLE OF ESTIMATED BENT CAP QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	15'-1"	481
B	6	#11	15'-1"	481
E	2	#5	2'-5"	5
F	5	#5	7'-0"	37
S	26	#5	11'-2"	303
T	4	#5	15'-1"	63
REINFORCING STEEL			LB	1,370
CLASS "C" CONC (CAP)			CY	4.4

(1) DO NOT CAST EARWALL UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

(2) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BOX BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.

(3) FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH.....1'-0"
BARS Z LENGTH.....12'-7"
REINFORCING STEEL.....64 LB
CLASS "C" CONC (COL).....0.36 CY

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

SEE "BRIDGE LAYOUT" FOR FOUNDATION TYPE, SIZE, AND LENGTH.

SEE "TOP OF CAP ELEVATIONS" SHEET FOR TOP OF CAP ELEVATIONS.

SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

CALCULATED FOUNDATION LOADS = 70 TONS/DR SH

MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE (f'c = 3,600 psi).

PROVIDE GRADE 60 REINFORCING STEEL.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED
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11/22/2022

HL93 LOADING

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

BENT NO. 2 (PHASE 2)

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 81

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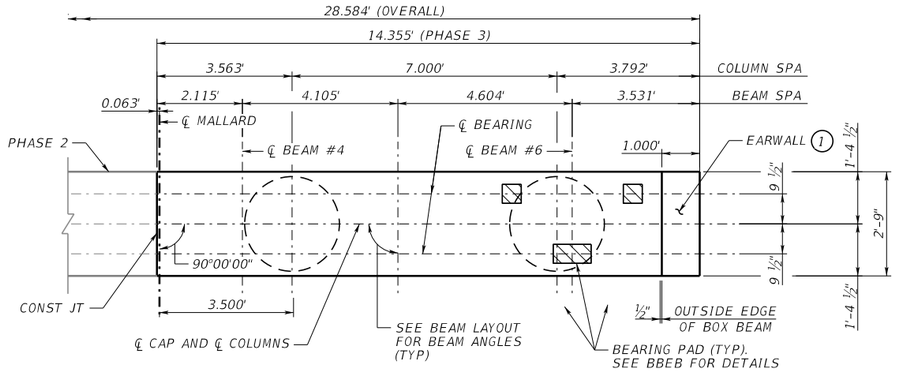
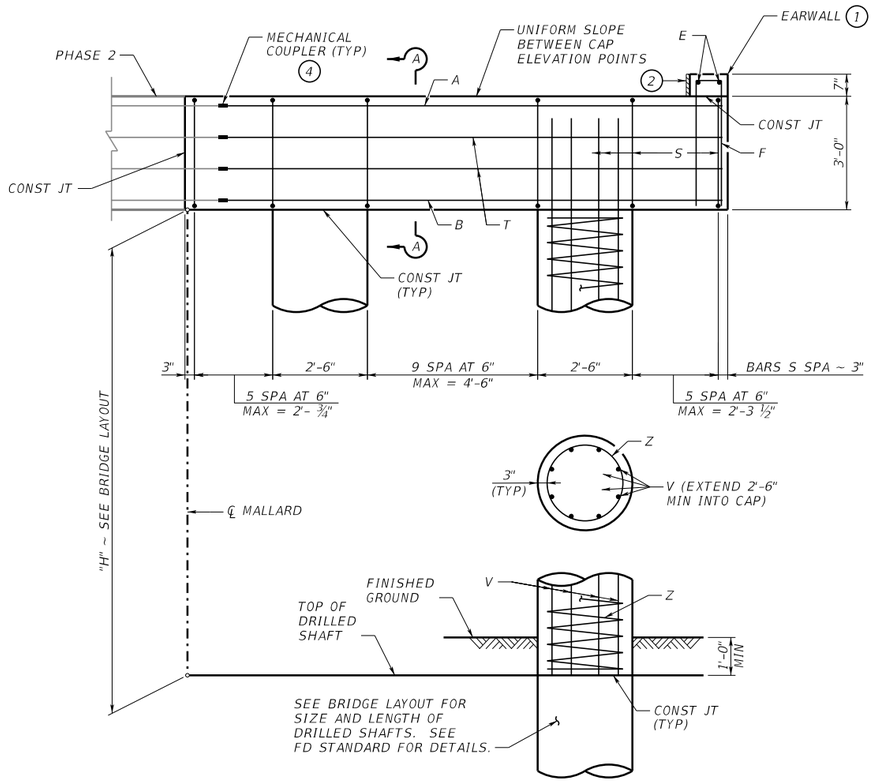


PLAN

(LOOKING UP STATION)



ELEVATION

TABLE OF COLUMN QUANTITIES (3)

"H"	BARS V 16-#9		BARS Z 2-#3 SPIRAL		REINF STEEL	CLASS "C" CONC (COL)
HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
7'	9'-6"	517	106'-11"	80	597	2.5

TABLE OF ESTIMATED BENT CAP QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	13'-2"	420
B	6	#11	13'-2"	420
E	2	#5	2'-5"	5
F	5	#5	7'-0"	37
S	22	#5	11'-2"	256
T	4	#5	13'-2"	55
REINFORCING STEEL			LB	1,193
CLASS "C" CONC (CAP)			CY	4.4

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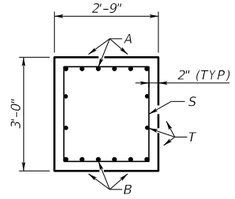
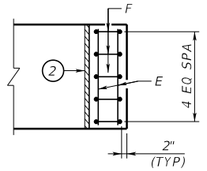
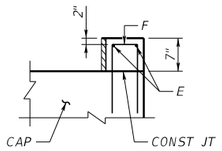
(4) THE CONTRACTOR WILL SPLICE BARS BY WELDING IN ACCORDANCE WITH TxDOT ITEM 448, "STRUCTURAL FIELD WELDING" OR BY USING MECHANICAL COUPLERS IN ACCORDANCE WITH TxDOT ITEM 440, "REINFORCEMENT FOR CONCRETE".



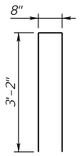
SECTION A-A



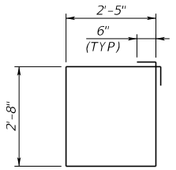
EARWALL PLAN



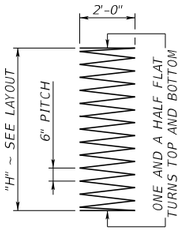
EARWALL ELEVATION



BARS F



BARS S



BARS Z

HL93 LOADING

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
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Texas Department of Transportation
Bryan District

BENT NO. 2 (PHASE 3)

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 82

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

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SEE "TOP OF CAP ELEVATIONS" SHEET FOR TOP OF CAP ELEVATIONS.

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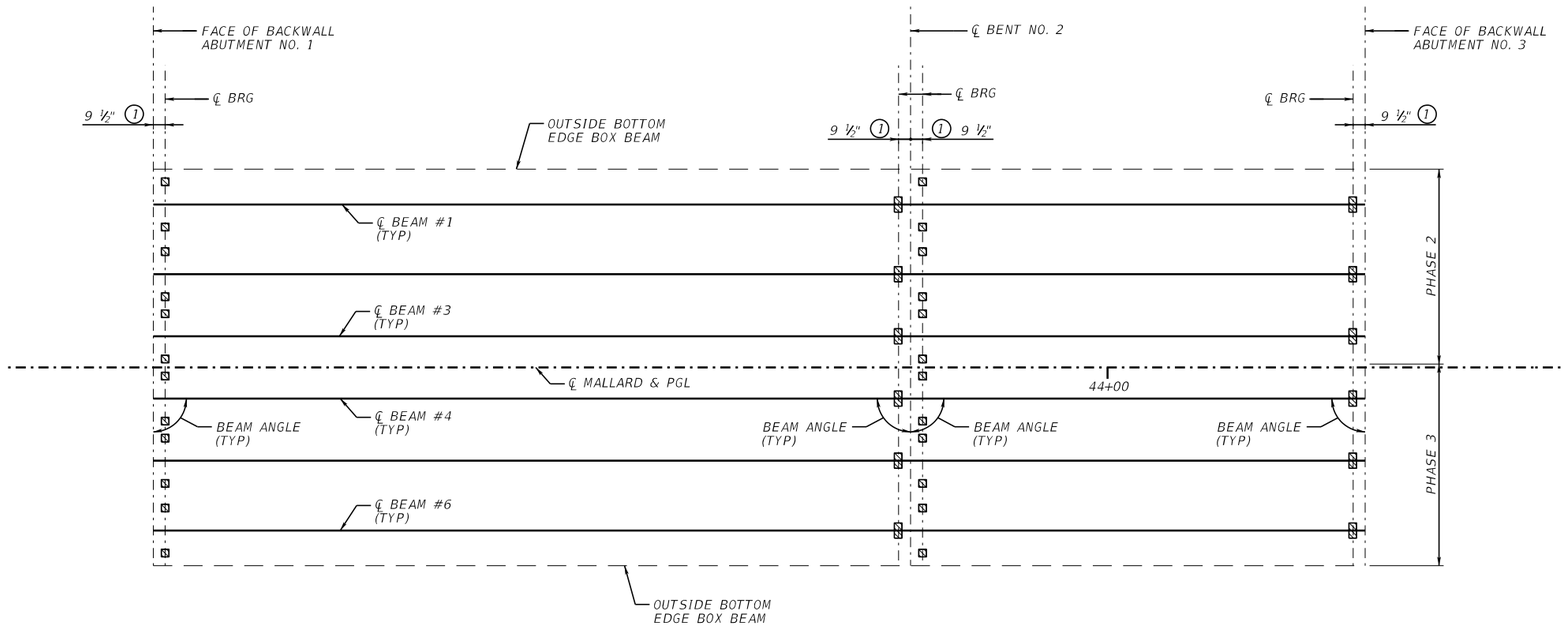
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

CALCULATED FOUNDATION LOADS = 70 TONS/DR SH

MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE (f'c = 3,600 psi).

PROVIDE GRADE 60 REINFORCING STEEL.



SPAN 1

(4B20 & 5B20 BOX BEAMS)

SPAN 2

(4B20 & 5B20 BOX BEAMS)

(1) SEE BBEB STANDARD FOR ORIENTATION OF DIMENSION.

(2) LENGTHS SHOWN ARE BOTTOM BOX BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BOX 1	50.0000	48.4167	49.5037	0.01215
BOX 2	50.0000	48.4167	49.5037	0.01215
BOX 3	50.0000	48.4167	49.5037	0.01215
BOX 4	50.0000	48.4167	49.5037	0.01215
BOX 5	50.0000	48.4167	49.5037	0.01215
BOX 6	50.0000	48.4167	49.5037	0.01215

BEAM REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BOX 1	30.0000	28.4167	29.5009	-0.00801
BOX 2	30.0000	28.4167	29.5009	-0.00801
BOX 3	30.0000	28.4167	29.5009	-0.00801
BOX 4	30.0000	28.4167	29.5009	-0.00801
BOX 5	30.0000	28.4167	29.5009	-0.00801
BOX 6	30.0000	28.4167	29.5009	-0.00801

BENT REPORT

ABUT NO. 1 (S 44 45 29.07 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 13.2500 L

		STEP SPAC. (CL ABUT)	BEAM ANGLE D M S
SPAN 1	STEP 1	0.0000	90 00 0
	STEP 4	13.2500	90 00 0
	STEP 7	13.2500	90 00 0
	TOTAL	26.5000	

BENT NO. 2 (S 44 45 29.07 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 13.2500 L

		STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 1	STEP 1	0.0000	90 00 0
	STEP 4	13.2500	90 00 0
	STEP 7	13.2500	90 00 0
	TOTAL	26.5000	

BENT NO. 2 (S 44 45 29.07 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 13.2500 L

		STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 2	STEP 1	0.0000	90 00 0
	STEP 4	13.2500	90 00 0
	STEP 7	13.2500	90 00 0
	TOTAL	26.5000	

ABUT NO. 3 (S 44 45 29.07 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 13.2500 L

		STEP SPAC. (CL ABUT)	BEAM ANGLE D M S
SPAN 2	STEP 1	0.0000	90 00 0
	STEP 4	13.2500	90 00 0
	STEP 7	13.2500	90 00 0
	TOTAL	26.5000	

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED PROFESSIONAL ENGINEER
11/22/2022

HL93 LOADING

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

BEAM LAYOUT

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 83

...\91730059_Mallard Rd_BD.dgn
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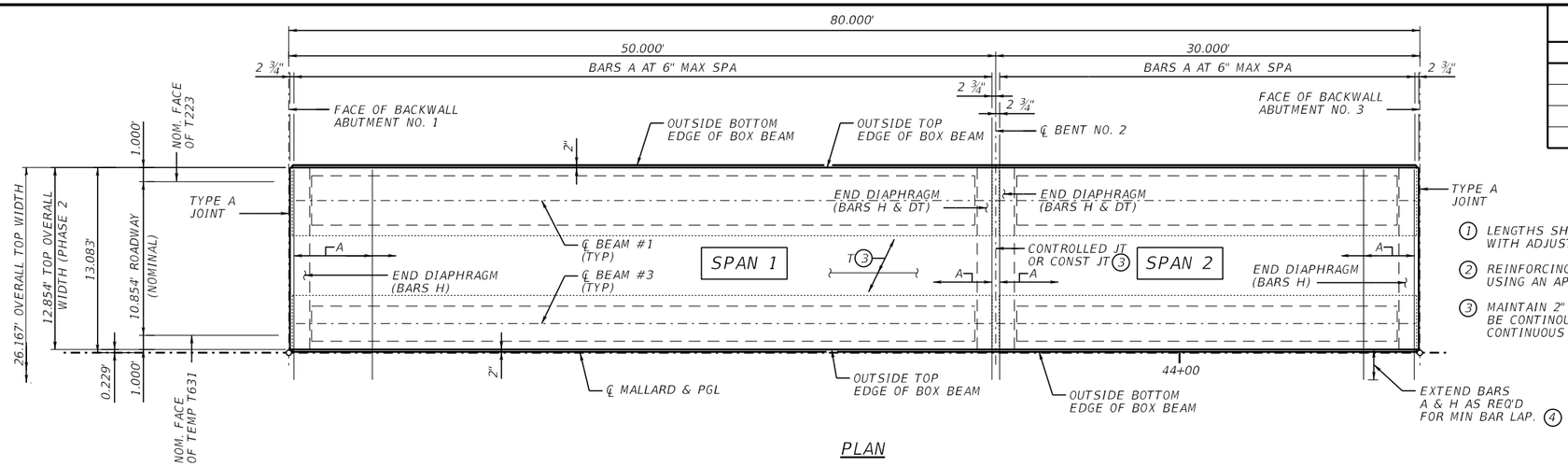


PLAN

BAR TABLE	
BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

TABLE OF ESTIMATED QUANTITIES

SPAN	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY 4B20) (1)	PRESTR CONCRETE BOX BEAMS (TY 5B20) (1)	REINF STEEL (2)
NO.	CY	SF	LF	LF	LB
1	2.6	643	99.01	49.50	1,286
2	1.6	386	59.00	29.50	772
TOTAL	4.2	1,028	158.01	79.00	2,058

(1) LENGTHS SHOWN ARE BOTTOM BOX BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

(2) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.0 LBS/SF.

(3) MAINTAIN 2" END COVER ON BARS T. BARS T MUST BE CONTINOUS THROUGH CONTROLLED JOINT. SEE CONTINUOUS SLAB DETAIL.

(4) AT THE CONTRACTORS OPTION, MECHANICAL COUPLERS MAY BE USED IN ACCORDANCE WITH TxDOT ITEM 440, "REINFORCEMENT FOR CONCRETE". PROVIDE 1'-0" MIN EXTENSION FOR BARS A & H

(5) THEORETICAL DIMENSION.

(6) FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.

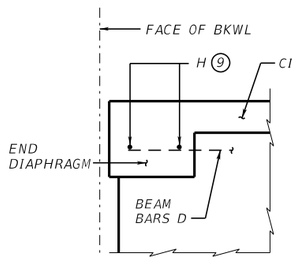
(7) BACKER ROD MUST BE 25% LARGER THAN JOINT OPENING AND MUST BE COMPATIBLE WITH THE SEALANT.

(8) USE CLASS 7 SILICONE SEALANT. PREPARE JOINT AND SEAL IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS".

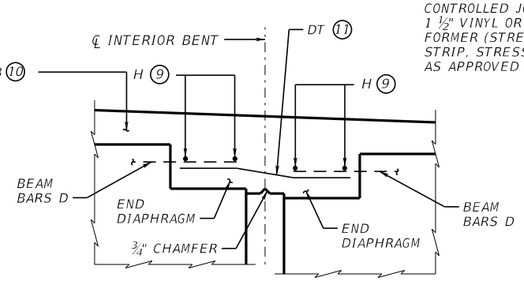
(9) PROVIDE 2" END COVER TO BARS H. AFTER ALL BEAMS HAVE BEEN PLACED, WELD ONE BAR H TO TWO BARS D AT EACH END OF ALL BEAMS.

(10) SLAB REINFORCING OMITTED FOR CLARITY.

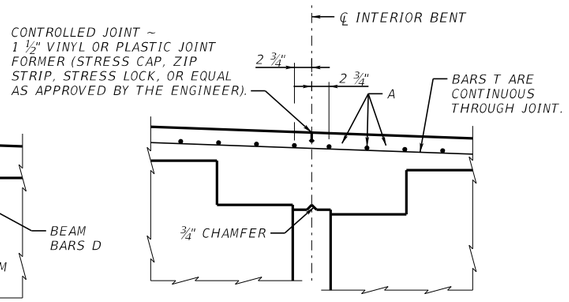
(11) LAP BARS DT 9" MIN WITH EACH BEAM BAR D AT INTERIOR BENTS WITHOUT EXPANSION JOINTS. BARS DT SHOWN BENT FOR CLARITY ONLY.



ABUTMENT
(WITH EXPANSION JOINT)

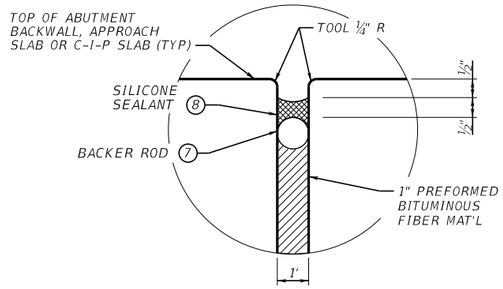


INTERIOR BENT
(WITHOUT EXPANSION JOINT)



CONTINUOUS SLAB DETAIL
(DIAPHRAGM REINFORCING NOT SHOWN FOR CLARITY)

TYPICAL END DIAPHRAGM
(ALONG CENTERLINE OF BOX BEAM)



TYPE A JOINT DETAIL

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

SEE T223 STANDARD, T631 STANDARD, AND BBRAS STANDARD FOR RAIL ANCHORAGE IN SLAB.

SEE BB-B20 STANDARD FOR PRESTRESSED CONCRETE BOX BEAM DETAILS.

IT IS RECOMMENDED TO ERECT BEAMS ADJACENT TO THE HIGH SIDE OF THE CROSS SLOPE FIRST AND PROGRESS TO THE LOW SIDE.

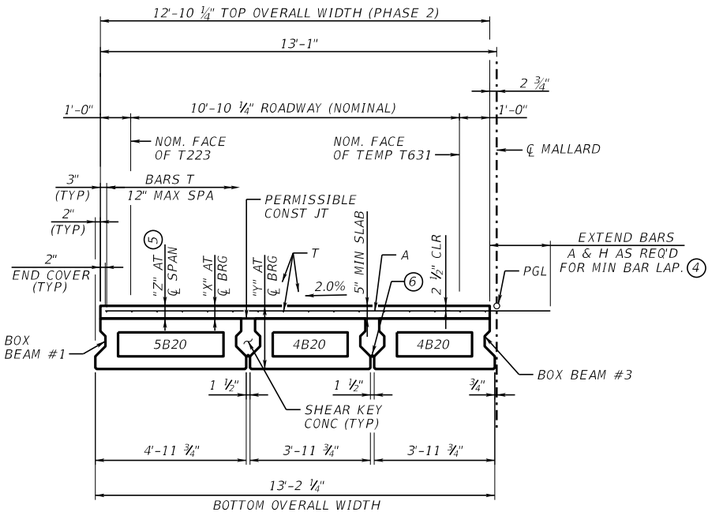
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

PROVIDE CLASS "S" CONCRETE (f'c = 4,000 psi) FOR SLAB AND SHEAR KEY.

PROVIDE GRADE 60 REINFORCING STEEL

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
#5 = 2'-0"



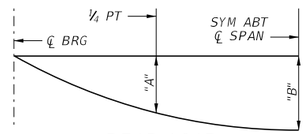
TYPICAL TRANSVERSE SECTION

TABLE OF SECTION DEPTHS

SPAN NO.	BEAM NO.	"X" AT ℄ BRG	"Y" AT ℄ BRG	"Z" AT ℄ SPAN (5)
1	1	5 1/2"	2'-1 1/2"	6"
1	2 & 3	5 1/2"	2'-1 1/2"	5 7/8"
2	1 - 3	5 1/4"	2'-1 1/4"	5 3/8"

TABLE OF DEAD LOAD DEFLECTIONS

SPAN NO.	BEAM NO.	POINT	SHEAR KEY	SLAB	TOTAL
			FT	FT	FT
1	1	"A"	0.002	0.013	0.015
		"B"	0.003	0.018	0.021
1	2	"A"	0.006	0.013	0.019
		"B"	0.008	0.019	0.027
1	3	"A"	0.003	0.013	0.016
		"B"	0.004	0.018	0.022
2	1 & 3	"A"	0.000	0.001	0.001
		"B"	0.000	0.002	0.002
2	2	"A"	0.000	0.002	0.002
		"B"	0.000	0.002	0.002



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO SHEAR KEY AND CONCRETE SLAB ONLY (Ec = 5000 ksi). ADJUST DEFLECTIONS BASED ON FIELD OBSERVATIONS AS NEEDED.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED PROFESSIONAL ENGINEER
11/22/2022

HL93 LOADING

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

80.00' PRESTRESSED CONC BOX BEAM UNIT (PHASE 2)

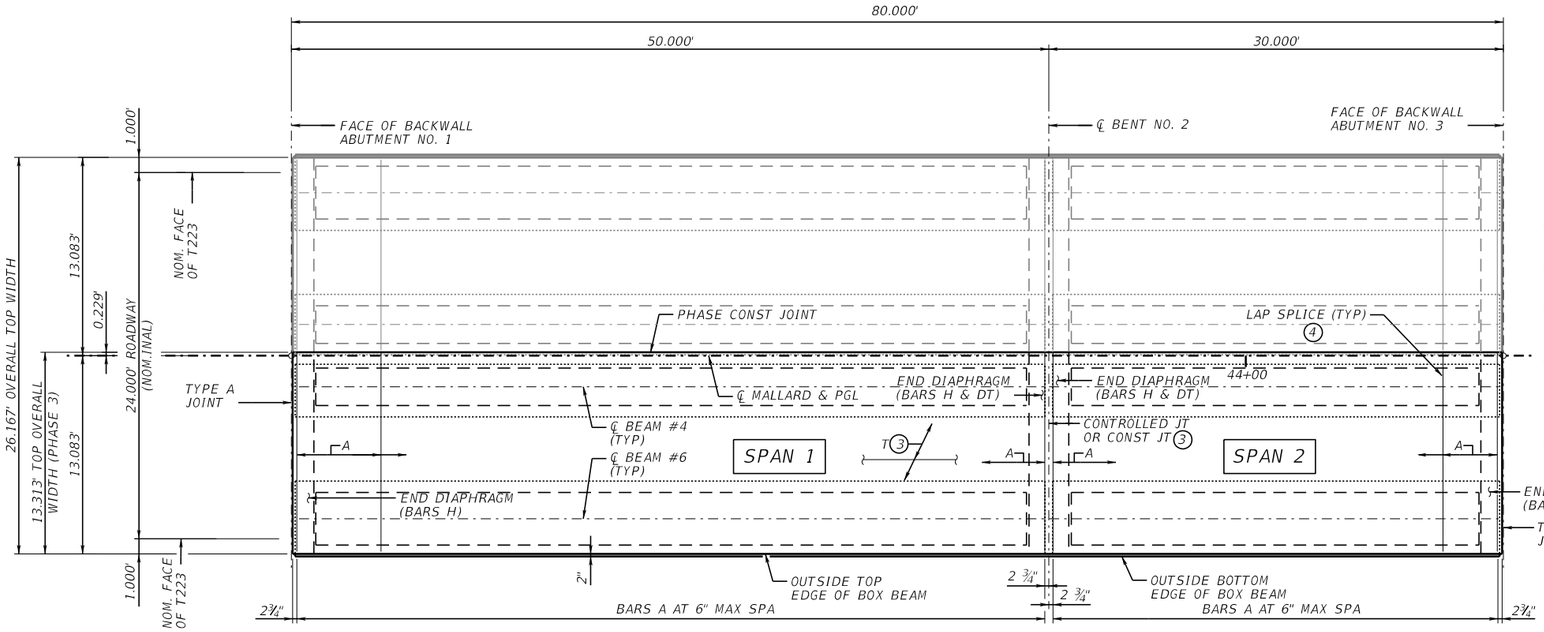
MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 84

BAR TABLE	
BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

TABLE OF ESTIMATED QUANTITIES

SPAN	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY 4B20) (1)	PRESTR CONCRETE BOX BEAMS (TY 5B20) (1)	REINF STEEL (2)
NO.	CY	SF	LF	LF	LB
1	4.0	666	99.01	49.50	1,332
2	2.4	399	59.00	29.50	798
TOTAL	6.4	1,065	158.01	79.00	2,130



PLAN

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GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).

SEE T223 STANDARD AND BBRAS STANDARD FOR RAIL ANCHORAGE IN SLAB.

SEE BB-B20 STANDARD FOR PRESTRESSED CONCRETE BOX BEAM DETAILS.

AFTER PHASE 3 CONSTRUCTION, REMOVE TEMP T631 RAIL. CORE DRILL AND REMOVE T631 ANCHOR BOLTS. FILL HOLE WITH TY D (EXTENDED) MATERIAL IN ACCORDANCE WITH DMS-4655, "CONCRETE REPAIR MATERIALS". CONTRACTOR MAY PROVIDE ALTERNATE REPAIR DETAILS SIGNED AND SEALED BY AN ENGINEER. THE LABOR, MATERIALS, AND INCIDENTALS FOR THE REPAIR OF THE DECK WILL NOT BE PAID DIRECTLY BUT WILL BE SUBSIDARY TO BID ITEM 496-6099, REMOVE STR (RAIL).

IT IS RECOMMENDED TO ERECT BEAMS ADJACENT TO THE HIGH SIDE OF THE CROSS SLOPE FIRST AND PROGRESS TO THE LOW SIDE.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

PROVIDE CLASS "S" CONCRETE (f'c = 4,000 psi) FOR SLAB AND SHEAR KEY.

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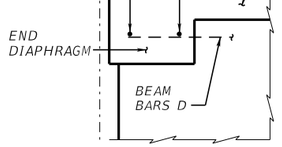
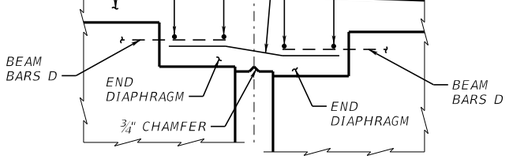


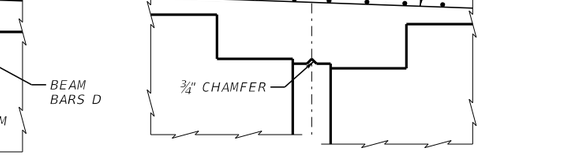
ABUTMENT
(WITH EXPANSION JOINT)



INTERIOR BENT
(WITHOUT EXPANSION JOINT)

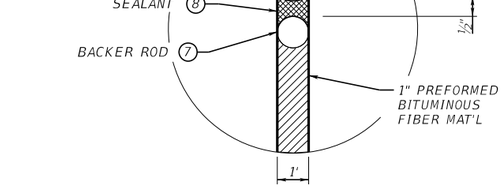
TYPICAL END DIAPHRAGM

(ALONG CENTERLINE OF BOX BEAM)

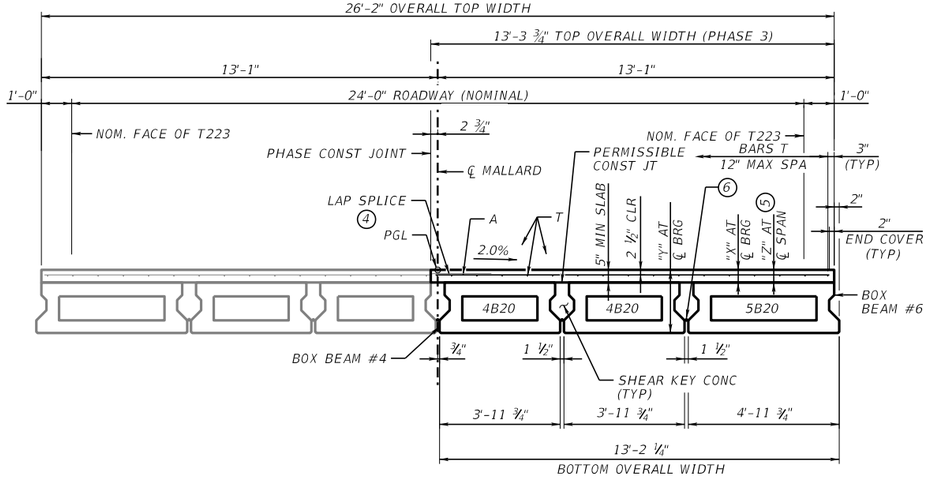


CONTINUOUS SLAB DETAIL

(DIAPHRAGM REINFORCING NOT SHOWN FOR CLARITY)



TYPE A JOINT DETAIL



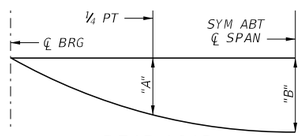
TYPICAL TRANSVERSE SECTION

TABLE OF SECTION DEPTHS

SPAN NO.	BEAM NO.	"X" AT ℄ BRG	"Y" AT ℄ BRG	"Z" AT ℄ SPAN (5)
1	4 & 5	5 ½"	2'-1 ½"	5 ⅞"
1	6	5 ½"	2'-1 ½"	6"
2	4 - 6	5 ¼"	2'-1 ¼"	5 ⅜"

TABLE OF DEAD LOAD DEFLECTIONS

SPAN NO.	BEAM NO.	POINT	SHEAR KEY	SLAB	TOTAL
			FT	FT	FT
1	4	"A"	0.005	0.013	0.018
		"B"	0.007	0.019	0.026
1	5	"A"	0.006	0.013	0.019
		"B"	0.008	0.019	0.027
1	6	"A"	0.002	0.013	0.015
		"B"	0.003	0.018	0.021
2	4 & 5	"A"	0.000	0.002	0.002
		"B"	0.000	0.002	0.002
2	6	"A"	0.000	0.001	0.001
		"B"	0.000	0.002	0.002



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO SHEAR KEY AND CONCRETE SLAB ONLY (Ec = 5000 ksi). ADJUST DEFLECTIONS BASED ON FIELD OBSERVATIONS AS NEEDED.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

HL93 LOADING

PRINT DATE	REVISION DATE
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Jacobs
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Texas Department of Transportation
Bryan District

80.00' PRESTRESSED CONC BOX BEAM UNIT (PHASE 3)

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 85

DATE:
FILE:

DESIGNED BEAMS (STRAIGHT STRANDS)

OPTIONAL DESIGN

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: TOTAL	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: DE-BONDED	DEBONDED STRAND PATTERN PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ②: Moment	LIVE LOAD DISTRIBUTION FACTOR ②: Shear
MALLARD RD AT BERRY CREEK	1	1 & 6	5B20		18	0.6	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	4.500	5.000	1.911	-2.415	1,535	0.600	0.655
	1	2 - 5	4B20		16	0.6	270	7.31	7.31	0	2.50	16	0	0	0	0	0	0	4.500	5.000	2.198	-2.798	1,483	0.600	0.600
	2	1 & 6	5B20		12	0.6	270	7.38	7.38	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.740	-0.975	887	0.600	0.691
	2	2 - 5	4B20		10	0.6	270	7.31	7.31	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.861	-1.143	841	0.600	0.600

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.

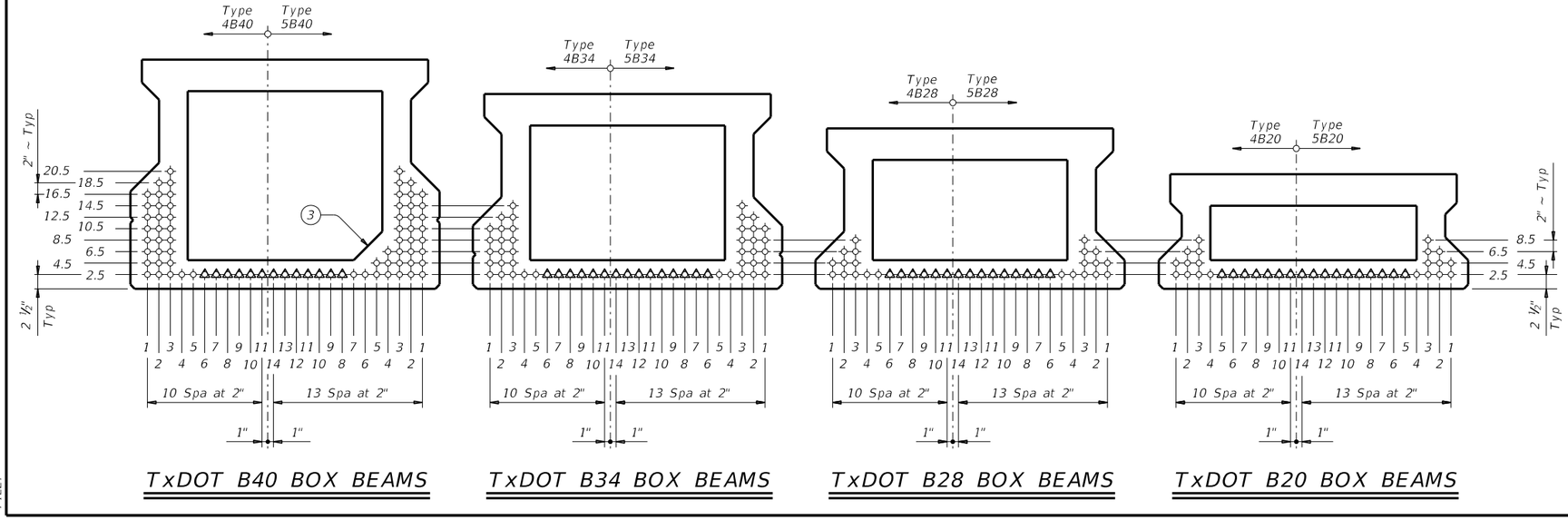
③ Bottom corner chamfer required for 4B40 and 5B40 boxes when beam lengths are greater than 100 ft.

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel bars.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:
1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.
Strand debonding must comply with Item 424.4.2.2.2.4.
Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.
Full-length debonded strands are only permitted in positions marked △.



TxDOT B40 BOX BEAMS | TxDOT B34 BOX BEAMS | TxDOT B28 BOX BEAMS | TxDOT B20 BOX BEAMS

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

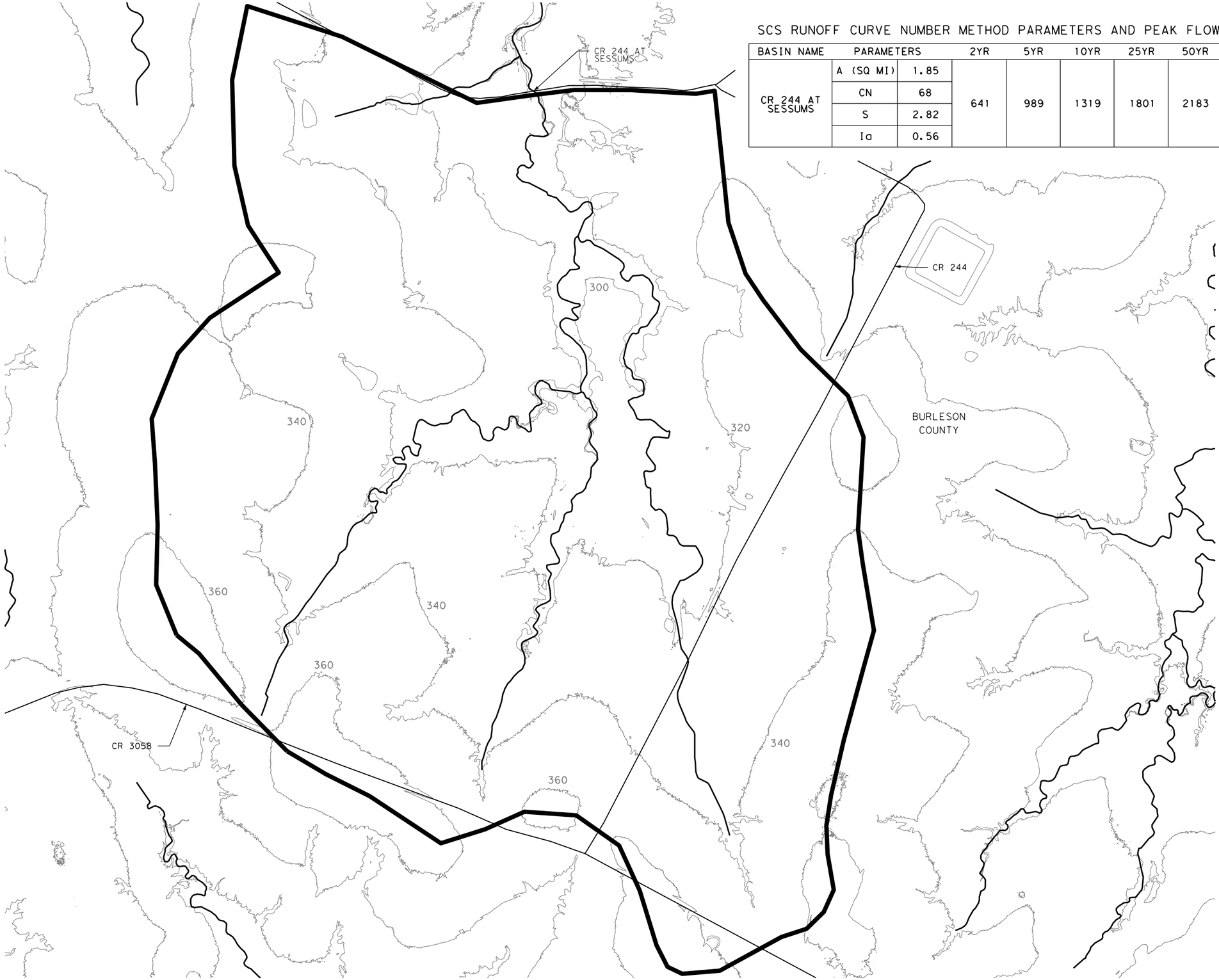
PRESTRESSED CONCRETE BOX BEAM DESIGNS
(NON-STANDARD SPANS)

BBND

FILE: bbstds07.dgn	DN: TxDOT	CK: TxDOT	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
04-11: f'ci and LLDF. 01-16: Notes.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		86

SCS RUNOFF CURVE NUMBER METHOD PARAMETERS AND PEAK FLOWS (CFS)

BASIN NAME	PARAMETERS		2YR	5YR	10YR	25YR	50YR	100YR
CR 244 AT SESSUMS	A (SQ MI)	1.85	641	989	1319	1801	2183	2594
	CN	68						
	S	2.82						
	Ia	0.56						



HORIZONTAL

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NOTES:

1. DRAINAGE AREA DELINEATED BASED ON USGS TOPOGRAPHIC DATA.

2. NRCS-CN METHOD WAS USED TO CALCULATE PEAK FLOWS PER USDA TR-55 MANUAL (JUNE, 1986)

3. FEMA ZONE A, MAP NO 48051C0175C, EFFECTIVE JANUARY 6, 2011.

STATE OF TEXAS
ADAM N. KORANSKY
95988
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PROFESSIONAL ENGINEER
11/22/2022

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DRAINAGE AREA MAP

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR

STATE	DISTRICT	COUNTY	
TEXAS	BRY	BURLESON	
CONTROL	SECTION	JOB	SHEET NO.
0917	30	059, ETC.	87

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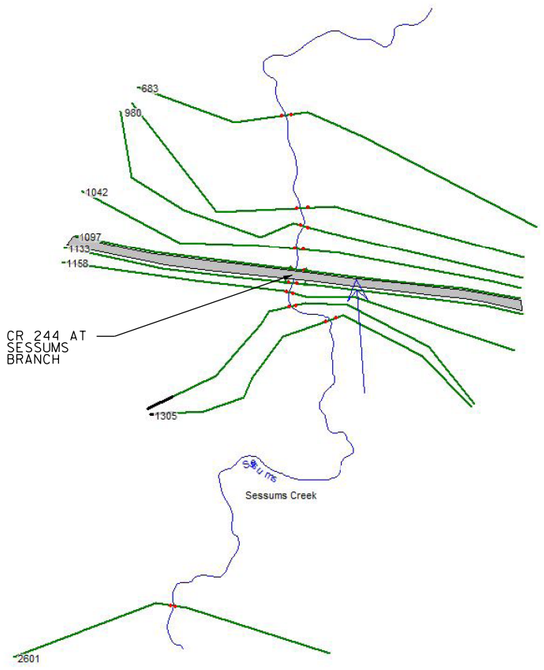
HEC-RAS 10-YEAR COMPARISON

RIVER STATION (FT)	LOCATION	PROPOSED STRUCTURE 10 YR Q (CFS)	PROPOSED STRUCTURE 10 YR V (CHAN) (FPS)	PROPOSED STRUCTURE 10 YR WSEL (FT)	RIVER STATION (FT)	EXISTING STRUCTURE 10 YR Q (CFS)	EXISTING STRUCTURE 10 YR V (CHAN) (FPS)	EXISTING STRUCTURE 10 YR WSEL (FT)
2601		1319	9.55	287.17	2601	1319	9.55	287.17
1305		1319	1.86	285.75	1305	1319	1.82	285.83
1197		1319	5.85	285.38	1197	1319	5.76	285.48
1158		1319	4.63	285.44	1158	1319	4.50	285.54
1133	BR U/S XS	1319	9.30	284.11	1133	1319	8.56	284.46
1115	CR 244	Bridge			1115	Bridge		
1097	BR D/S XS	1319	6.68	283.90	1097	1319	6.86	283.84
1042		1319	9.25	283.09	1042	1319	9.25	283.09
980		1319	7.99	283.10	980	1319	7.99	283.10
931		1319	6.84	283.04	931	1319	6.84	283.04
683		1319	5.99	282.48	683	1319	5.99	282.48

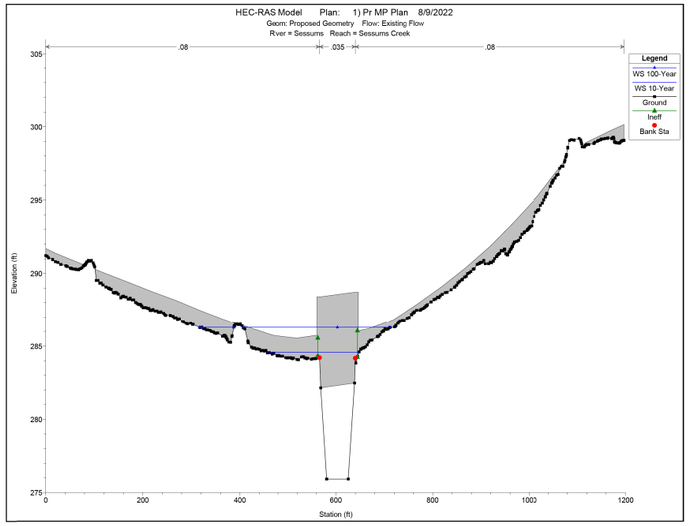
HEC-RAS 100-YEAR COMPARISON

RIVER STATION (FT)	LOCATION	PROPOSED STRUCTURE 100 YR Q (CFS)	PROPOSED STRUCTURE 100 YR V (CHAN) (FPS)	PROPOSED STRUCTURE 100 YR WSEL (FT)	RIVER STATION (FT)	EXISTING STRUCTURE 100 YR Q (CFS)	EXISTING STRUCTURE 100 YR V (CHAN) (FPS)	EXISTING STRUCTURE 100 YR WSEL (FT)
2601		2594	11.83	287.86	2601	2594	11.71	287.87
1305		2594	2.27	287.62	1305	2594	2.26	287.64
1197		2594	5.68	287.39	1197	2594	5.64	287.41
1158		2594	5.23	287.38	1158	2594	5.20	287.40
1133	BR U/S XS	2594	10.37	286.12	1133	2594	9.21	286.52
1115	CR 244	Bridge			1115	Bridge		
1097	BR D/S XS	2594	10.98	284.72	1097	2594	9.95	285.11
1042		2594	11.52	284.53	1042	2594	11.52	284.53
980		2594	9.51	284.58	980	2594	9.51	284.58
931		2594	8.41	284.47	931	2594	8.41	284.47
683		2594	7.08	283.93	683	2594	7.08	283.93

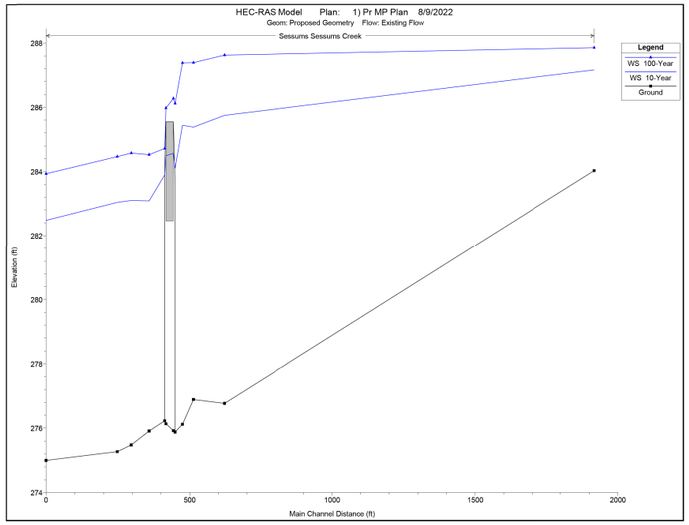
CROSS SECTION LOCATION MAP



CR 244 AT SESSUMS BRANCH HEC-RAS CROSS SECTION COMPUTATION



CR 244 AT SESSUMS BRANCH HEC-RAS PROFILE COMPUTATION



NOTES:

1. HEC-RAS VER 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS AND DESIGN OF THE BRIDGE. NORMAL DEPTH COMPUTATION USED FOR THE DOWNSTREAM BOUNDARY CONDITION SLOPE = 0.002610 FT/FT FOR EXISTING AND PROPOSE CONDITIONS.

2. BURLESON COUNTY FLOODPLAIN ADMINISTRATOR, KEITH SCHROEDER, WAS INFORMED OF THE PROPOSED PROJECT AND PROVIDED WITH A SUMMARY OF HYDRAULIC IMPACTS ON 08-20-2022.

STATE OF TEXAS
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HYDRAULIC DATA SHEET

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR

STATE	DISTRICT	COUNTY	
TEXAS	BRY	BURLESON	
CONTROL	SECTION	JOB	SHEET NO.
0917	30	059, ETC.	88

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CONTRACTION SCOUR CALCULATIONS 25-YEAR

PARAMETER	LOB	CHANNEL	ROB	UNIT
AVERAGE DEPTH OF FLOW IN U/S CHANNEL (Y1)		8.68		FT
APPROACH VELOCITY (V1)		11.71		FPS
DEPTH IN CONTRACTED SECTION BEFORE SCOUR (Y0)		3.67		FT
FLOW IN CONTRACTED SECTION (Q2)		1801.0		CFS
BOTTOM WIDTH OF CONTRACTED SECTION (W2)		70.00		FT
GRAIN SIZE (D50)		0.2000		MM
FLOW IN UPSTREAM CHANNEL (Q1)		1801.0		CFS
BOTTOM WIDTH OF MAIN CHANNEL (W1)		20.60		FT
CHANNEL SLOPE		0.003		FT/FT
SHEAR VELOCITY (V*) = (g.y.S)0.5		0.85		FPS
WATER TEMPERATURE		60.0		°F
MEDIAN BED MATERIALS FALL VELOCITY(1)		0.06		FPS
V*/T		14.36		-
K1(2)		0.69		-
AVERAGE FLOW DEPTH IN CONTRACTED SECTION (Y2)	N/A	3.73	N/A	FT
CONTRACTION SCOUR (Ys = Y2 - Y0)	N/A	0.06	N/A	FT
CRITICAL VELOCITY FOR INCEPTION MOTION (Vc)	0.0	1.4	0.0	FPS
EQUATION	N/A	LIVE	N/A	-

CONTRACTION SCOUR CALCULATIONS 100-YEAR

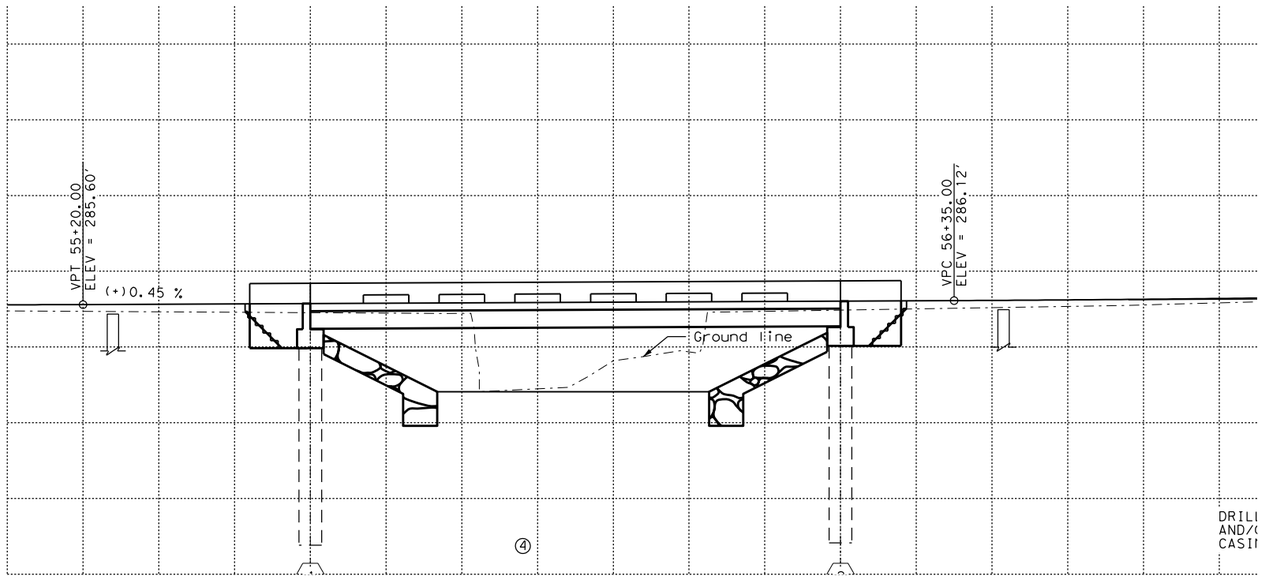
PARAMETER	LOB	CHANNEL	ROB	UNIT
AVERAGE DEPTH OF FLOW IN U/S CHANNEL (Y1)		10.24		FT
APPROACH VELOCITY (V1)		10.37		FPS
DEPTH IN CONTRACTED SECTION BEFORE SCOUR (Y0)		3.47		FT
FLOW IN CONTRACTED SECTION (Q2)		2519.5		CFS
BOTTOM WIDTH OF CONTRACTED SECTION (W2)		70.00		FT
GRAIN SIZE (D50)		0.2000		MM
FLOW IN UPSTREAM CHANNEL (Q1)		2594.0		CFS
BOTTOM WIDTH OF MAIN CHANNEL (W1)		20.60		FT
CHANNEL SLOPE		0.003		FT/FT
SHEAR VELOCITY (V*) = (g.y.S)0.5		0.93		FPS
WATER TEMPERATURE		60.0		°F
MEDIAN BED MATERIALS FALL VELOCITY(1)		0.06		FPS
V*/T		15.60		-
K1(2)		0.69		-
AVERAGE FLOW DEPTH IN CONTRACTED SECTION (Y2)	N/A	4.29	N/A	FT
CONTRACTION SCOUR (Ys = Y2 - Y0)	N/A	0.82	N/A	FT
CRITICAL VELOCITY FOR INCEPTION MOTION (Vc)	0.0	1.4	0.0	FPS
EQUATION	N/A	LIVE	N/A	-

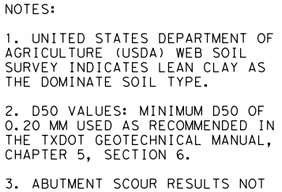
NOTES:

1. UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) WEB SOIL SURVEY INDICATES LEAN CLAY AS THE DOMINATE SOIL TYPE.

2. D50 VALUES: MINIMUM D50 OF 0.20 MM USED AS RECOMMENDED IN THE TXDOT GEOTECHNICAL MANUAL, CHAPTER 5, SECTION 6.

3. ABUTMENT SCOUR RESULTS NOT REPORTED AS RECOMMENDED IN THE TXDOT GEOTECHNICAL MANUAL, CHAPTER 5, SECTION 6.





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Bryan District

SCOUR DATA SHEET

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 89

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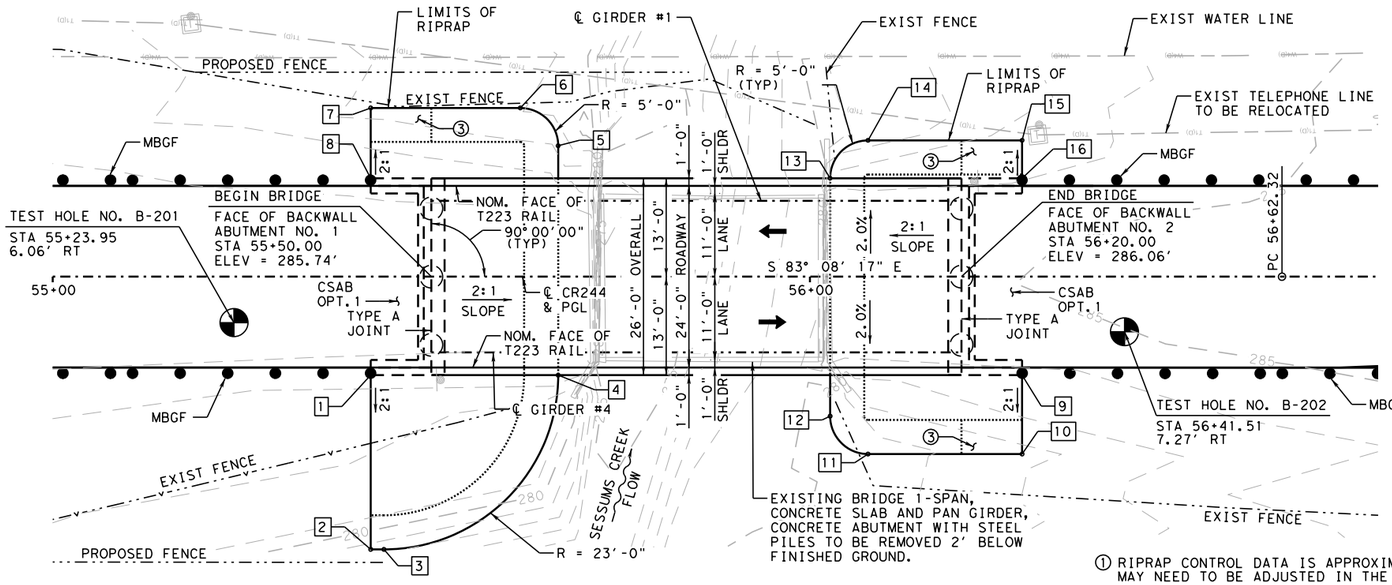
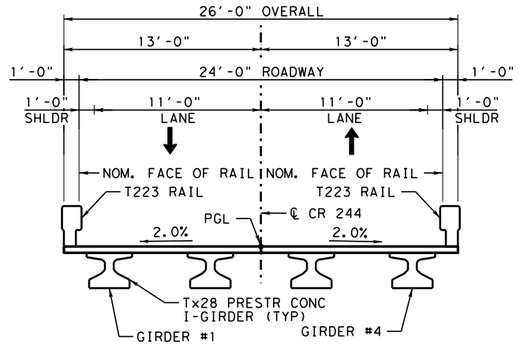


PLAN

ABUTMENTS AT BEARING S 06°51'43" W



TYPICAL TRANSVERSE SECTION

N.T.S

① RIPRAP CONTROL DATA IS APPROXIMATE AND MAY NEED TO BE ADJUSTED IN THE FIELD.

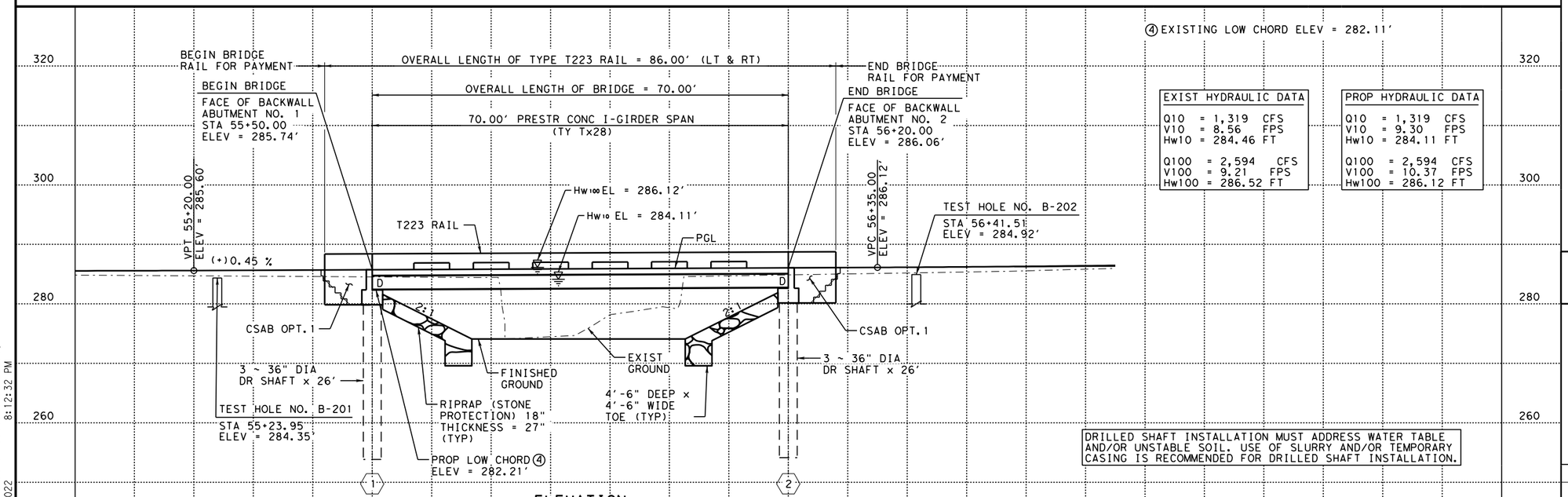
② TOP OF SIDE SLOPE RIPRAP IS AT THE BOTTOM OF CREEK ELEVATION. APPROXIMATE BOTTOM OF CREEK ELEVATION = 275.00'

③ PLACE GROUT IN THE TOE OF THE RIPRAP ALONG THE ABUTMENT WINGWALL CAP IN ACCORDANCE WITH TxDOT ITEM 432.2.3. THE GROUT MUST FILL ALL RIPRAP STONE VOIDS AT AND BELOW THE BOTTOM OF ABUTMENT WINGWALL CAP. DO NOT PLACE GROUT IN THE RIPRAP TOE BEYOND THE ABUTMENT WINGWALL CAP LIMITS. THE LABOR, MATERIALS, AND INCIDENTALS FOR THE GROUT PLACEMENT WILL BE SUBSIDIARY TO BID ITEM 432-6033, RIPRAP (STONE PROTECTION) (18 IN).

RIPRAP CONTROL DATA ①

POINT	STA	OFFSET (FT)
1	55+42.00	13.00 RT
2 ②	55+42.00	36.00 RT
3	55+43.75	36.00 RT
4	55+66.75	13.00 RT
5	55+66.75	17.28 LT
6	55+61.75	22.28 LT
7	55+42.00	22.28 LT
8	55+42.00	13.00 LT
9	56+28.00	13.00 RT
10	56+28.00	23.41 RT
11	56+07.65	23.41 RT
12	56+02.65	18.41 RT
13	56+02.65	13.00 LT
14	56+07.65	18.00 LT
15	56+28.00	18.00 LT
16	56+28.00	13.00 LT

HL93 LOADING: SUPERSTRUCTURE INV/OPR RATING = 1.01/1.89
SUBSTRUCTURE INV/OPR RATING = SUBSTRUCTURE NOT RATED



ELEVATION

DRILLED SHAFT INSTALLATION MUST ADDRESS WATER TABLE AND/OR UNSTABLE SOIL. USE OF SLURRY AND/OR TEMPORARY CASING IS RECOMMENDED FOR DRILLED SHAFT INSTALLATION.

EXIST HYDRAULIC DATA

Q10 = 1,319 CFS
V10 = 8.56 FPS
Hw10 = 284.46 FT

Q100 = 2,594 CFS
V100 = 9.21 FPS
Hw100 = 286.52 FT

PROP HYDRAULIC DATA

Q10 = 1,319 CFS
V10 = 9.30 FPS
Hw10 = 284.11 FT

Q100 = 2,594 CFS
V100 = 10.37 FPS
Hw100 = 286.12 FT

0 5 10 20

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).
2. BRIDGE NOT DESIGNED FOR OVERLAY.
3. "D" DENOTES DOWELS IN THE OUTSIDE GIRDERS UNLESS SPECIFIED OTHERWISE ON THE ABUTMENT DETAIL SHEETS.
4. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
5. CONTRACTOR TO VERIFY LOCATION AND STATUS OF ALL UTILITIES NOT IDENTIFIED PRIOR TO CONSTRUCTION.
6. CONTRACTOR MUST FIELD VERIFY ALL EXISTING ABUTMENT LOCATIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO FABRICATION OF I-GIRDERS.
7. SEE "TEST HOLE DATA" SHEET FOR TEST HOLE DATA.
8. SEE IGMS STANDARD FOR TYPE A JOINT DETAILS.

FUNCTIONAL CLASS: RURAL LOCAL
DESIGN SPEED: MEET EXISTING CONDITIONS
ADT: 180 (2020); 180 (2040)
EXIST NBI: 17-026-0-AA01-85-001
PROP NBI: 17-026-0-AA01-85-101

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED PROFESSIONAL ENGINEER
11/22/2022

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BRIDGE LAYOUT

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 90

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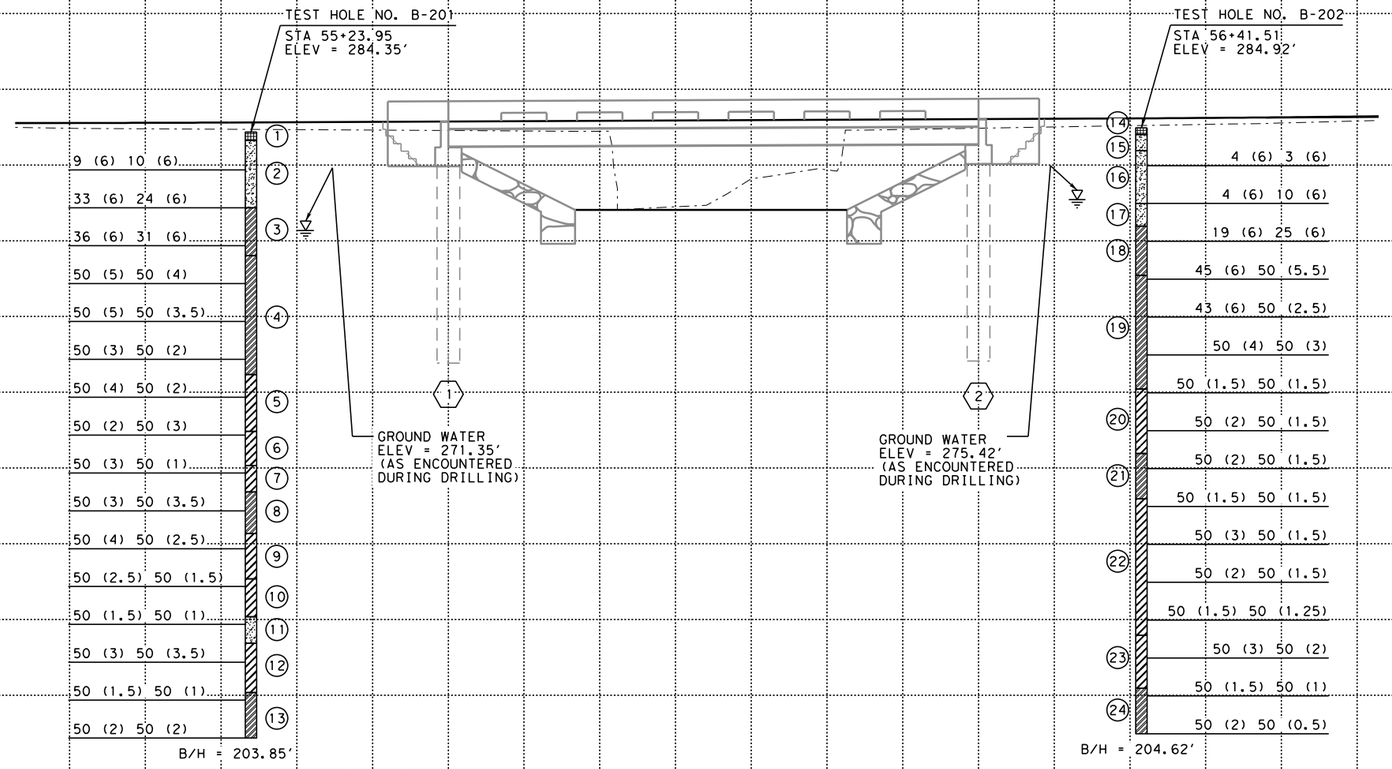

1. CHIPSEAL (1.25"), BASE (11.75")
2. SAND, CLAYEY, LOOSE, MOIST, BROWN, FINE GRAINED, TRACE FERROUS STAINING BELOW 8' (SC)
3. CLAY, LEAN WITH SAND, VERY STIFF, MOIST, LIGHT BROWN (CL)
4. CLAY, LEAN WITH SAND, HARD, MOIST, GRAY TO 22.5, DARK GRAY FROM 26' TO 27.5', GRAY BELOW 30.5' (CL)
5. CLAY, FAT, HARD, MOIST, DARK GRAY (CH)
6. CLAY, FAT, HARD, MOIST, DARK GRAY, TRACE LIGNITIC SEAMS (CH)
7. CLAY, FAT WITH SAND, VERY HARD, MOIST, GRAY (CH)
8. CLAY, LEAN WITH SAND, HARD, MOIST, GRAY (CL)
9. CLAY, FAT, HARD, MOIST, GRAY (CH)
10. CLAY, FAT WITH SAND, VERY HARD, MOIST, DARK BROWN, TRACE LIGNITIC SEAMS (CH)
11. SAND, CLAYEY, VERY DENSE, MOIST, BROWN, FINE GRAINED (SC)
12. CLAY, FAT WITH SAND, HARD, MOIST, LIGHT GRAY (CH)
13. CLAY, LEAN WITH SAND, VERY HARD, MOIST, GRAY (CL)
14. CHIPSEAL (1.25"), BASE (9.75")
15. SAND, CLAYEY, MOIST, LIGHT BROWN, FINE GRAINED (SC)
16. SAND, CLAYEY, VERY LOOSE, MOIST, LIGHT BROWN AND BROWN, FINE GRAINED (SC)
17. SAND, CLAYEY, LOOSE, MOIST, LIGHT BROWN, FINE GRAINED (SC)
18. CLAY, LEAN, VERY STIFF, MOIST, BROWN TO 14.5', LIGHT BROWN BELOW 16.4', TRACE FERROUS STAINING TO 14.5' (CL)
19. CLAY, LEAN WITH SAND, HARD, MOIST, LIGHT BROWN TO 22.7', GRAY BELOW 26', TRACE FERROUS STAINING TO 22.7' (CL)
20. CLAY, FAT, VERY HARD, MOIST, DARK GRAY (CH)
21. CLAY, SANDY LEAN, VERY HARD, MOIST, DARK GRAY (CL)
22. CLAY, SANDY FAT, VERY HARD, MOIST, GRAY TO 57', DARK BROWN FROM 60.5' TO 62', GRAY BELOW 65.3', TRACE LIGNITIC SEAMS BELOW 60.5' (CH)
23. CLAY, SANDY FAT, HARD, MOIST, GRAY (CH)
24. CLAY, SANDY LEAN, VERY HARD, MOIST, BROWN (CL)

TEST HOLE DATA IS A REPRODUCTION OF THE DRILLING LOGS FROM A GEOTECHNICAL INVESTIGATION BY CORSAIR CONSULTING LLC DATED JUNE 15 AND 16, 2021.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
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11/22/2022

HL93 LOADING

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TEST HOLE DATA

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 91

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SUMMARY OF ESTIMATED QUANTITIES

BID ITEM NUMBER	400-6005	416-6004	420-6013	422-6001	425-6035	432-6033	450-6006	454-6021	4171-6001
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (36 IN) (1)	CL "C" CONC (ABUT) (2)	REINF CONC SLAB	PRESTR CONC GIRDER (Tx28) (3)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	TYPE A JOINT	INSTALL BRIDGE IDENTIFICATION NUMBERS
	CY	LF	CY	SF	LF	CY	LF	LF	EA
2 ~ ABUTMENTS	60	156	32.8			276	32.0	52	
1 ~ 70.00' PRESTR CONC I-GIRDER SPAN				1,820	278.00		140.0		
TOTAL	60	156	32.8	1,820	278.00	276	172.0	52	2

(1) CONTRACTOR MUST USE SULFATE RESISTANT CONCRETE FOR DRILLED SHAFTS.

(2) QUANTITY INCLUDES 0.4 CY FOR SHEAR KEYS. SEE ABUTMENT DETAILS (AIG-24) STANDARD SHEET AND SHEAR KEY DETAILS FOR I-GIRDERS (IGSK) STANDARD SHEET FOR SHEAR KEY LOCATION, DETAILS, AND NOTES.

(3) LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

BEARING SEAT ELEVATIONS

	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
ABUT 1 (FWD)	281.982	282.115	282.115	281.982
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
ABUT 2 (BK)	282.289	282.422	282.422	282.289

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BEARING SEAT ELEVATIONS ONLY

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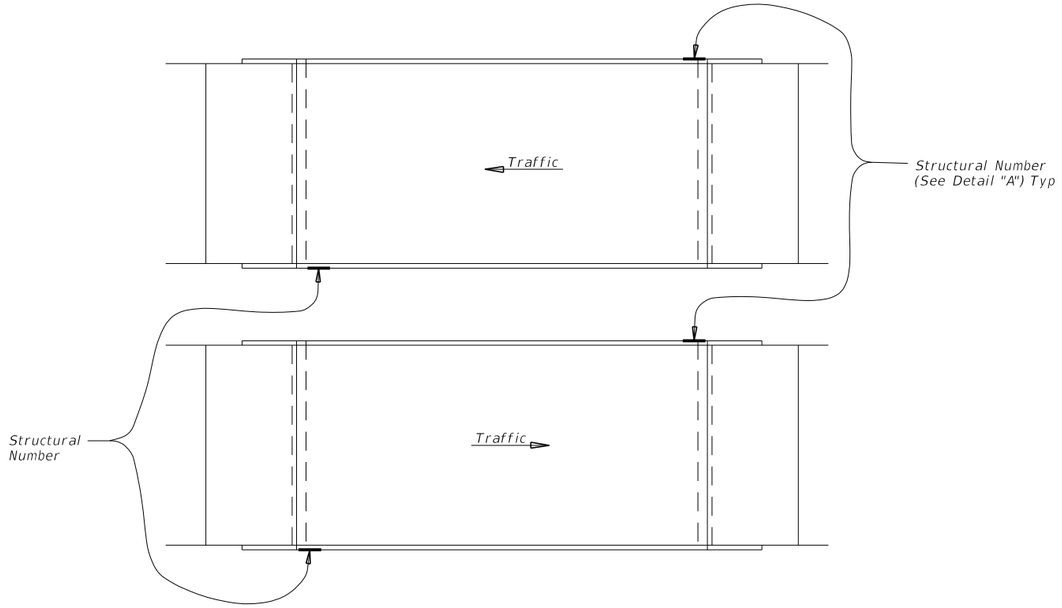
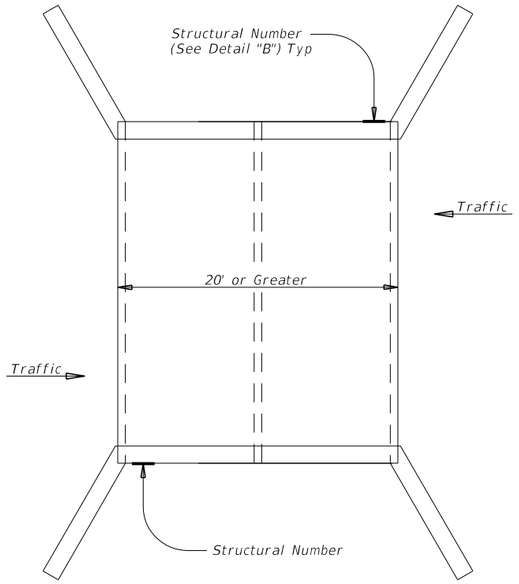
ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 92

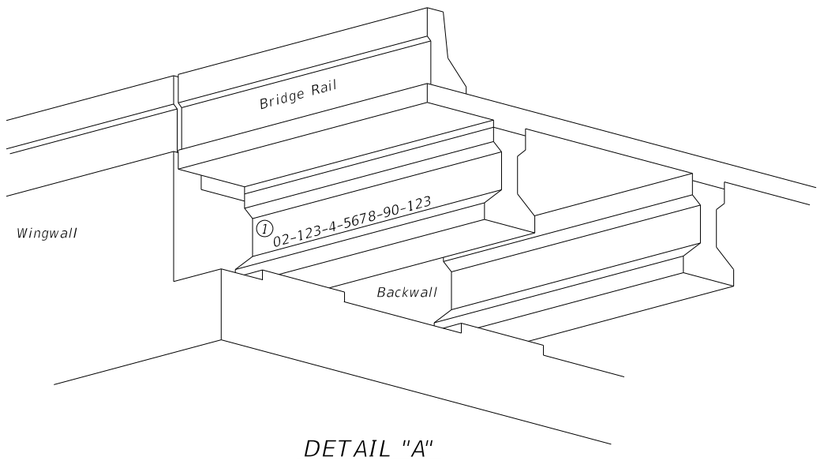


AT BRIDGE LOCATIONS

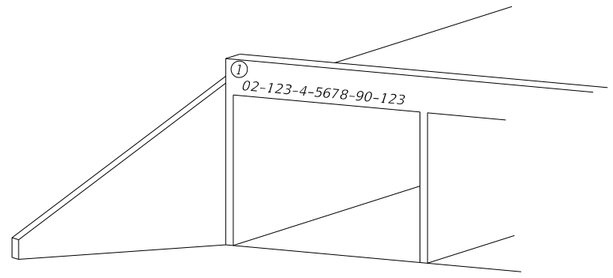


AT CULVERT LOCATIONS

DETAIL FOR NBI NUMBERS



DETAIL "A"



DETAIL "B"

① Apply NBI number on both sides of structure (once each side). Apply to outside beam close to abutment on the upstream traffic side at bridge locations. Apply to headwall adjacent to wingwall at culvert locations.

② Use brass stencil, 3 inch, numbers and letters, adjustable interlocking stencil set or equal of legend height 3 inches, symbol height 3 inches.

GENERAL NOTES:

Cost of furnishing and applying NBI numbers, including ink and stencil plates shall be paid at the unit bid price for "Install Bridge Identifcation Numbers" under SS 4171.

Each structure shall have 2 (two) NBI numbers applied per structure.

STATE OF TEXAS
WILLIAM A. SHEKARCHI
131441
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

PRINT DATE	REVISION DATE
11/22/2022	

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2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

NBI NUMBER LABELS

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 93

...\STND\BRDG\NBI_Design.dgn
11/22/2022 8:13:00 PM

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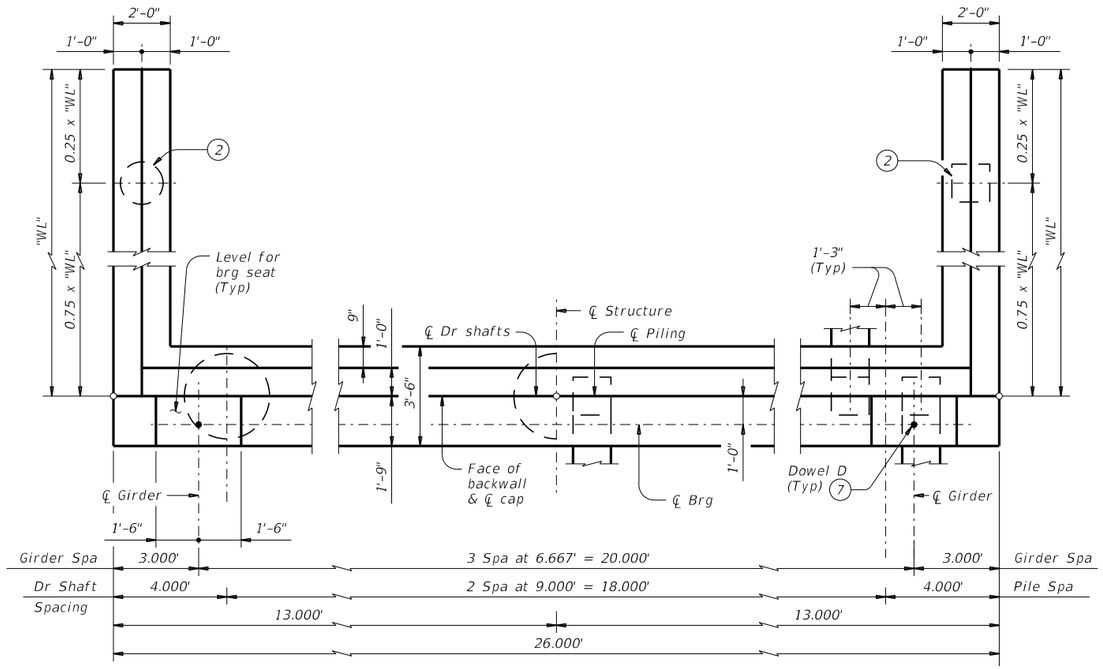
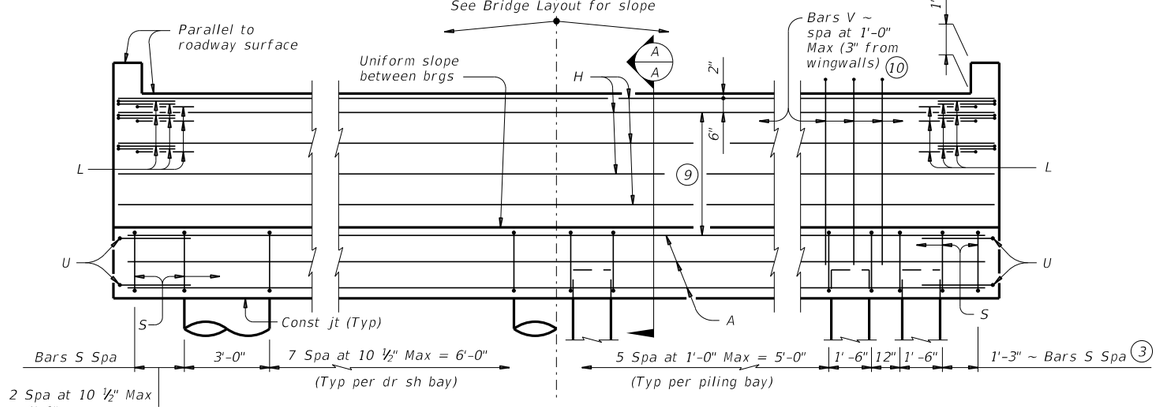


SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN (1)

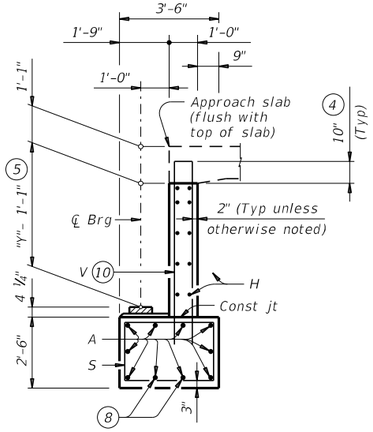


SHOWING DRILLED SHAFTS — SHOWING PILES

ELEVATION

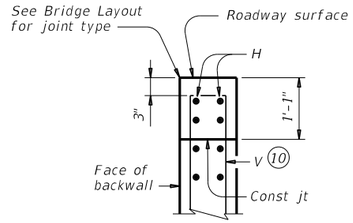
TABLE A

Header Slope	Girder Type	Wingwall Type	Wingwall Lgth "WL"
2:1	Tx28	Cantilevered	8.000'
	Tx34	Cantilevered	9.000'
	Tx40	Cantilevered	10.000'
	Tx46	Cantilevered	11.000'
	Tx54	Cantilevered	12.000'
3:1	Tx28	Cantilevered	12.000'
	Tx34	Founded	13.000'
	Tx40	Founded	15.000'
	Tx46	Founded	16.000'
	Tx54	Founded	18.000'



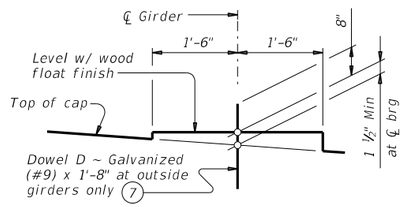
SECTION A-A

(With approach slab) (6)



BACKWALL DETAIL

(Without approach slab) (6)



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

(1) See Table A for variable dimensions based on header slope and girder type.

(2) See Table A to determine if wingwall foundations are required.

(3) For piling larger than 16" adjust Bars S spacing as required to avoid piling.

(4) Increase as required to maintain 3" from finished grade.

(5) See Span details for "Y" value.

(6) See Bridge Layout to determine if approach slab is present.

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

(8) With pile foundations, move Bars A shown to clear piles.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

TABLE OF FOUNDATION LOADS

Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	64	54
45	69	56
50	73	59
55	77	61
60	81	63
65	85	65
70	88	67
75	92	69
80	96	71
85	100	73
90	104	75
95	108	77
100	111	79
105	115	80
110	119	82
115	123	84
120	126	86
125	130	88

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

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

See applicable rail details for rail anchorage in wingwalls.

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

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

MATERIAL NOTES:

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

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

Provide Grade 60 reinforcing steel.

Galvanize dowel bars D.

HL93 LOADING — SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

AIG-24

FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	BRY	BURLESON		94

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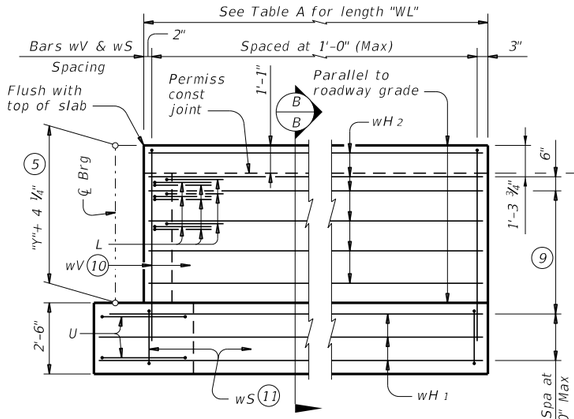
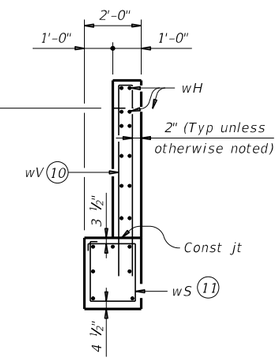
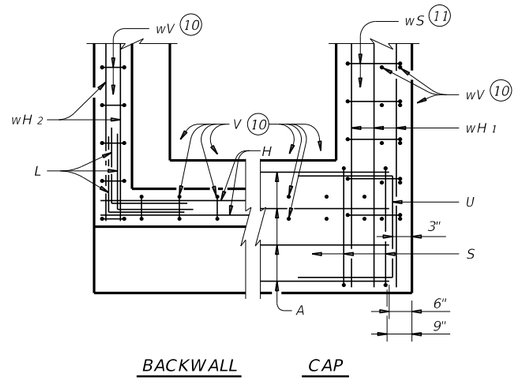


WINGWALL ELEVATION

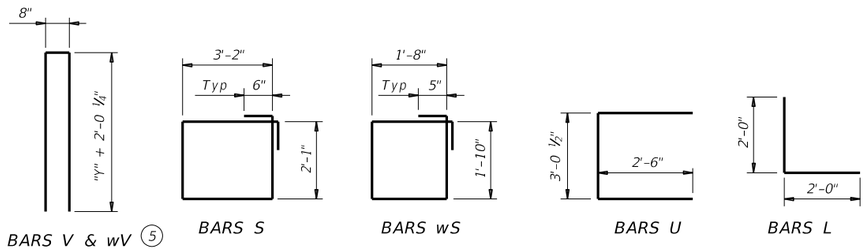


SECTION B-B



BACKWALL CAP

CORNER DETAILS



BARS V & wV (5) BARS S BARS wS BARS U BARS L

(5) See Span details for "Y" value.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

(11) Adjust as required to avoid piling.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

AIG-24

FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	BRY	BURLESON		95

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TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	11'-4"	296
wH1	14	#6	9'-5"	198
wH2	20	#6	7'-8"	230
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213

Reinforcing Steel	Lb	3,099
Class "C" Concrete	CY	15.2

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	12'-4"	322
wH1	14	#6	10'-5"	219
wH2	20	#6	8'-8"	260
wS	20	#4	7'-10"	105
wV	20	#5	12'-4"	257

Reinforcing Steel	Lb	3,231
Class "C" Concrete	CY	16.6

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	13'-4"	348
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	348
wS	22	#4	7'-10"	115
wV	22	#5	13'-4"	306

Reinforcing Steel	Lb	3,503
Class "C" Concrete	CY	18.1

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	14'-4"	374
wH1	14	#6	12'-5"	261
wH2	24	#6	10'-8"	385
wS	24	#4	7'-10"	126
wV	24	#5	14'-4"	359

Reinforcing Steel	Lb	3,651
Class "C" Concrete	CY	19.7

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	12	#6	25'-8"	463
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	15'-8"	409
wH1	14	#6	13'-5"	282
wH2	28	#6	11'-8"	491
wS	26	#4	7'-10"	136
wV	26	#5	15'-8"	425

Reinforcing Steel	Lb	3,966
Class "C" Concrete	CY	21.6

TABLES OF ESTIMATED QUANTITIES WITH 3:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	11'-4"	296
wH1	14	#6	13'-5"	282
wH2	20	#6	11'-8"	350
wS	26	#4	7'-10"	136
wV	26	#5	11'-4"	307

Reinforcing Steel	Lb	3,439
Class "C" Concrete	CY	17.8

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	12'-4"	322
wH1	14	#6	14'-5"	303
wH2	20	#6	12'-8"	381
wS	28	#4	7'-10"	147
wV	28	#5	12'-4"	360

Reinforcing Steel	Lb	3,581
Class "C" Concrete	CY	19.3

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	13'-4"	348
wH1	14	#6	16'-5"	345
wH2	24	#6	14'-8"	529
wS	32	#4	7'-10"	167
wV	32	#5	13'-4"	445

Reinforcing Steel	Lb	3,980
Class "C" Concrete	CY	21.7

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	14'-4"	374
wH1	14	#6	17'-5"	366
wH2	24	#6	15'-8"	565
wS	34	#4	7'-10"	178
wV	34	#5	14'-4"	508

Reinforcing Steel	Lb	4,137
Class "C" Concrete	CY	23.4

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	12	#6	25'-8"	463
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	15'-8"	409
wH1	14	#6	19'-5"	408
wH2	28	#6	17'-8"	743
wS	38	#4	7'-10"	199
wV	38	#5	15'-8"	621

Reinforcing Steel	Lb	4,603
Class "C" Concrete	CY	26.4

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

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

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

AIG-24

FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR			
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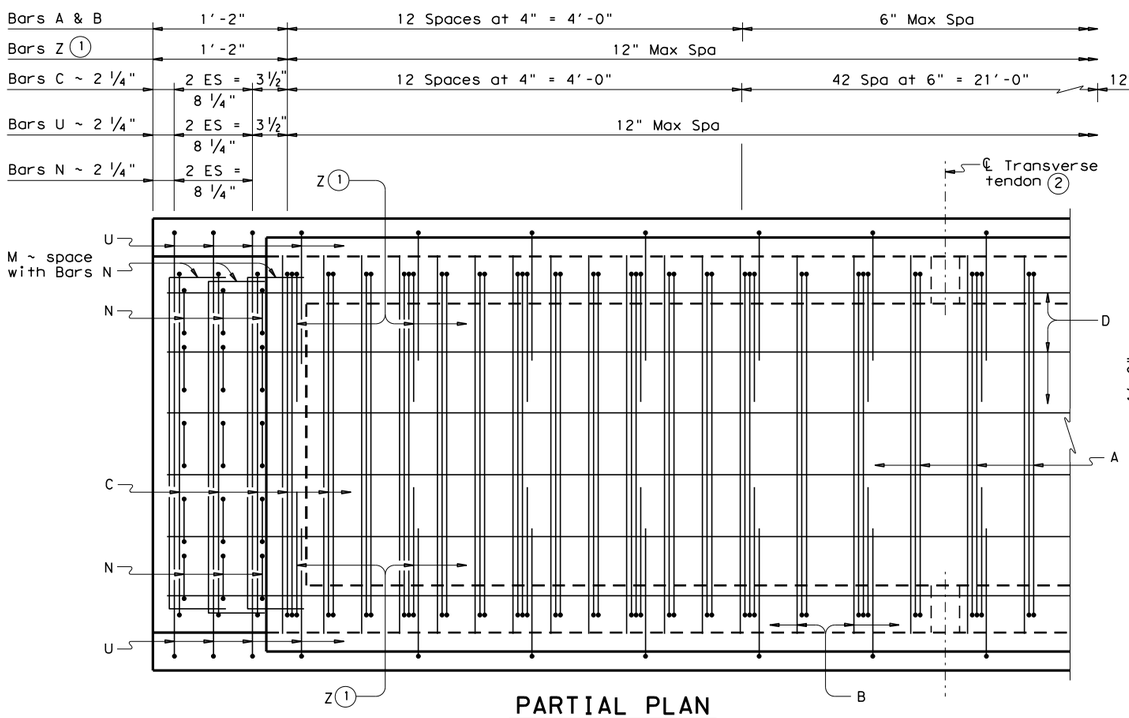

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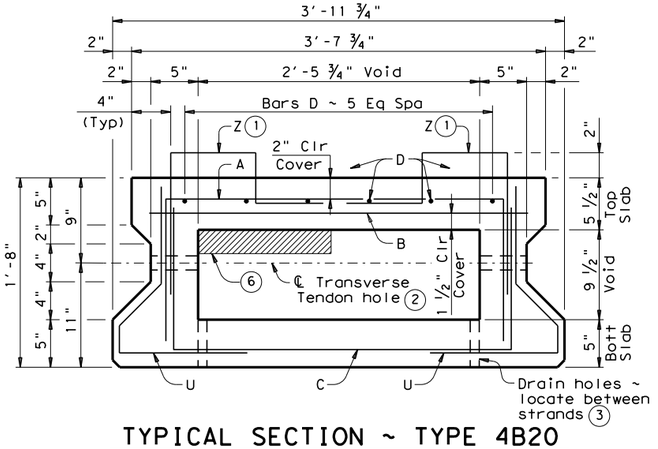

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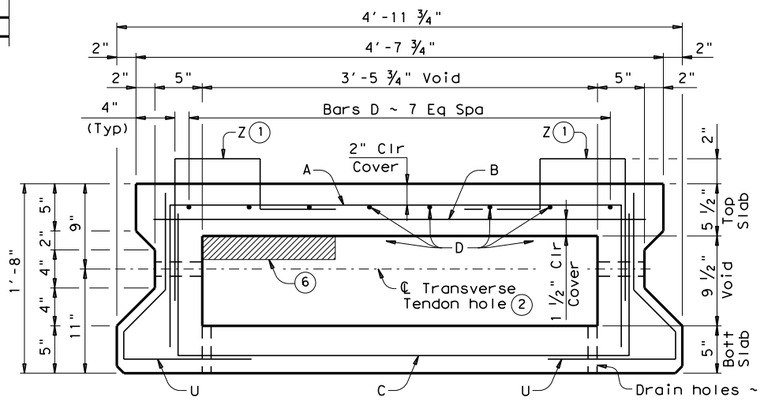
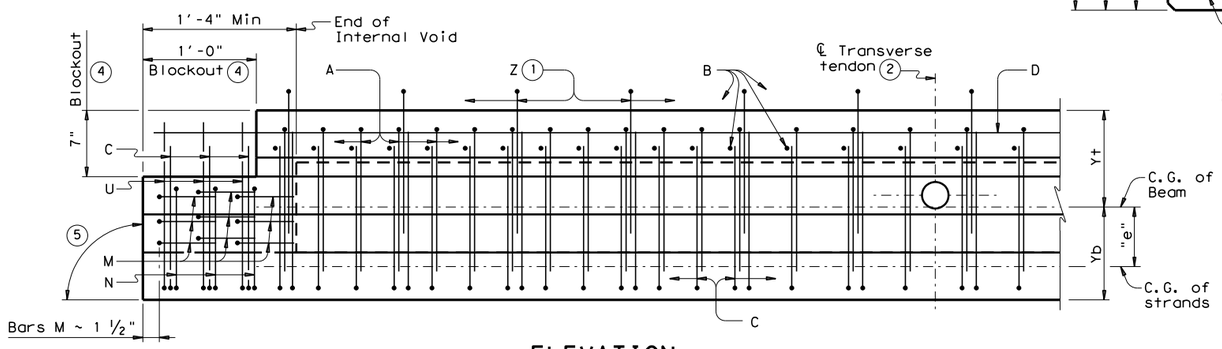


TYPICAL SECTION ~ TYPE 5B20



ELEVATION

BEAM PROPERTIES

		Type 4B20	Type 5B20
Area	in^2	591.8	717.8
Y top	in	10.19	10.12
Y bott	in	9.81	9.88
I	in^4	28,086	35,234
Weight (7)	lb/ft	616	748

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.

(3) Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".

(4) Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.

(5) 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.

(6) Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRAO for void modification dimensions.

(7) Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.

Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.

1 1/4" clear cover to reinforcement is required unless noted otherwise.

See standard BBRAS or BBRAO for railing anchorage at bridge edges to be cast in beams.

An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be substituted for Bars A, B, C, and D.

These details are applicable for skews up to 30 degrees only.

Chamfer bottom beam corners 3/4" or round to a 3/4" radius.

HL93 LOADING

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

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©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
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	BRY	BURLESON		97

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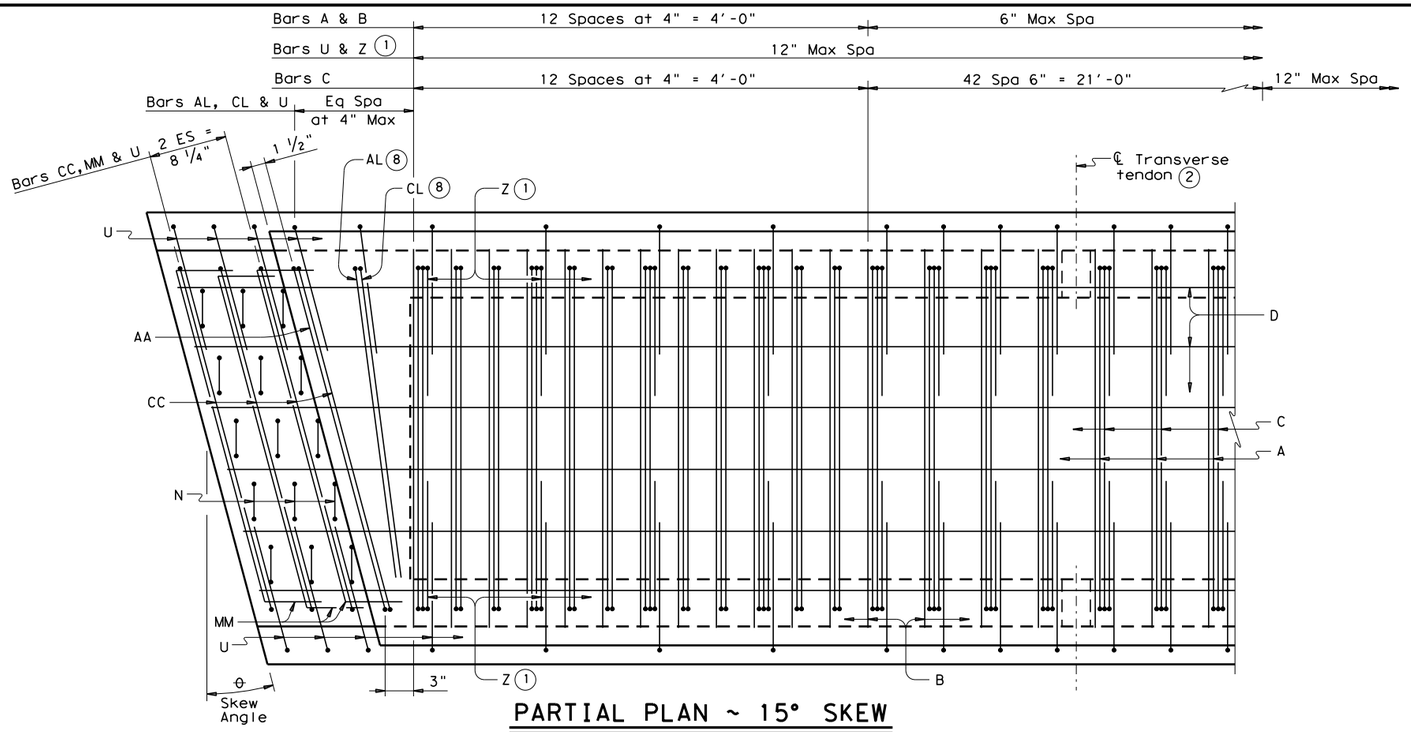
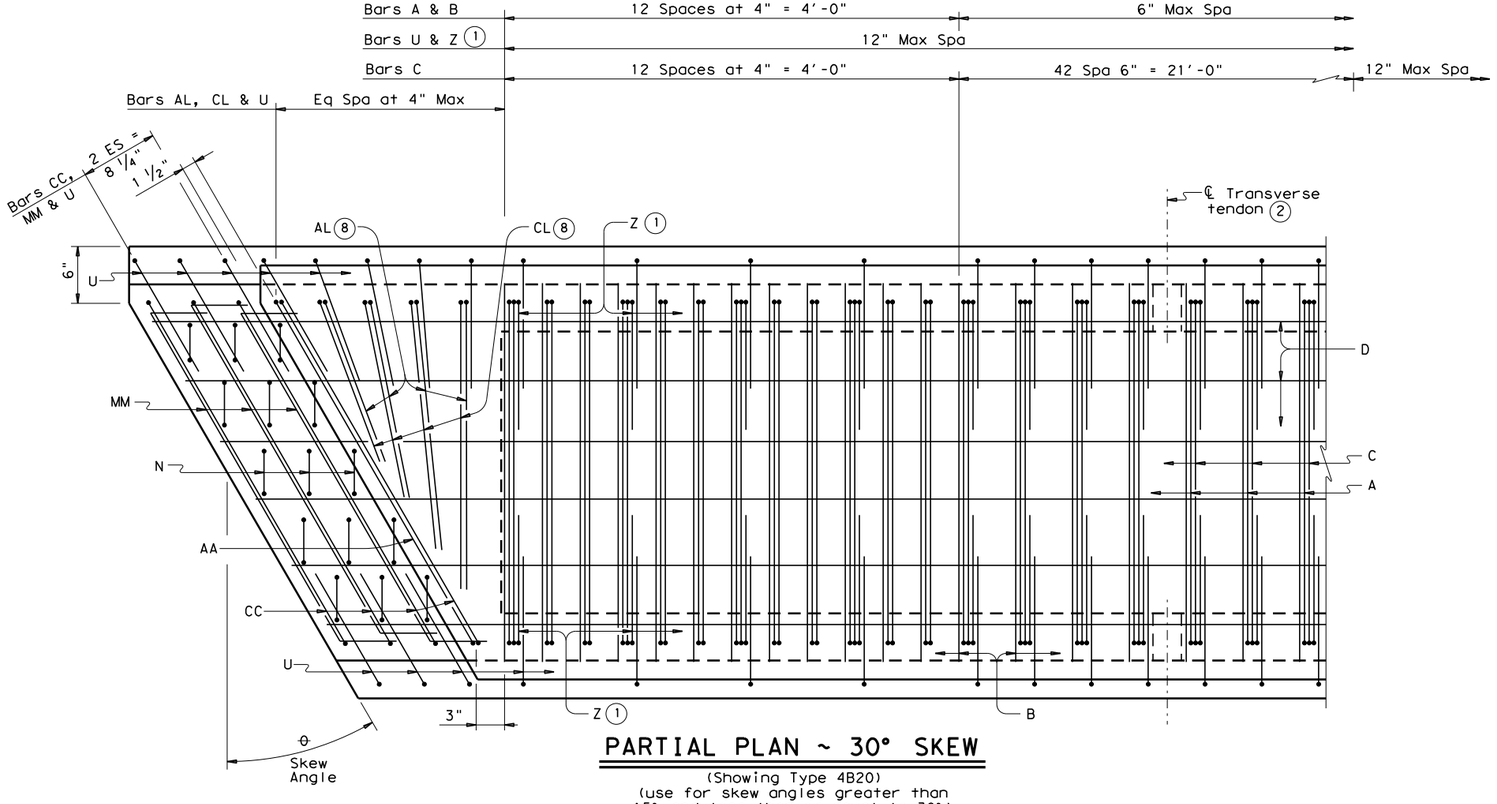


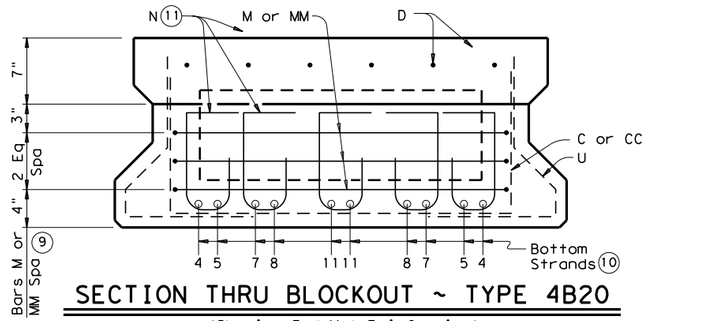
PARTIAL PLAN ~ 15° SKEW

(Showing Type 4B20)
(use for skew angles of 15° or less)



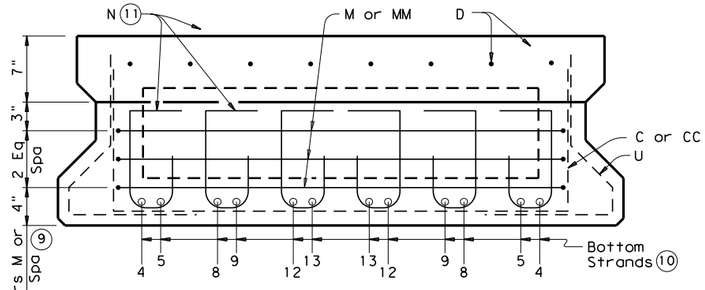
PARTIAL PLAN ~ 30° SKEW

(Showing Type 4B20)
(use for skew angles greater than 15° and less than or equal to 30°)



SECTION THRU BLOCKOUT ~ TYPE 4B20

(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B20

(Showing End Mat Reinforcing)

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia hole in interior beams. See standard BBPT for details.

(8) Cut as required to maintain one inch clear between bars.

(9) Bars M may be adjusted vertically as required to avoid pretensioning strands in web.

(10) See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.

(11) For Type 4B20 Box Beams: Bars N may be reduced to 4 bars per row when beam design contains fewer than 22 strands. In this case, place Bars N at the 5-6 and 8-9 strand locations.

For Type 5B20 Box Beams: Bars N may be reduced to 5 bars per row when beam design contains fewer than 28 strands. In this case, place Bars N at the 4-5, 9-10 and 14-14 strand locations.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		98

DATE: 11/22/2022 8:13:22 PM
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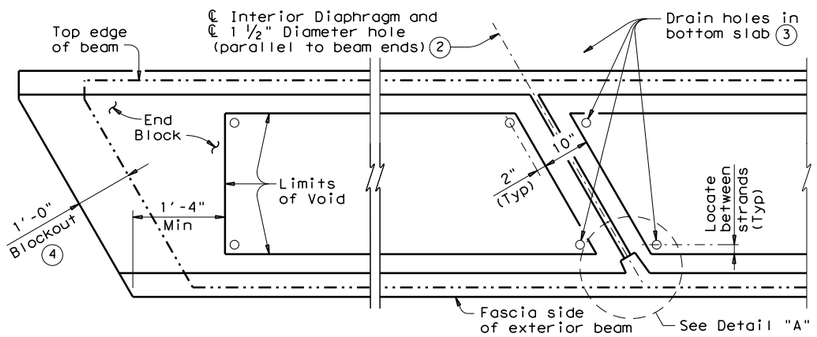
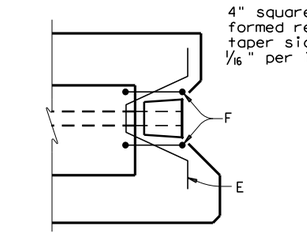
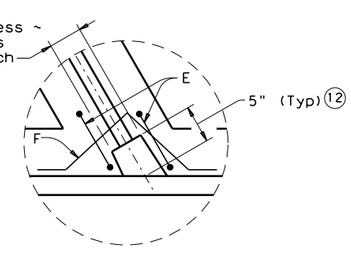


BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

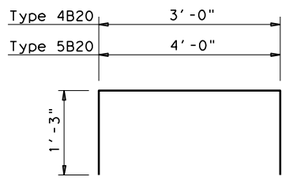
(Showing 30° skew)



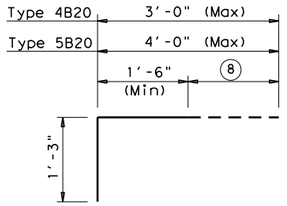
POST-TENSION ANCHORAGE DETAIL



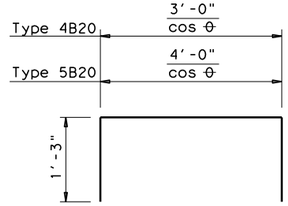
DETAIL A



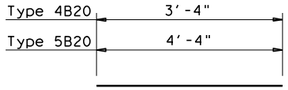
BARS A & C (#4)



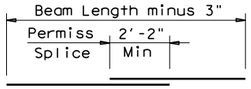
BARS AL & CL (#4)



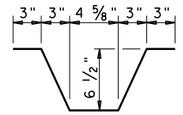
BARS AA & CC (#4)



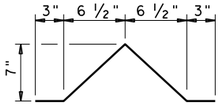
BARS B (#4)



BARS D (#5)
Permissible splices to be placed in middle third of span



BARS E (#4)



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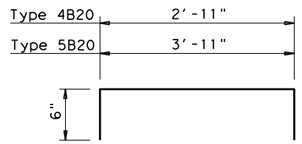
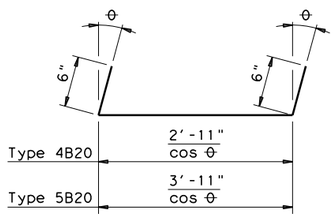
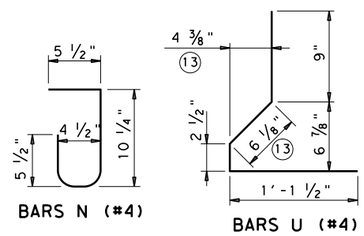


BARS M (#4)

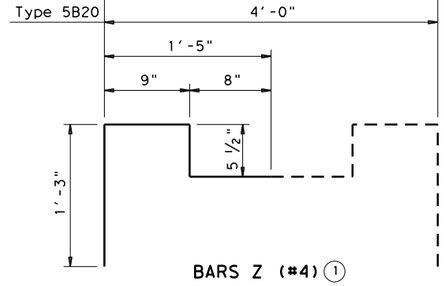


BARS MM (#4)



BARS N (#4)

BARS U (#4)



BARS Z (#4) (1)

At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.

(3) Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".

(4) Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.

(8) Cut as required to maintain one inch clear between bars.

(12) 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.

(13) Dimension will vary slightly with skew. Adjust as necessary.

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SHEET 3 OF 3

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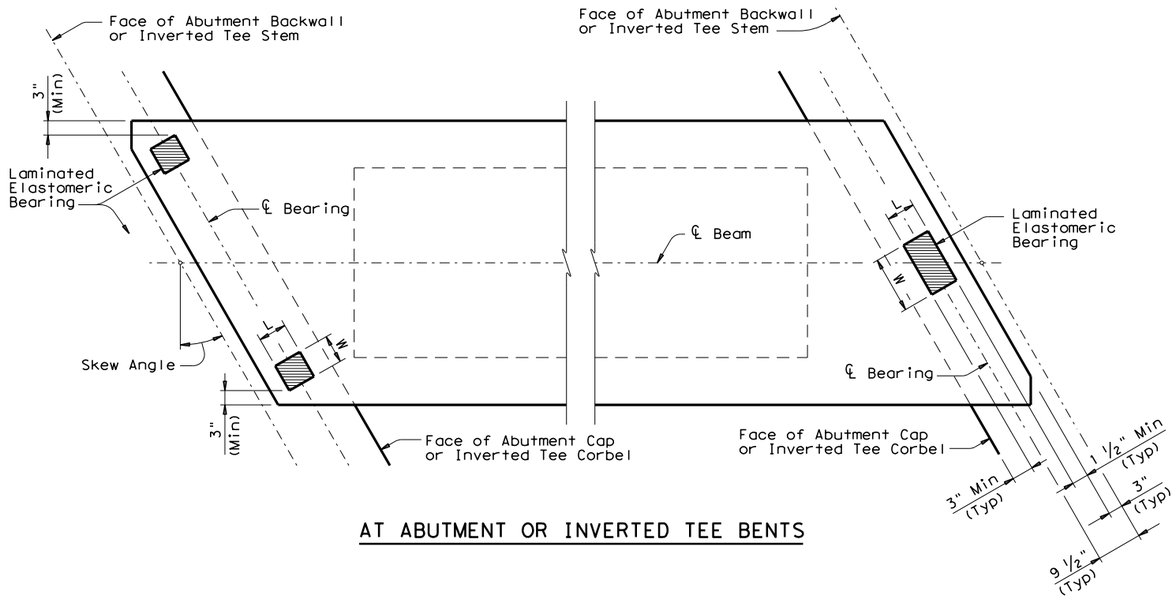
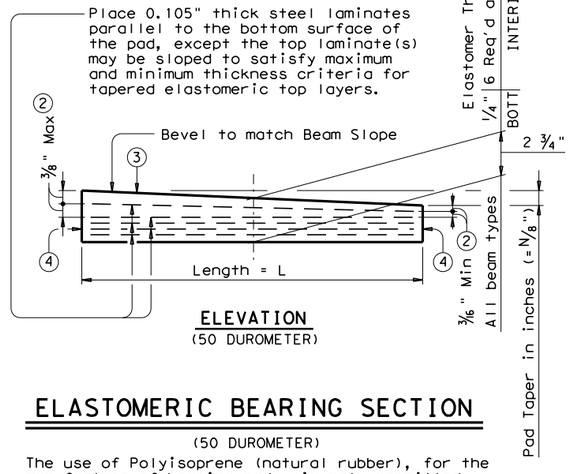
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		99



AT ABUTMENT OR INVERTED TEE BENTS



ELASTOMERIC BEARING SECTION

(50 DUROMETER)

The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

ELASTOMETRIC BEARING DIMENSIONS

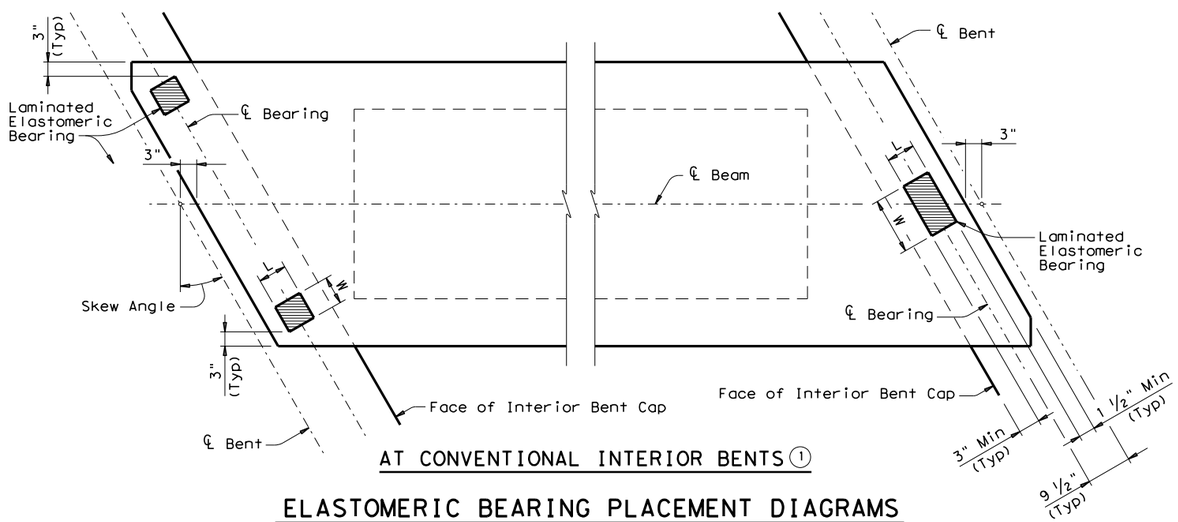
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"

① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.

② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

③ Indicate BEARING TYPE on all pads.
For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will 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 beam slope by more than $\left(\frac{0.0625"}{\text{Length}}\right)$ IN/IN.

④ Locate Permanent Mark here.



AT CONVENTIONAL INTERIOR BENTS ①

ELASTOMERIC BEARING PLACEMENT DIAGRAMS

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.

GENERAL NOTES:

Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal ℄ bearing as possible within limits shown.

Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.

For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings will 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 is to be included in unit price bid for "Prestressed Concrete Box Beams".

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

These details are applicable for skews up to 30 degrees only.

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ELASTOMERIC BEARING DETAILS
PRESTR CONC BOX BEAMS

BBEB

FILE: bbstde08.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT		
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.		
	DIST	COUNTY		SHEET NO.		
	BRY	BURLESON		100		

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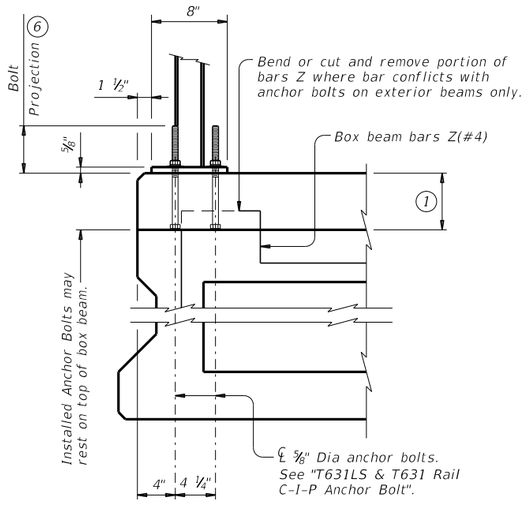
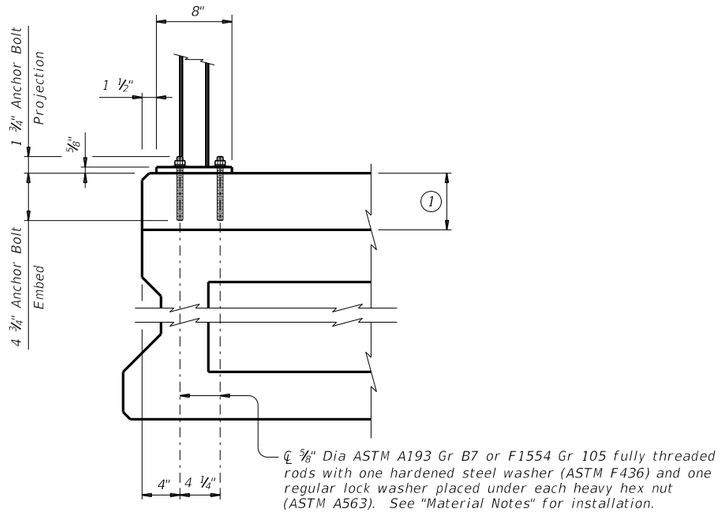


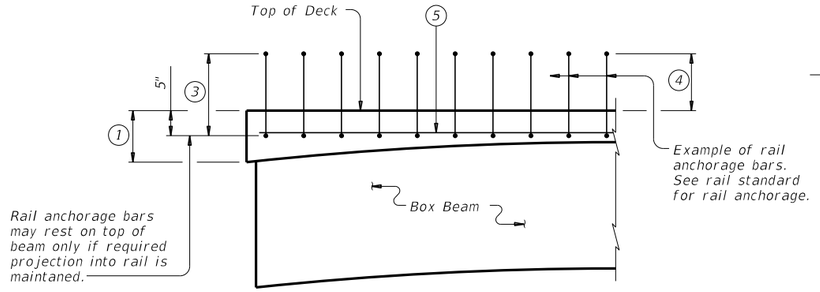
CAST-IN-PLACE ANCHORAGE OPTION



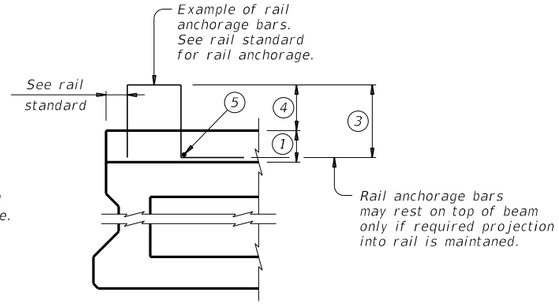
ADHESIVE ANCHORAGE OPTION

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

1. Cast-in-place slab thickness varies due to beam camber (5" minimum).
2. Replace cast-in-place anchor bolts shown on T631LS or T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
3. Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.
4. See Rail standard for projection from finished grade or top of sidewalk.
5. Place additional (#5) longitudinal bar.
6. Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 10", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
7. Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
   30° Skew: 1'-3" (acute corner only)
8. Location of Rail Expansion Joint must be at the intersection of ℄ Slab Expansion Joint, ℄ Rail Footprint and perpendicular to slab outside edge.
9. Cross-hatched area must have ½" Preformed Bitumuminous Fiber Material under concrete rail, as shown.



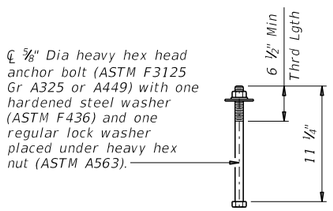
PART SPAN ELEVATION



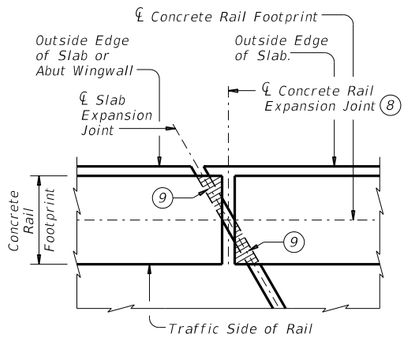
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

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

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

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

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

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

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

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

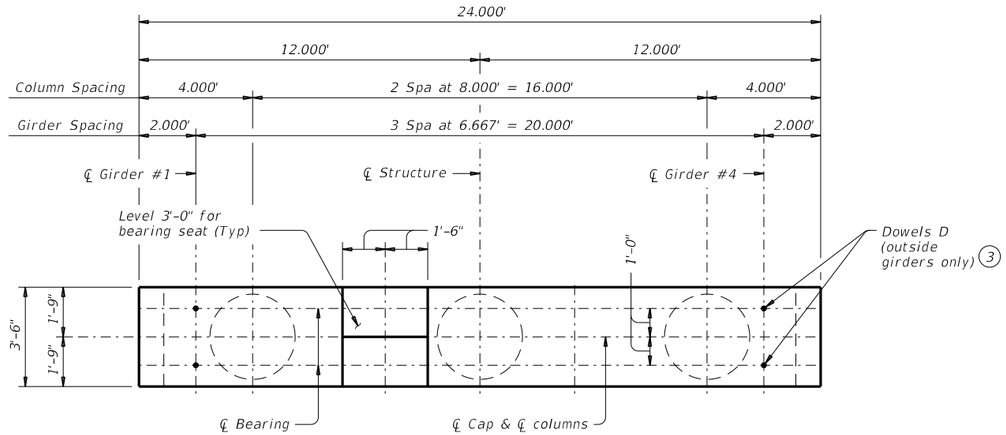
Bridge Division Standard

RAIL ANCHORAGE DETAILS

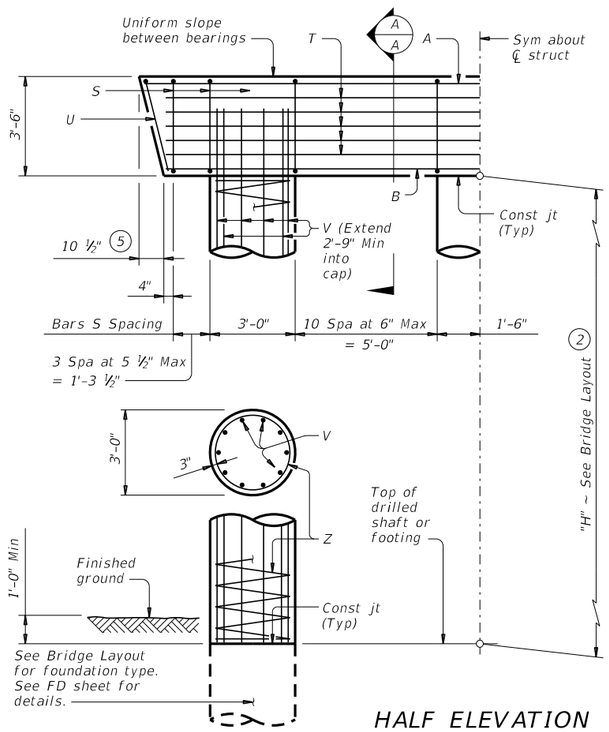
PRESTR CONC BOX BEAMS (WITH SLAB)

BBRAS

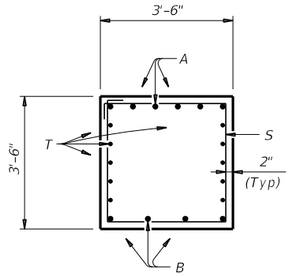
FILE: bbstde09-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
04-90: Updated for new rails. 01-12: Rails anchor bars. 07-14: Removed T101 & T6. Added T631. 03-16: Class D, E, or F epoxy in material notes. T221P & T224 in general notes. 03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		101



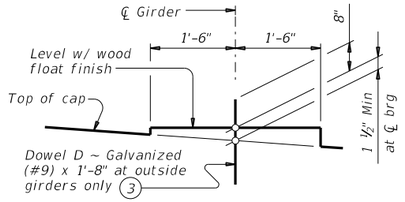
PLAN



HALF ELEVATION

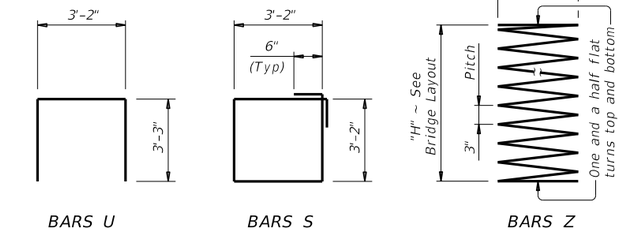


SECTION A-A



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)



1. Quantities shown are based on an "H" value of 36'. For each linear foot variation in "H" value, make the following adjustments:
   Bars V length, 1'-0"
   Bars Z length, 31'-5"
   Reinforcing steel, 165 Lb
   Class "C" conc (col), 0.78 CY
2. This standard may not be used for "H" heights exceeding 36'. In areas of very soft soil or where scour is anticipated, allowable "H" heights must be evaluated by the Engineer prior to the use of this standard.
3. Omit Dowels D at end of multi-span units. Adjust reinforcing steel total accordingly.
4. Foundation Loads based on "H" = 36'.
5. Measured parallel to top of cap cross-slope.

TABLE OF ESTIMATED QUANTITIES (1)

Bar	No.	Size	Length	Weight
A	6	#11	23'- 6"	749
B	4	#11	22'- 0"	468
D (3)	4	#9	1'- 8"	23
S	30	#5	13'- 8"	428
T	10	#5	22'- 0"	229
U	2	#5	9'- 8"	20
V	30	#9	38'- 9"	3,953
Z	3	#4	1,154'- 7"	2,314
Reinforcing Steel			Lb	8,184
Class "C" Concrete (Cap)			CY	10.7
Class "C" Concrete (Col)			CY	28.3

FOUNDATION LOADS (4)

Span Average	Drilled Shaft Loads	Pile Load (Tons/Pile)	
		3 Pile Ftg	4 Pile Ftg
Ft	Tons/Shaft		
40	104	38	29
45	112	41	31
50	119	43	33
55	127	46	35
60	134	48	37
65	142	51	39
70	149	53	40
75	157	56	42
80	164	58	44
85	172	61	46
90	179	63	48
95	187	66	50
100	194	68	52
105	201	70	53
110	209	73	55
115	216	75	57
120	223	78	59
125	231	80	61

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details (FD) standard sheet for all foundation details and notes.
See Shear Key (IGSK) standard sheet, for all shear key details and notes, if applicable.
Bent selected must be based on the average span length rounded up to the next 5 ft increment.
These bent details may be used with standard SIG-24 only.

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

MATERIAL NOTES:

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

HL93 LOADING

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INTERIOR BENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

BIG-24

FILE: big01sts-17.dgn	DN: TAR	CK: SDB	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		102

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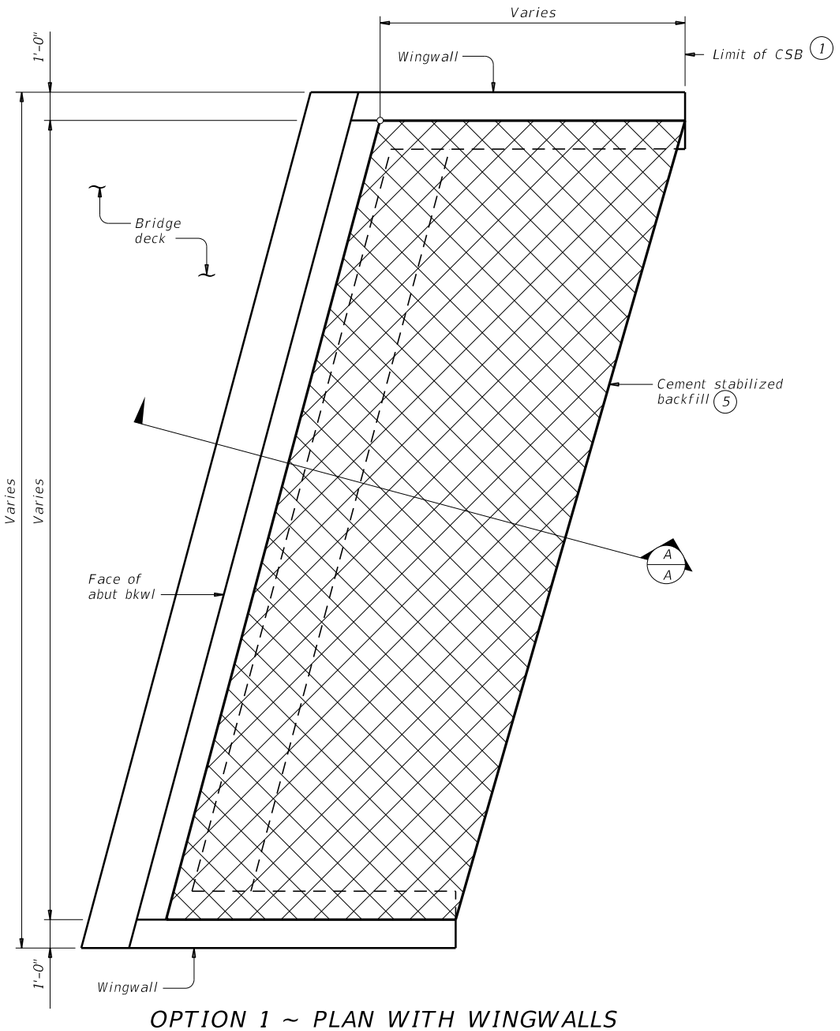
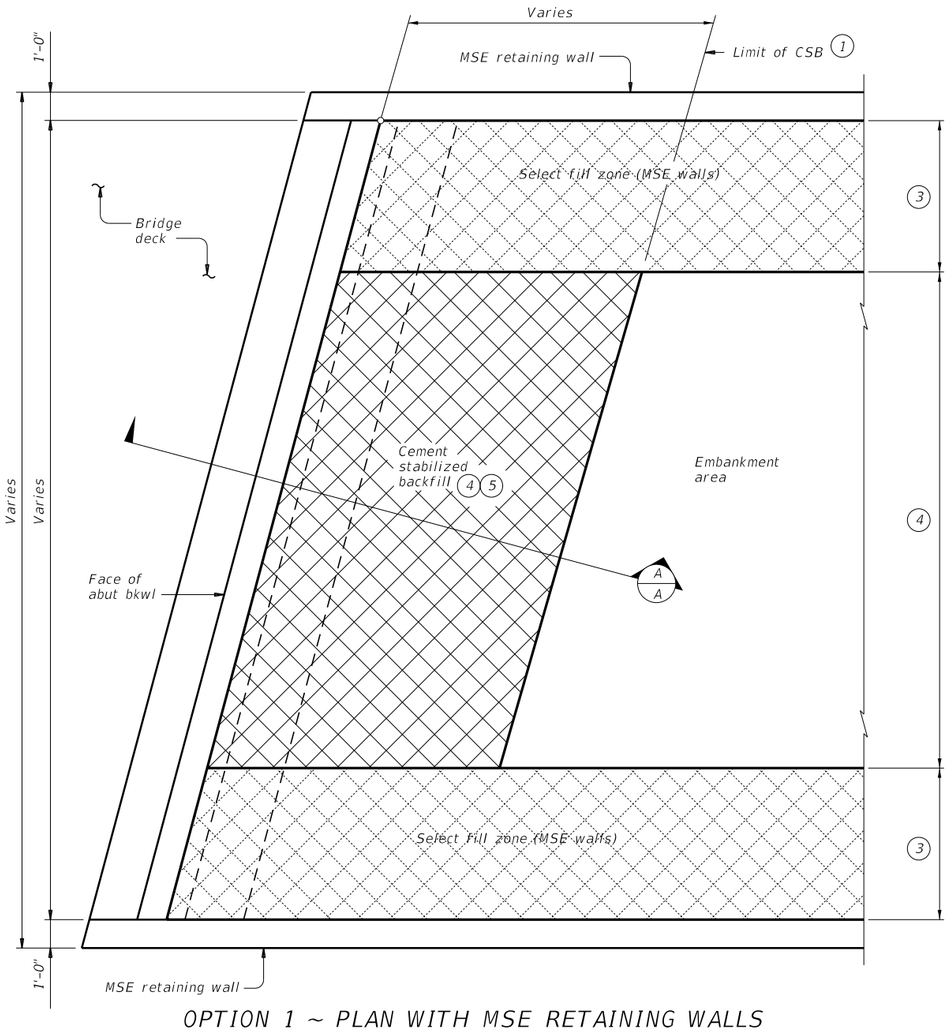


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

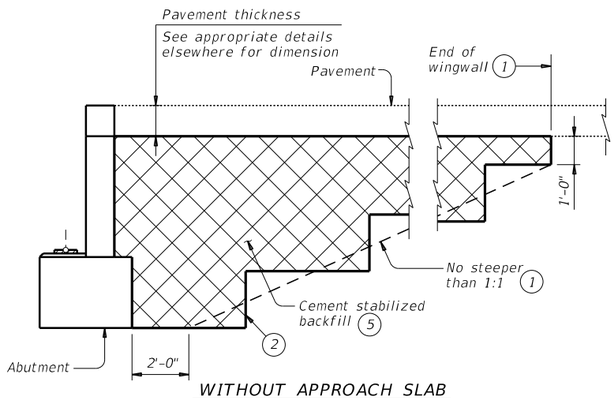
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

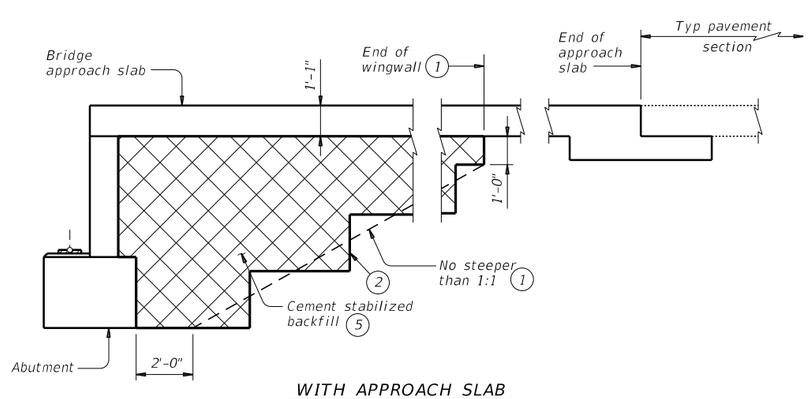
(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		103

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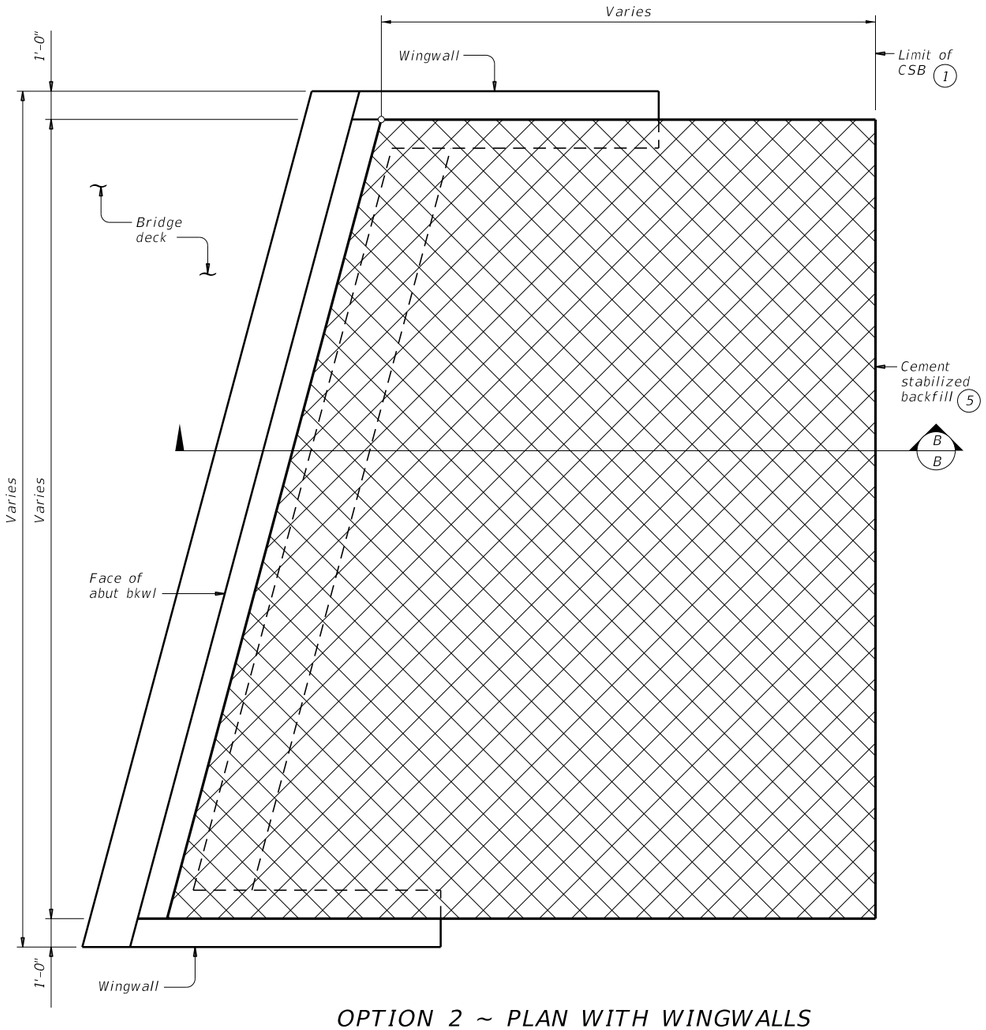
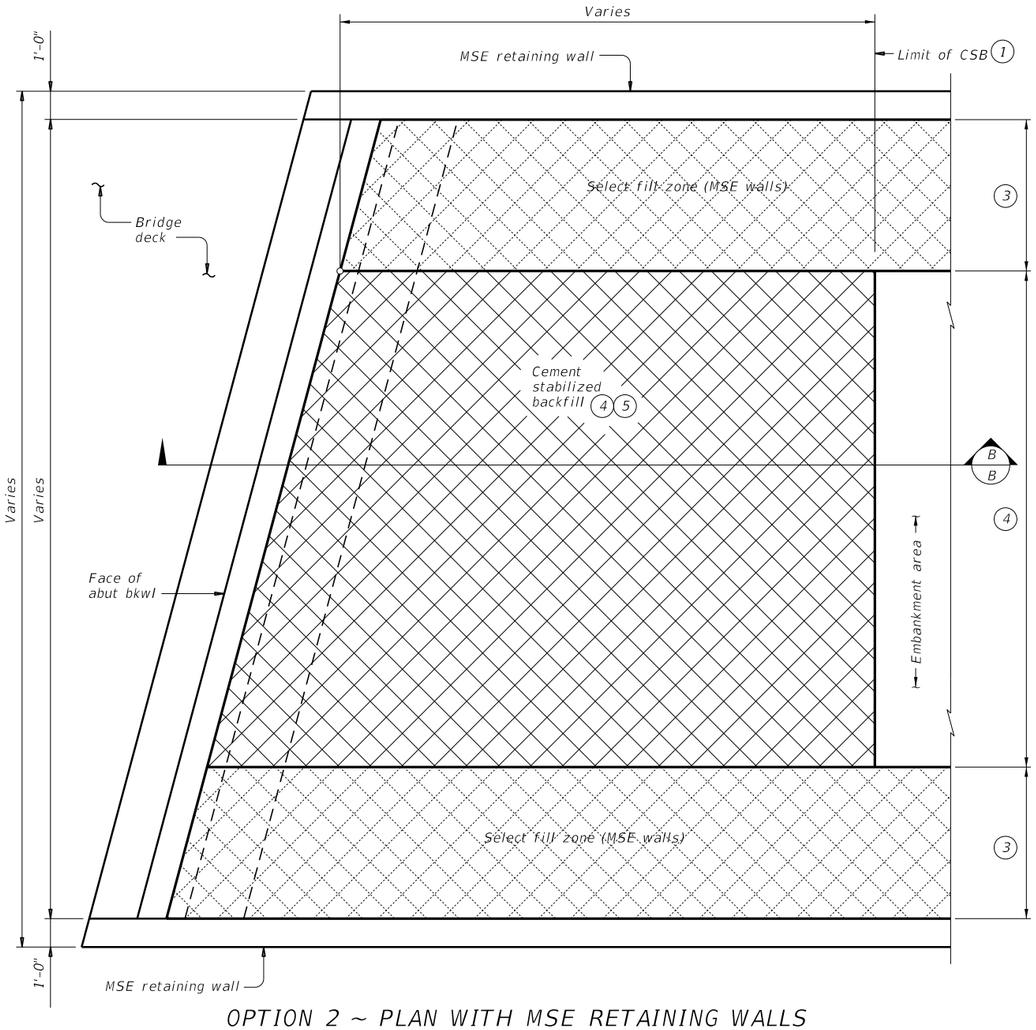


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

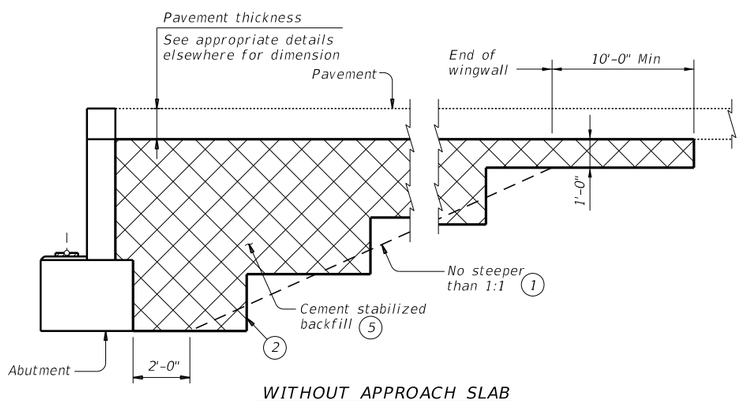
(1) *Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.*

(2) *Bench backfill as shown with 12" (approximate) bench depths.*

(3) *Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.*

(4) *When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.*

(5) *If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:*
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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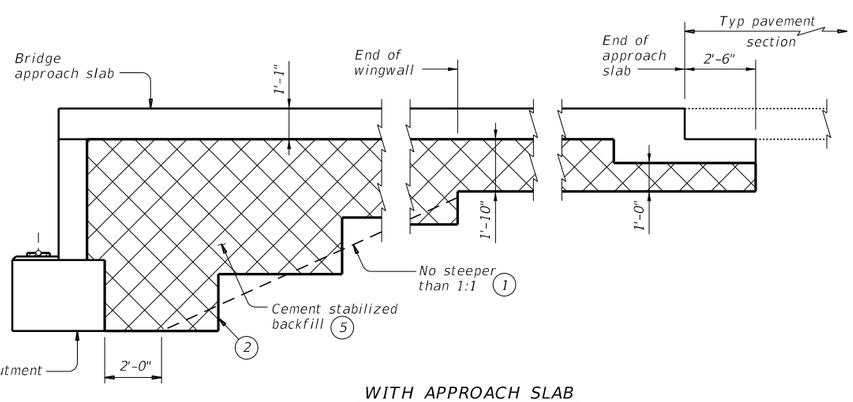

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
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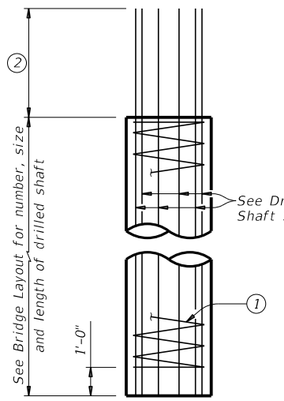
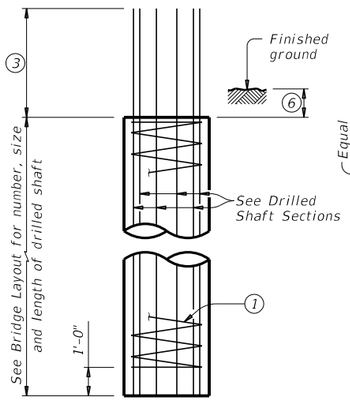
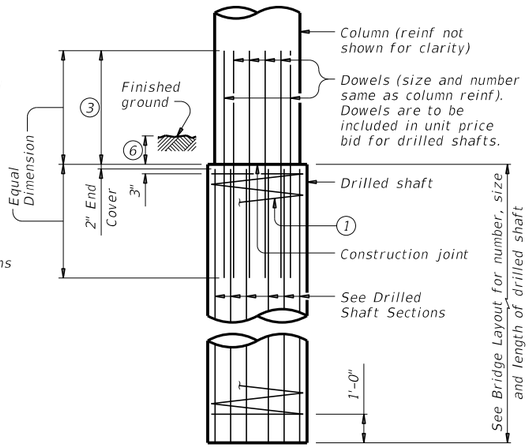


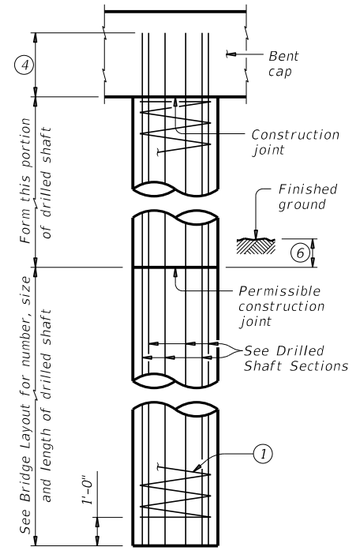
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



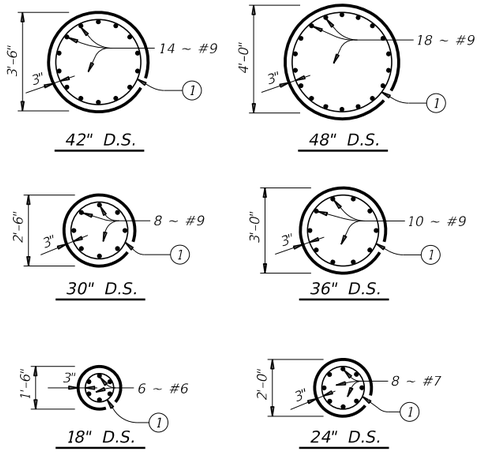
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

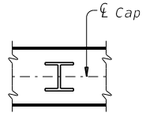


DRILLED SHAFT SECTIONS

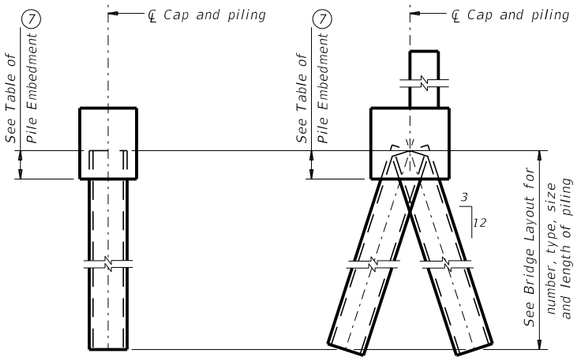
DRILLED SHAFT DETAILS

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

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

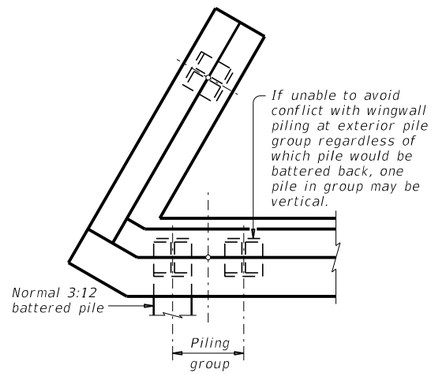


ORIENTATION OF STEEL H-PILING

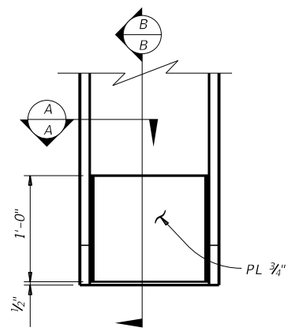


VERTICAL PILE BATTERED PILE

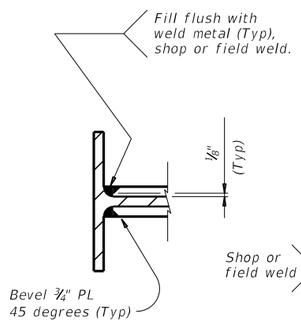
PILING DETAILS
(Concrete or steel H)



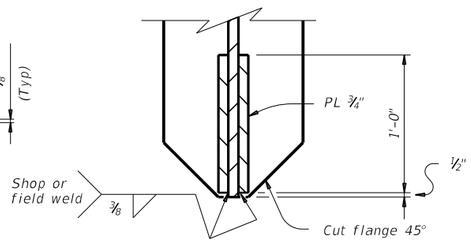
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



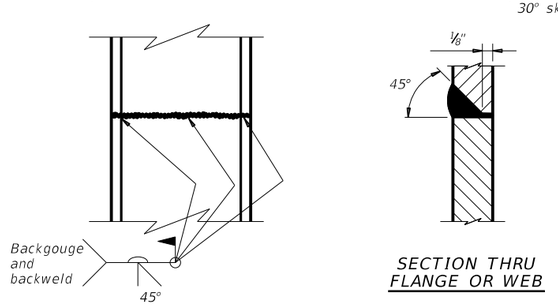
SECTION A-A



SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

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



SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

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

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

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

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

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

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

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		105

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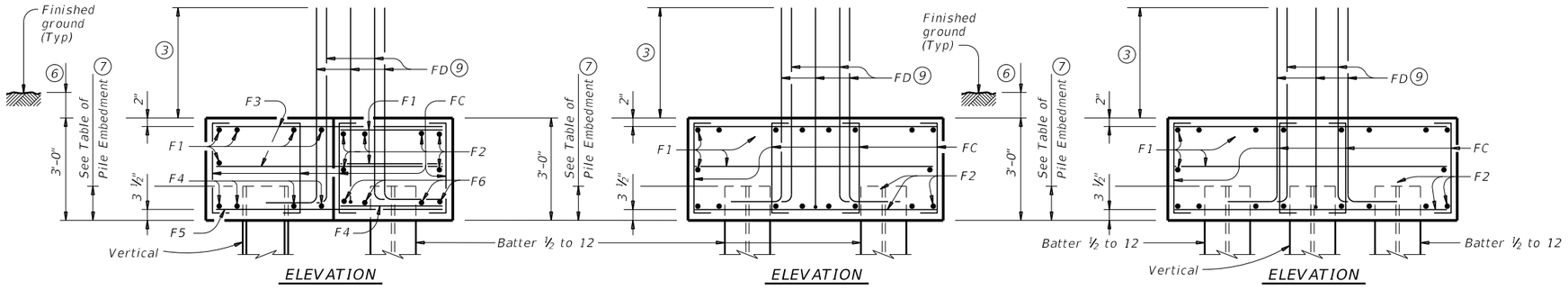
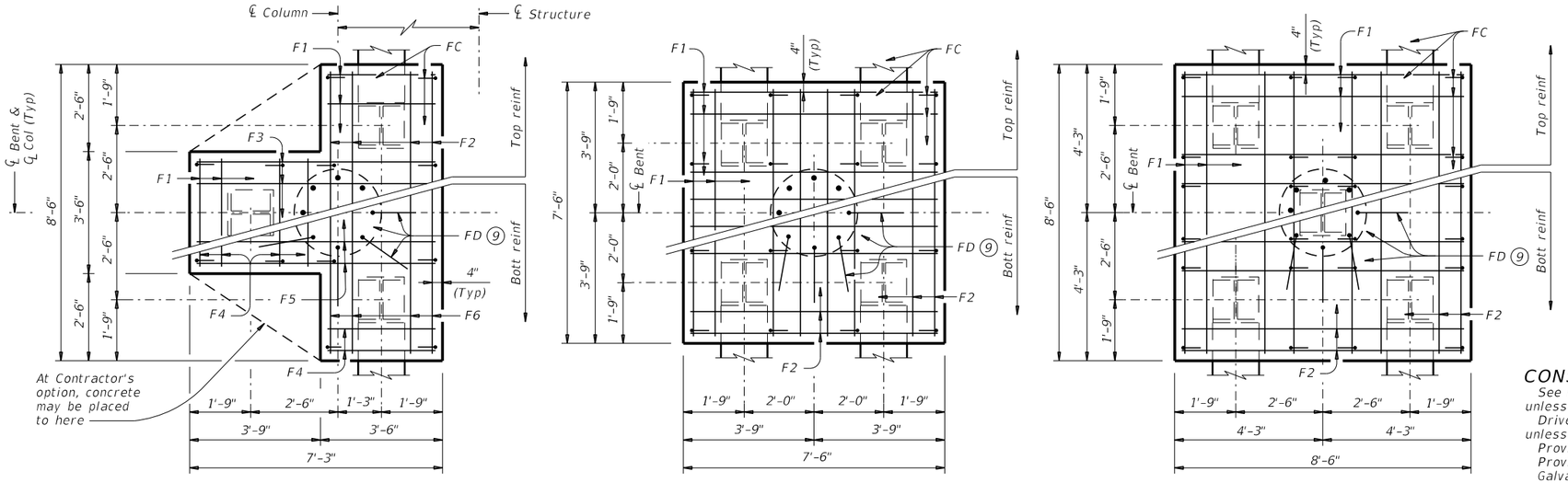




THREE PILE FOOTING (8)

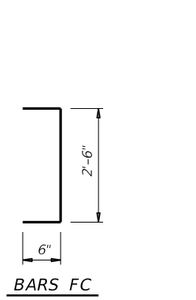
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

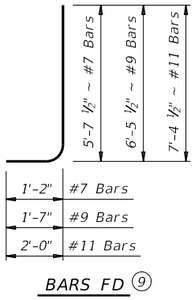
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

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

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

(7) Or as shown on plans.

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

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

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

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

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

ONE 4 PILE FOOTING

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

ONE 5 PILE FOOTING

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

CONSTRUCTION NOTES:

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

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

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

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

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

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

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

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

Maximum allowable pile loads for the footings shown are:

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

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		106

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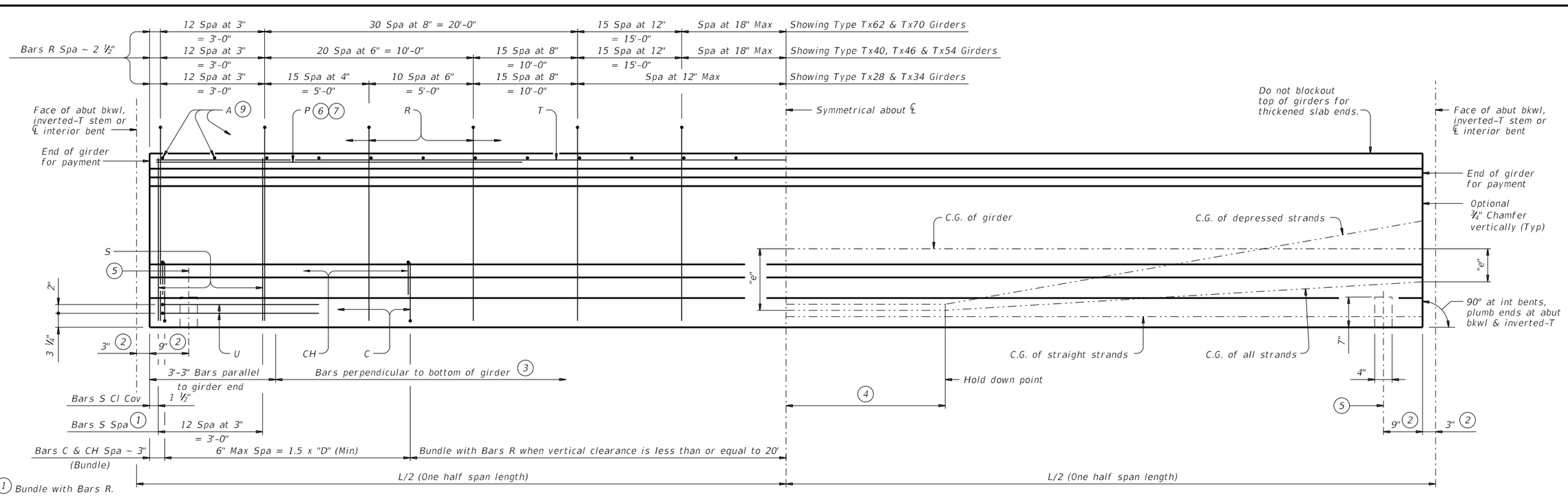


(1) Bundle with Bars R.

(2) Measured along ℄ 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').

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

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.

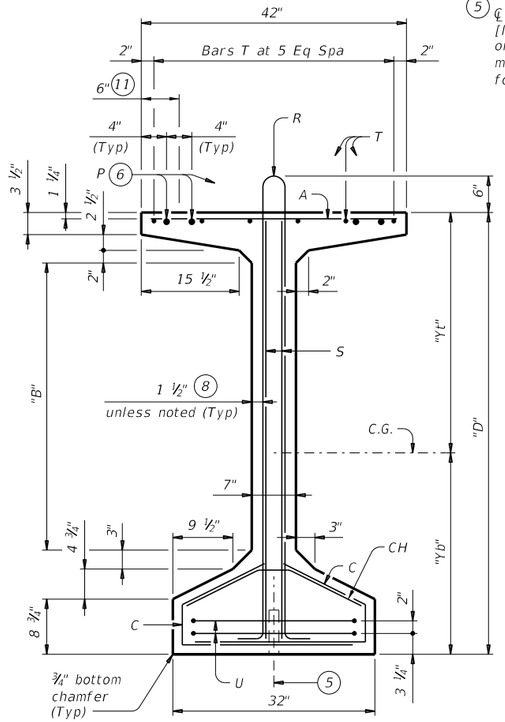
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

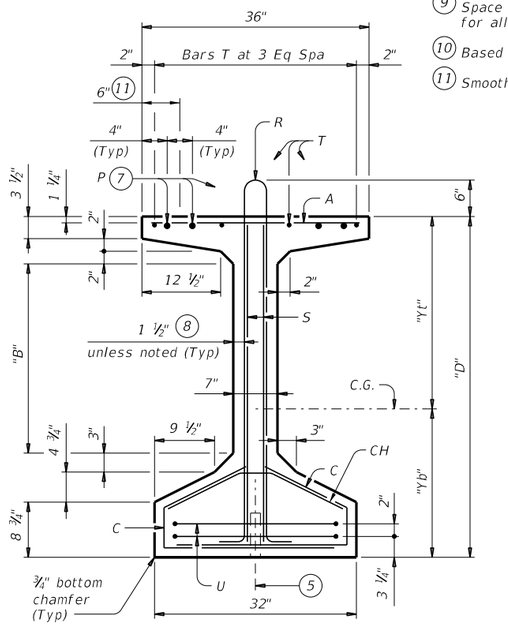
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

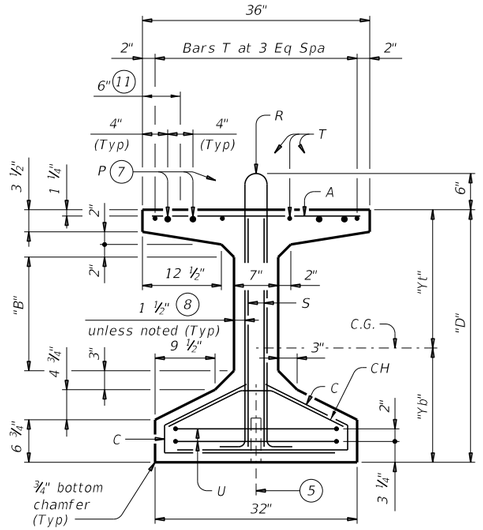
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in.²)	"Ix" (in.⁴)	"Iy" (in.⁴)	Weight (10) (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 ½"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 ½"	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.

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
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REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		107

DATE: 11/22/2022 8:14:21 PM
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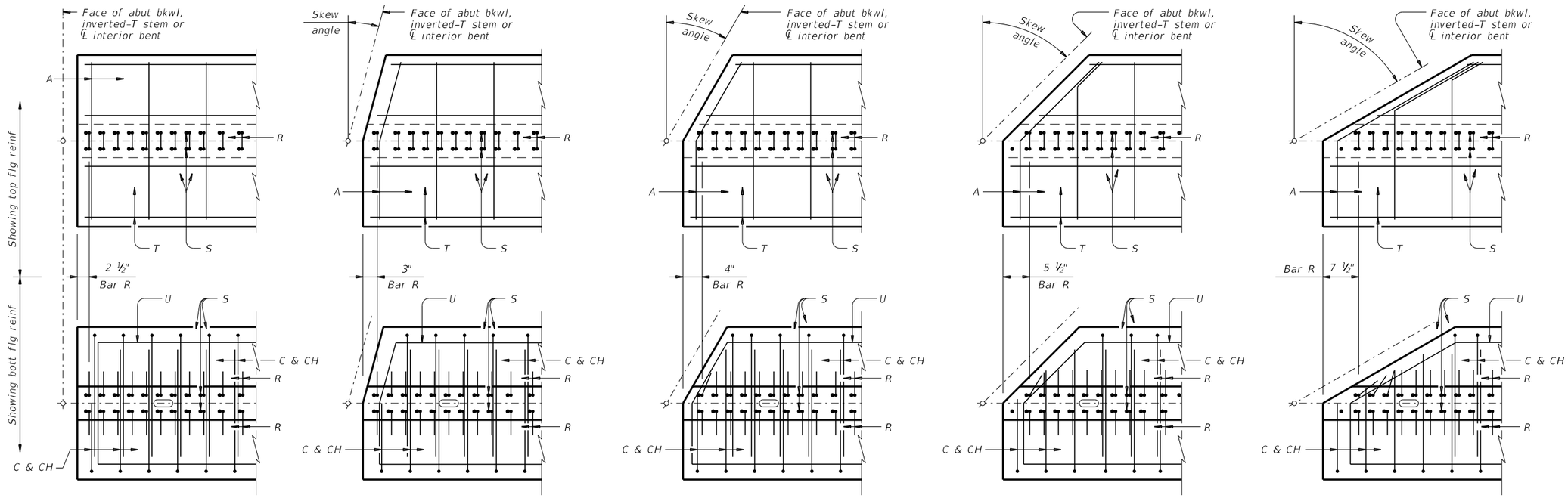
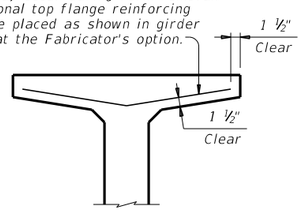
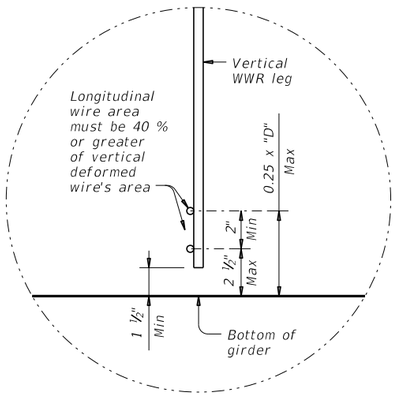


PLAN OF GIRDER ENDS (12)

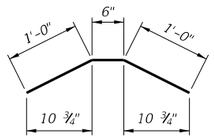
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



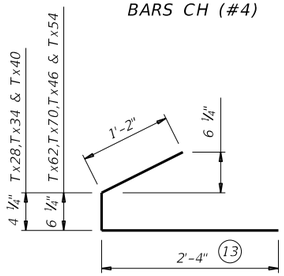
OPTIONAL TOP FLANGE REINFORCING DETAIL



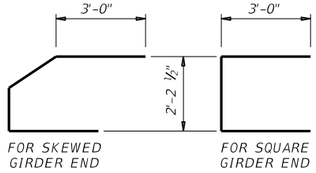
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



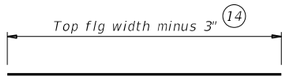
BARS CH (#4)



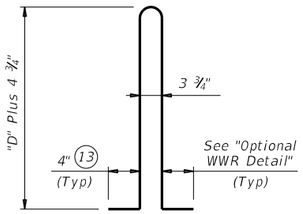
BARS C (#4)



BARS U (#5)

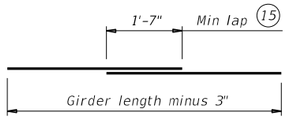


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

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IGD

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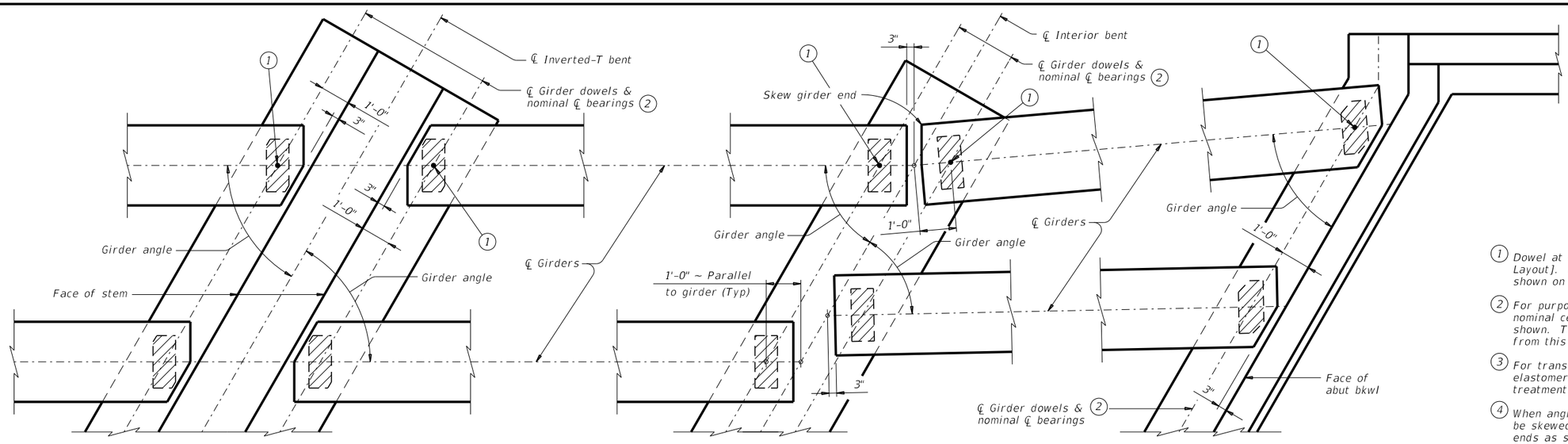


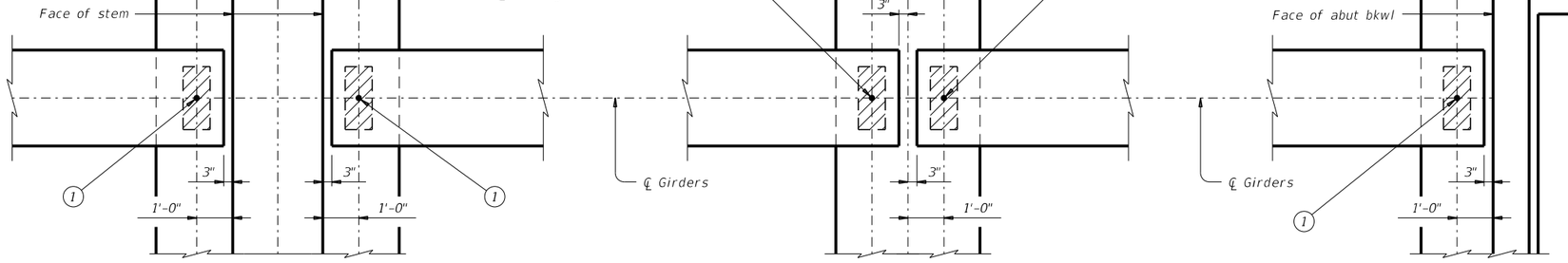
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

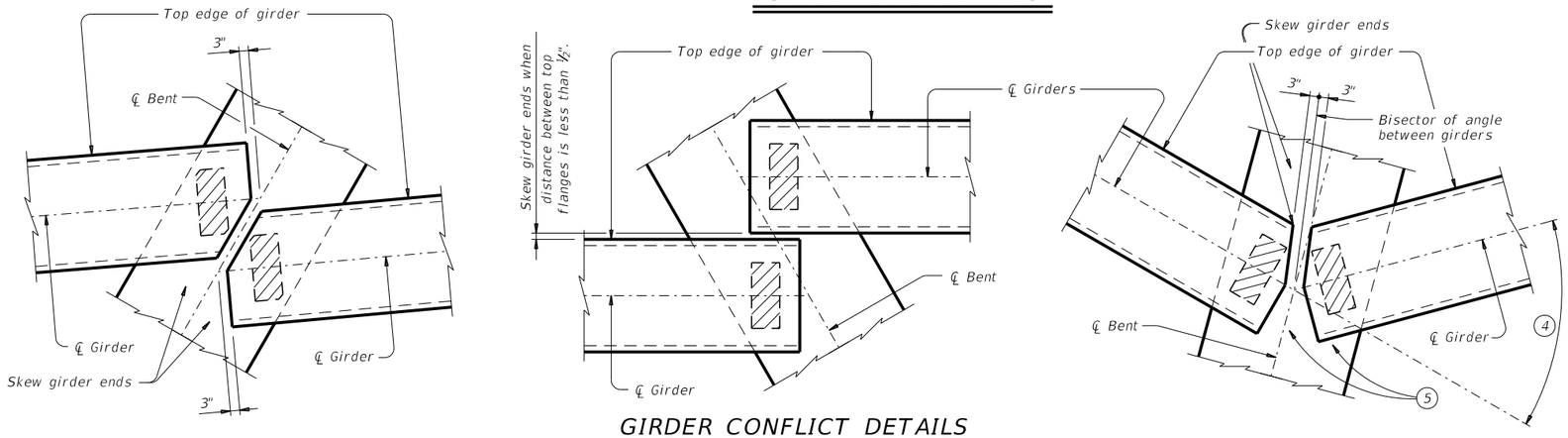
(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(4) When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.

(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.



GIRDER END DETAILS



GIRDER CONFLICT DETAILS

GENERAL NOTES:

These details accommodate skew angles up to 60°.

Shop drawings for approval are required.

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

Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

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ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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	BRY	BURLESON		109

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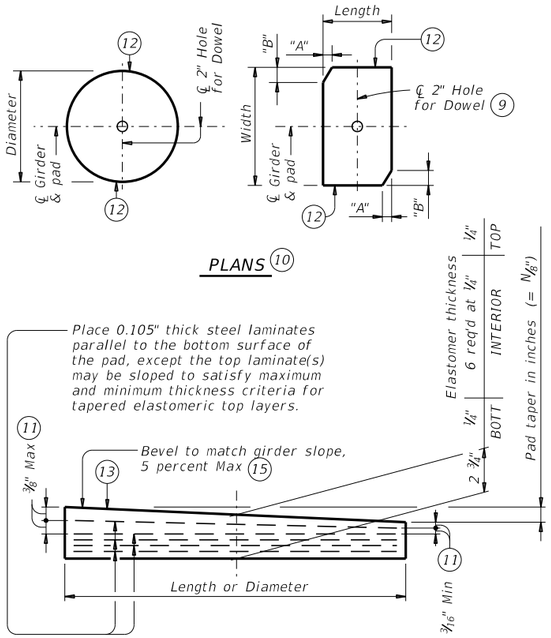
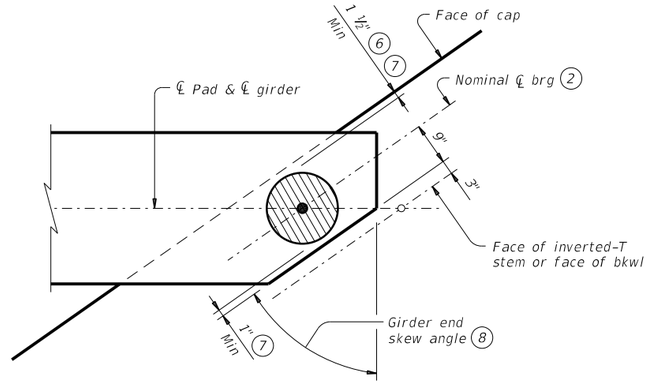
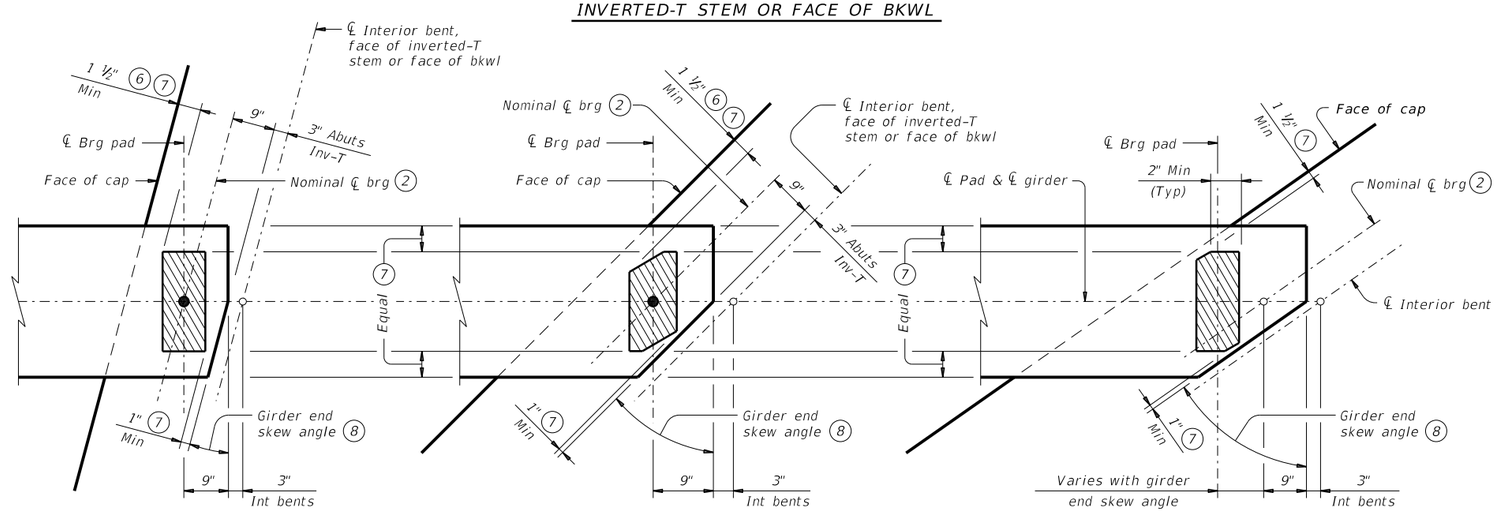


LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



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 16

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS 14

Girder Type	Abutments: Face of Bkwl to Face of Cap	Int Bents: Overall Cap Width	Inv-T Bents: Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

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"	Pad Clip Dimensions "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 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		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 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	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 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"

(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 ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ 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.

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ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

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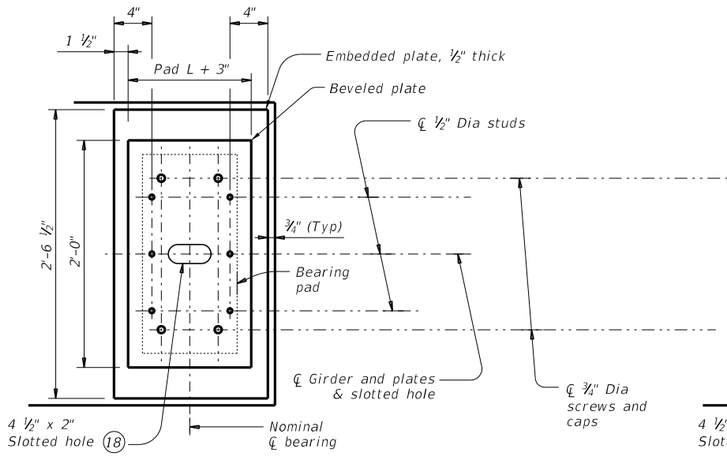
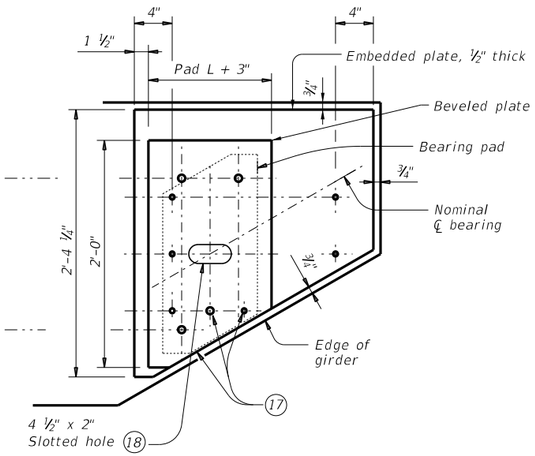
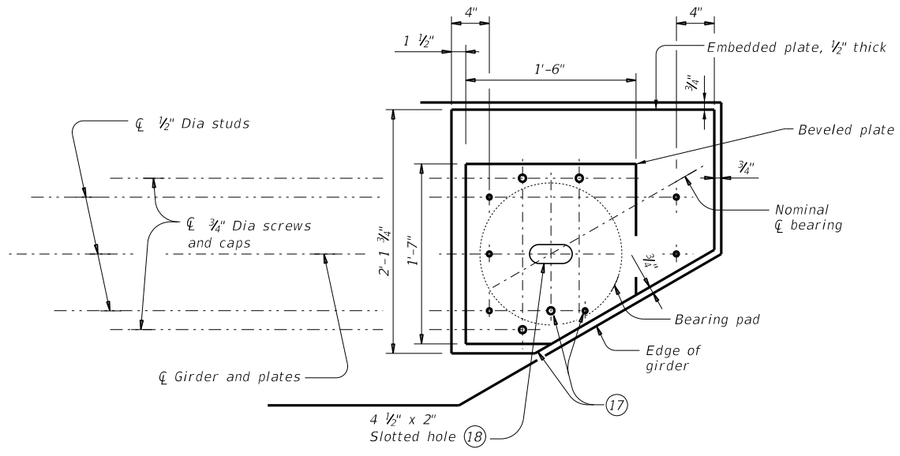


NORMAL GIRDER END
RECTANGULAR BEARING PAD

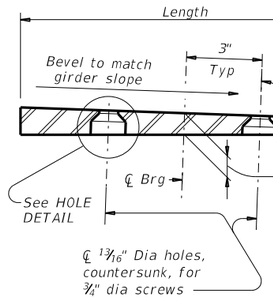


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD



SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



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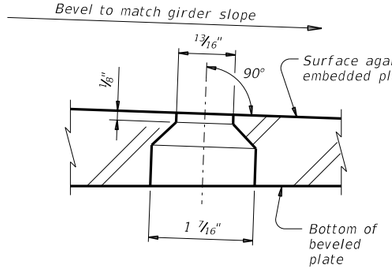


HOLE DETAIL

(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.

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.

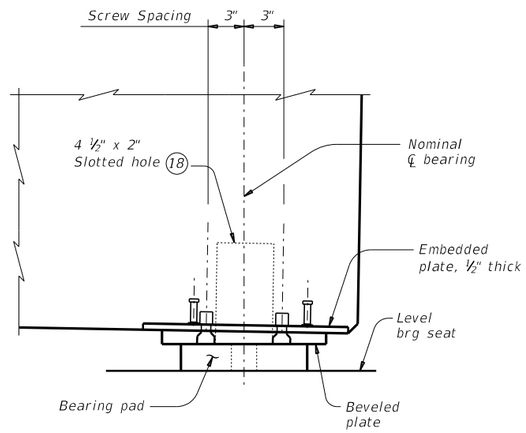
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

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

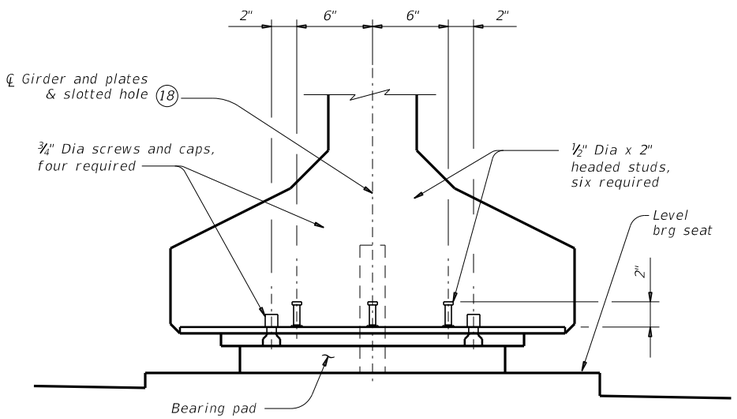
¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than ½" 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.

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

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ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

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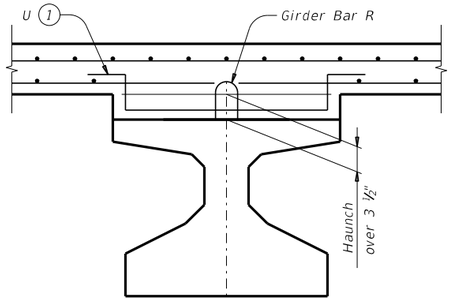
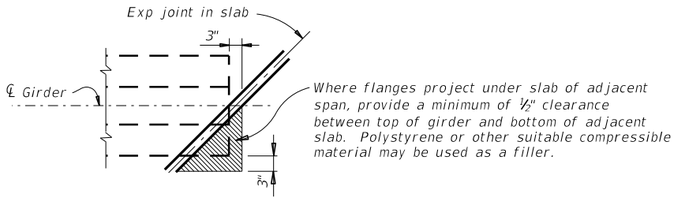
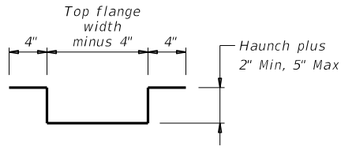


HAUNCH REINFORCING DETAIL



TREATMENT AT GIRDER END FOR SKEWED SPANS



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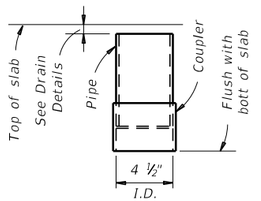
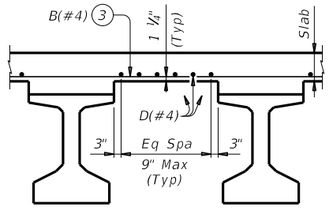
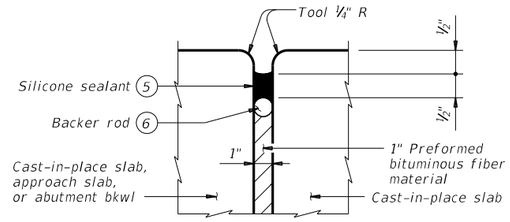


C-I-P DRAIN DETAIL (2)

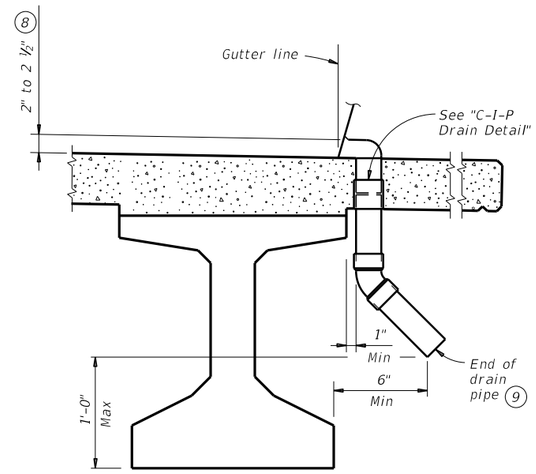


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL (7)



DRAIN DETAIL (10)

(1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

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

(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.

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.

Texas Department of Transportation

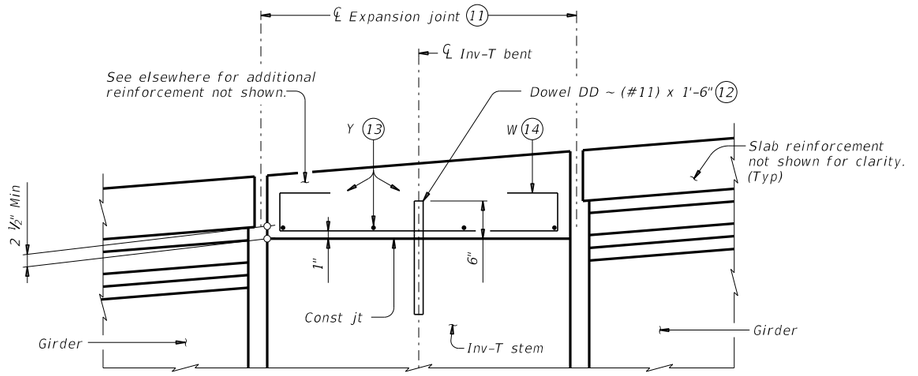
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS: 10-19: Modified Note 7. Type A now a pay item.	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		112



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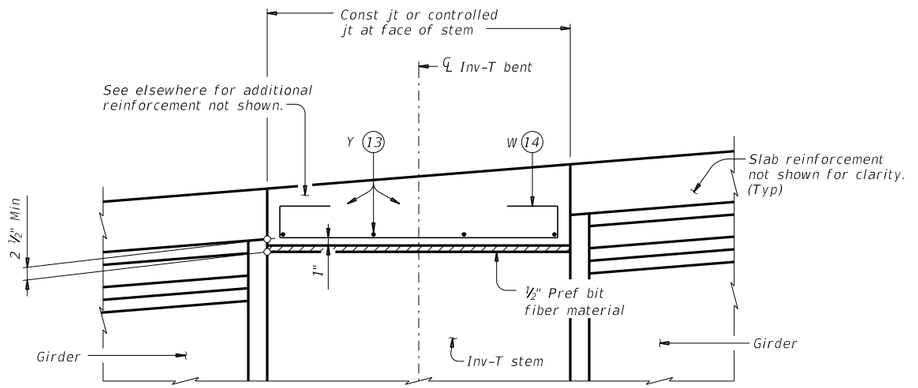
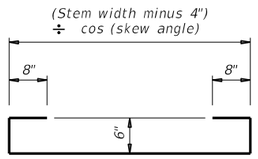
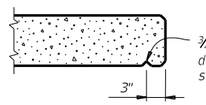


SHOWING CONST JTS OR CONTROLLED JTS

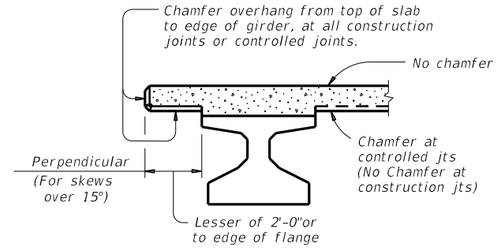
REINFORCEMENT OVER INV-T BENTS



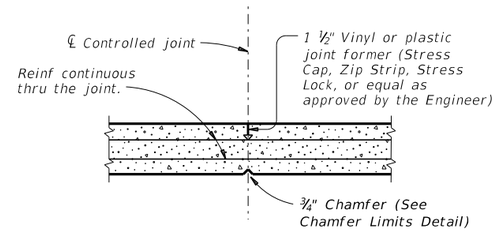
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		113

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DESIGNED GIRDERS

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

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ 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.

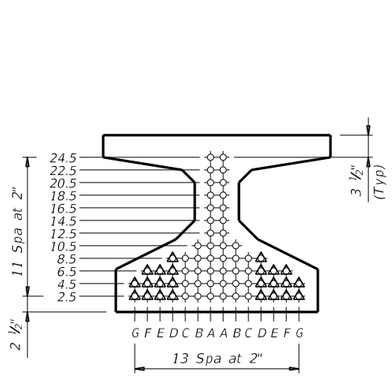
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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.

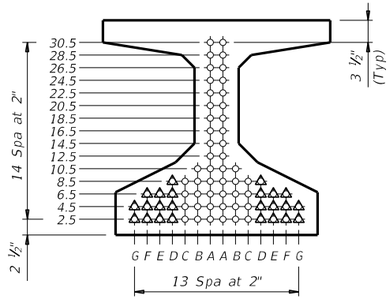
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must 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



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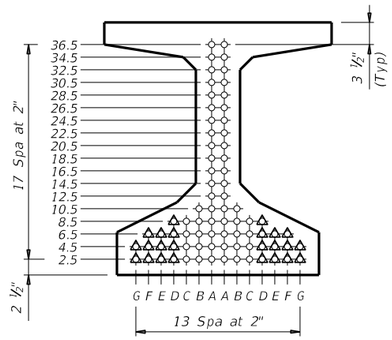

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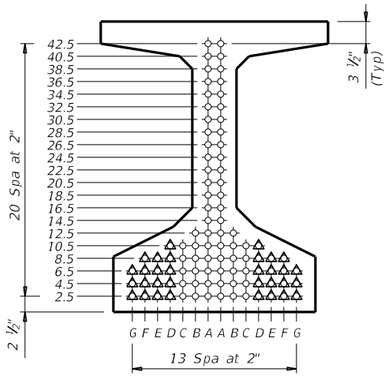

TYPE Tx46

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

24' ROADWAY

IGSD-24

FILE: ig01stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		114

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DESIGNED GIRDERS

STRUCTURE	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	DEPRESSED STRAND PATTERN: NO.	DEPRESSED STRAND PATTERN: TO END (in)	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)	OPTIONAL DESIGN: DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	OPTIONAL DESIGN: DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	OPTIONAL DESIGN: REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	OPTIONAL DESIGN: LIVE LOAD DISTRIBUTION FACTOR (2) Moment	OPTIONAL DESIGN: LIVE LOAD DISTRIBUTION FACTOR (2) Shear	LOAD RATING FACTORS: STRENGTH I Inv	LOAD RATING FACTORS: STRENGTH I Opr	LOAD RATING FACTORS: SERVICE III Inv
Type Tx54 Girders 24' Roadway 8.5" Slab	40	ALL	Tx54		8	0.6	270	21.01	21.01			4.000	5.000	0.511	-0.578	1798	0.770	0.800	2.05	2.66	3.76
	45	ALL	Tx54		10	0.6	270	21.01	21.01			4.000	5.000	0.636	-0.703	2126	0.740	0.800	2.24	2.90	3.69
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.781	-0.850	2533	0.720	0.810	1.81	2.35	2.91
	55	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.938	-1.007	2951	0.700	0.810	1.90	2.46	2.79
	60	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	1.108	-1.173	3271	0.680	0.810	1.60	2.07	2.25
	65	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.285	-1.348	3547	0.670	0.810	1.66	2.16	2.16
	70	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.482	-1.540	3502	0.660	0.820	1.41	1.82	1.73
	75	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.689	-1.733	3745	0.640	0.820	1.47	1.91	1.66
	80	ALL	Tx54		16	0.6	270	20.76	20.76			4.000	5.000	1.912	-1.944	4001	0.630	0.820	1.26	1.63	1.30
	85	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	2.148	-2.166	4406	0.620	0.820	1.07	1.39	1.00
	90	ALL	Tx54		20	0.6	270	20.41	19.21	4	10.5	4.000	5.000	2.379	-2.384	4806	0.610	0.820	1.33	1.73	1.16
	95	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.639	-2.624	5234	0.600	0.820	1.35	1.75	1.07
	100	ALL	Tx54		26	0.6	270	20.08	16.39	4	28.5	4.000	5.000	2.896	-2.871	5699	0.600	0.830	1.52	1.97	1.14
	105	ALL	Tx54		30	0.6	270	19.81	12.21	6	44.5	4.000	5.000	3.180	-3.130	6153	0.590	0.830	1.51	1.96	1.02
	110	ALL	Tx54		32	0.6	270	19.63	11.38	6	50.5	4.100	5.000	3.477	-3.400	6619	0.580	0.830	1.63	2.12	1.03
	115	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.500	3.786	-3.679	7096	0.570	0.830	1.60	2.07	1.00
	120	ALL	Tx54		38	0.6	270	19.22	13.22	6	44.5	5.200	6.100	4.116	-3.985	7646	0.570	0.830	1.65	2.14	1.01
	125	ALL	Tx54		42	0.6	270	19.01	12.72	6	50.5	5.600	6.600	4.415	-4.257	8113	0.560	0.830	1.71	2.24	1.09
Type Tx62 Girders 24' Roadway 8.5" Slab	60	ALL	Tx62		12	0.6	270	25.78	25.78			4.000	5.000	0.878	-0.986	3525	0.700	0.800	1.81	2.35	2.73
	65	ALL	Tx62		12	0.6	270	25.78	25.78			4.000	5.000	1.016	-1.133	3847	0.690	0.800	1.89	2.45	2.64
	70	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.171	-1.293	4173	0.680	0.810	1.61	2.08	2.16
	75	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.332	-1.455	4132	0.660	0.810	1.68	2.18	2.10
	80	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.506	-1.633	4429	0.650	0.810	1.45	1.88	1.72
	85	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.691	-1.819	4610	0.640	0.810	1.24	1.61	1.37
	90	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.885	-2.013	5051	0.630	0.810	1.29	1.68	1.31
	95	ALL	Tx62		20	0.6	270	25.18	24.78	4	6.5	4.000	5.000	2.081	-2.209	5493	0.620	0.820	1.11	1.44	1.02
	100	ALL	Tx62		22	0.6	270	25.05	23.96	4	10.5	4.000	5.000	2.295	-2.420	5959	0.610	0.820	1.16	1.50	1.01
	105	ALL	Tx62		24	0.6	270	24.94	23.28	4	14.5	4.000	5.000	2.514	-2.642	6475	0.610	0.820	1.37	1.78	1.10
	110	ALL	Tx62		26	0.6	270	24.85	22.70	4	18.5	4.000	5.000	2.723	-2.850	6936	0.600	0.820	1.39	1.80	1.03
	115	ALL	Tx62		30	0.6	270	24.58	17.78	6	40.5	4.000	5.000	2.963	-3.083	7440	0.590	0.820	1.56	2.02	1.09
	120	ALL	Tx62		34	0.6	270	24.25	15.07	6	58.5	4.200	5.000	3.213	-3.325	7957	0.580	0.820	1.55	2.01	1.00
	125	ALL	Tx62		36	0.6	270	24.11	17.11	6	48.5	4.700	5.600	3.480	-3.591	8551	0.580	0.820	1.64	2.13	1.04
	130	ALL	Tx62		40	0.6	270	23.88	16.68	6	54.5	5.100	6.100	3.733	-3.836	9072	0.570	0.820	1.52	2.09	1.02
	135	ALL	Tx62		42	0.6	270	23.78	16.35	6	58.5	5.300	6.300	4.002	-4.104	9676	0.570	0.830	1.61	2.18	1.05

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

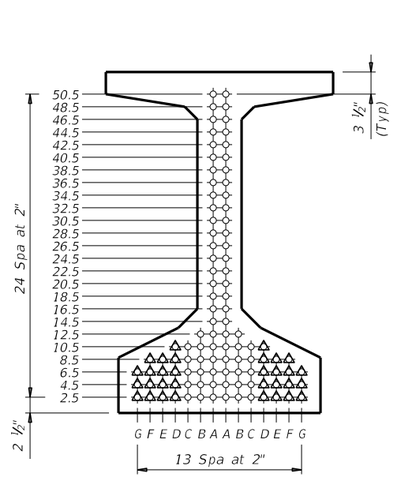
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

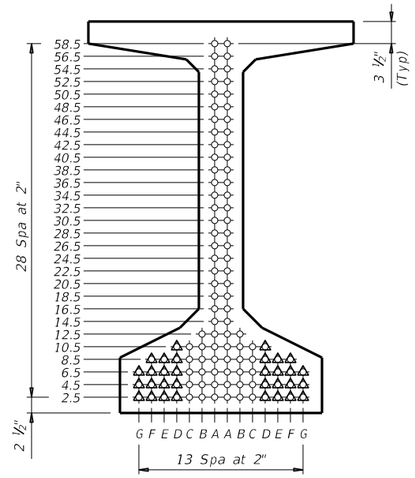
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

24' ROADWAY

IGSD-24

FILE: ig01stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		115

DATE: 11/22/2022 8:15:01 PM
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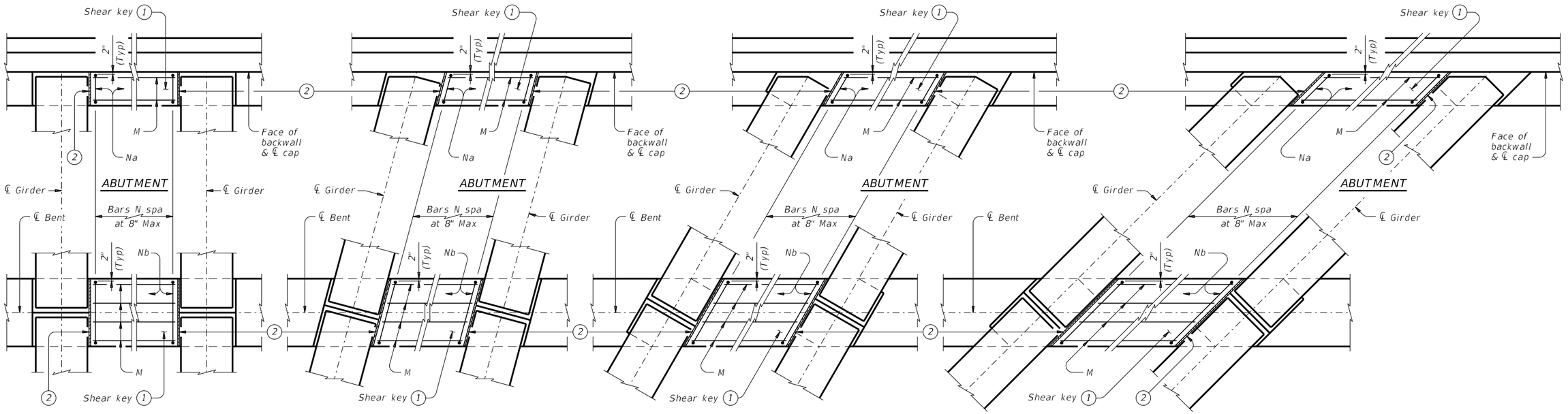


PARTIAL PLANS WITH NO SKEW

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 ¼" 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.

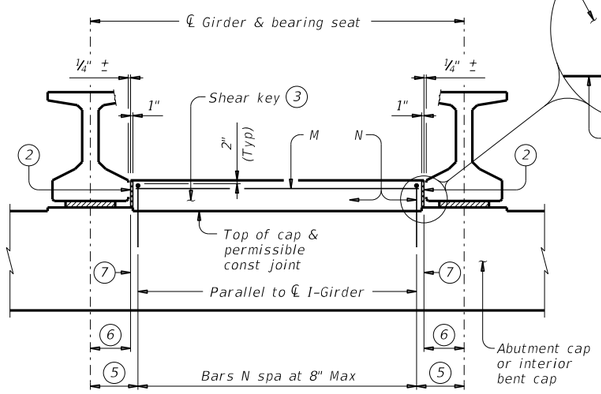
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ÷ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

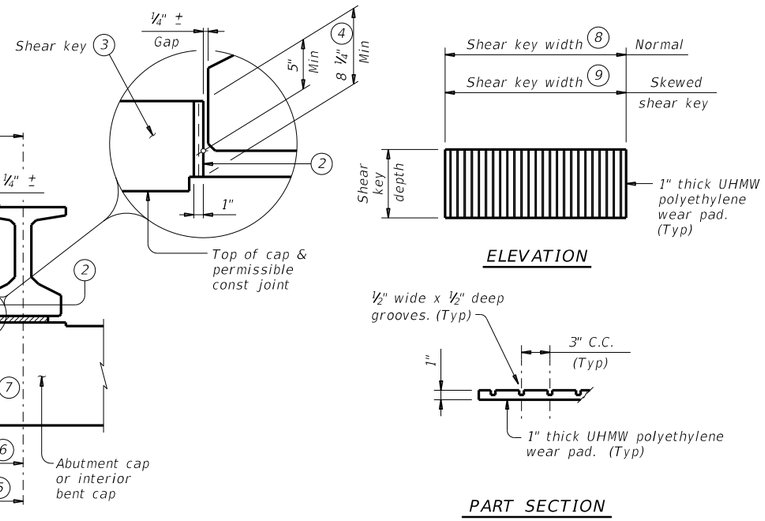
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

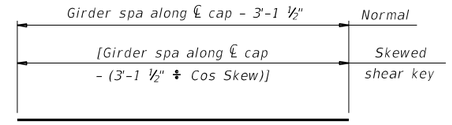


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

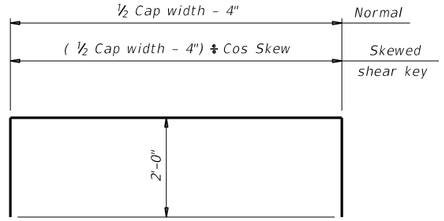
Showing shear key with girder Type Tx46.
Other I-Girder types similar.



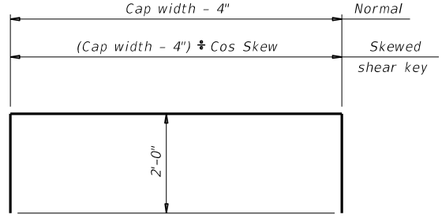
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



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.

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		116

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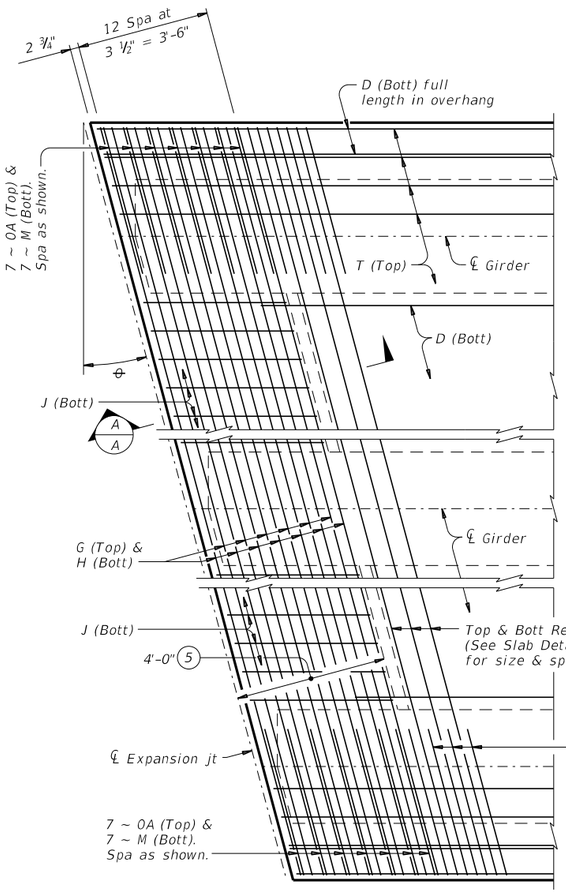
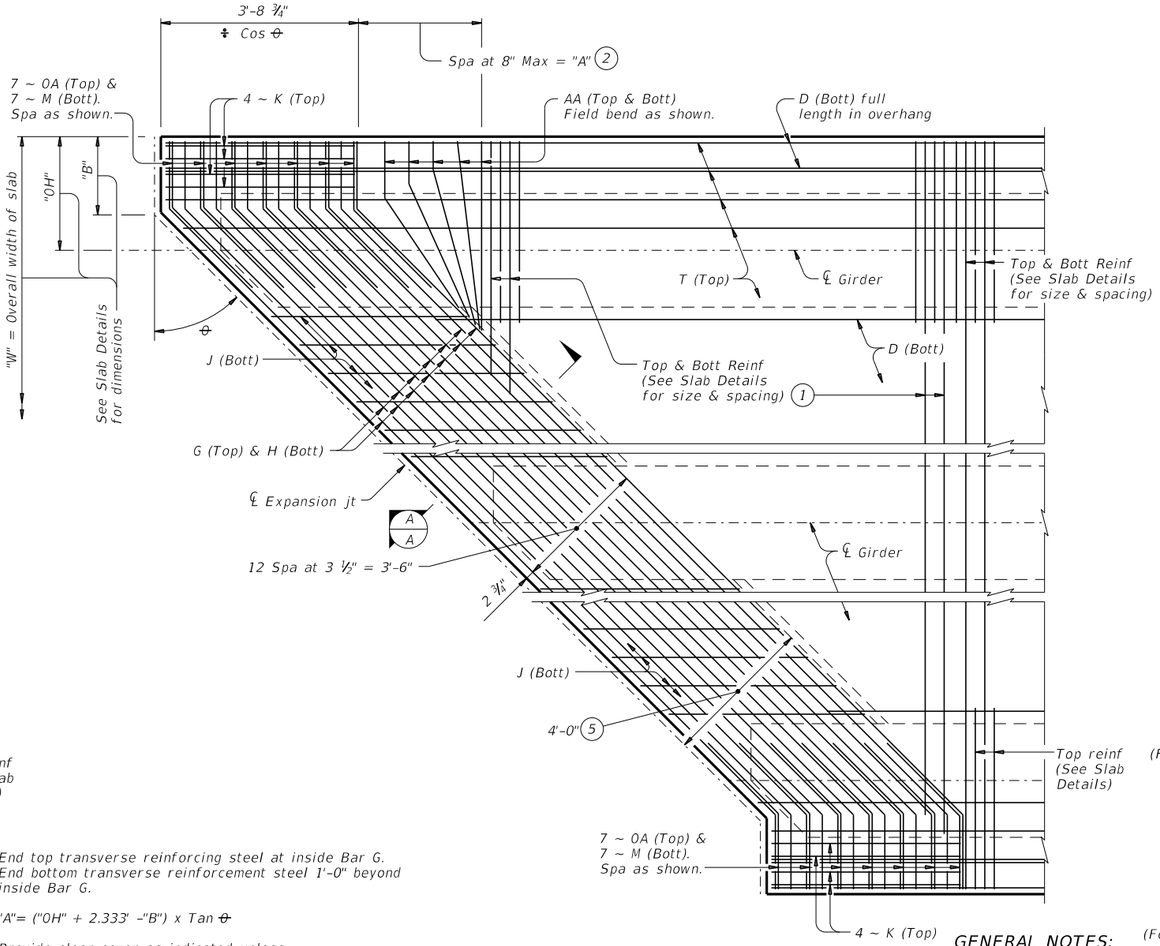
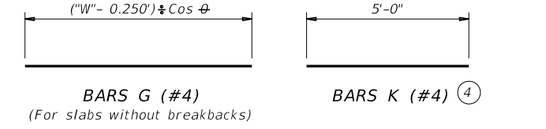


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



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 θ
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.



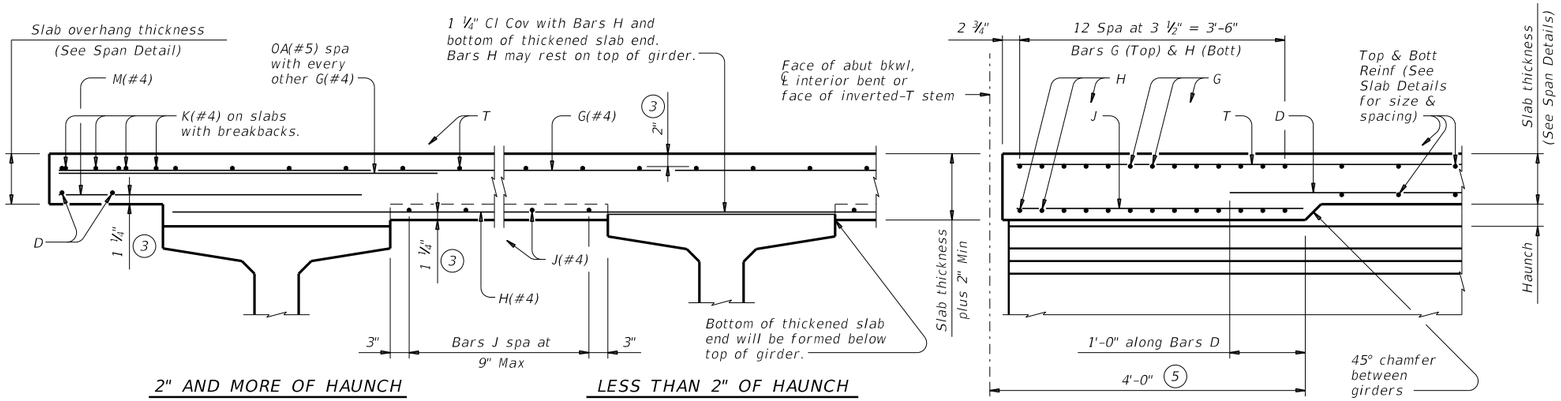
GENERAL NOTES:

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.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)

SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

FILE: igtssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		117

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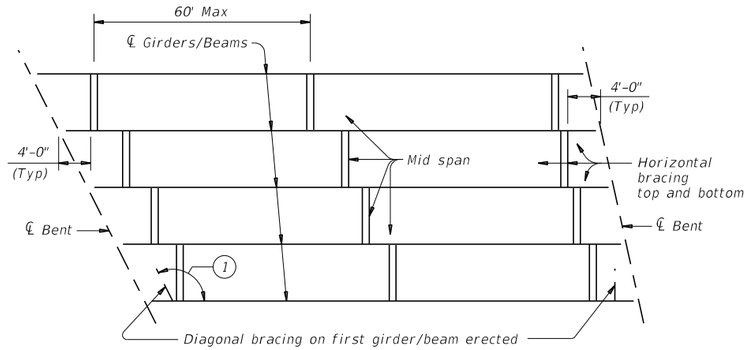
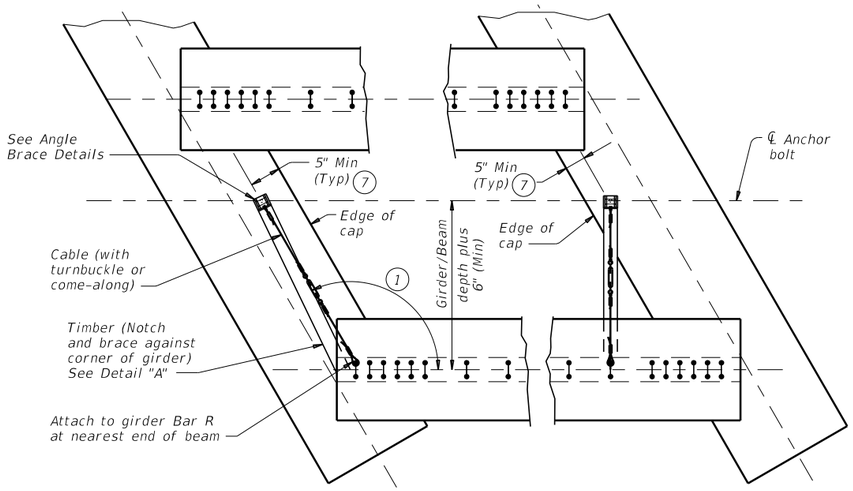
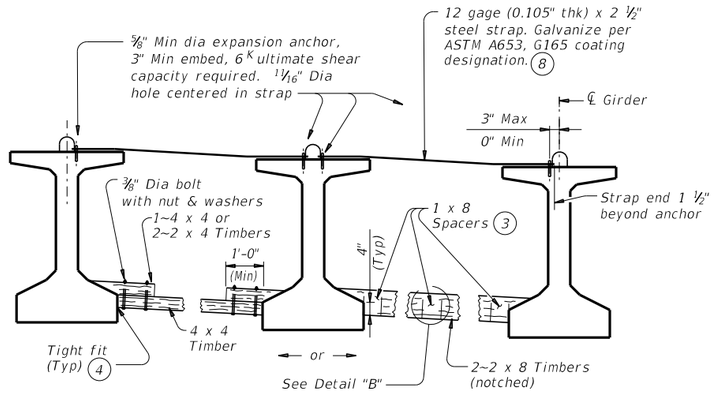


ERECTION BRACING

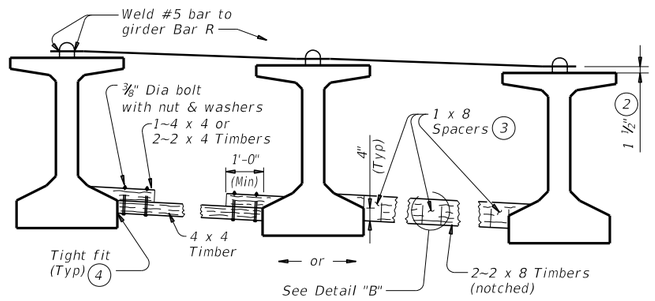


PLAN



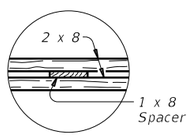
FOR ERECTION BRACING, OPTION 1

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



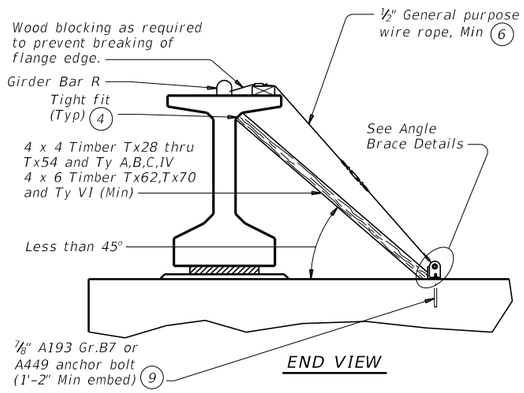
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS 5



PLAN

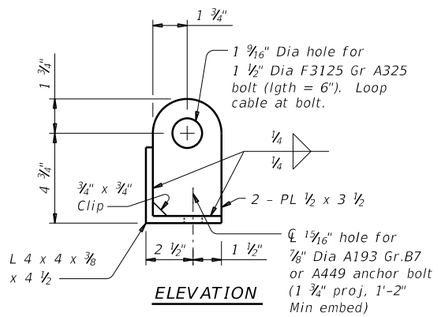
DETAIL "B"



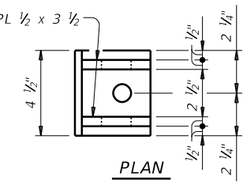
END VIEW

DIAGONAL BRACING DETAILS 5

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



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

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

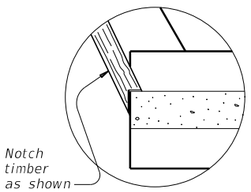
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

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



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst 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.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		118

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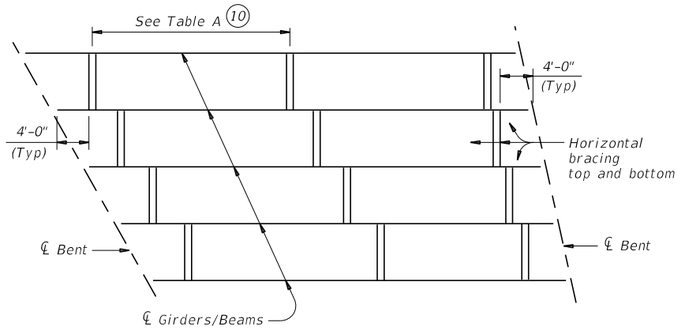


SLAB PLACEMENT BRACING

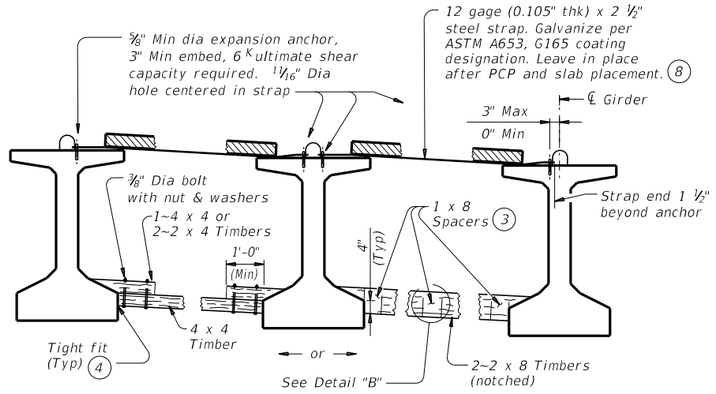
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

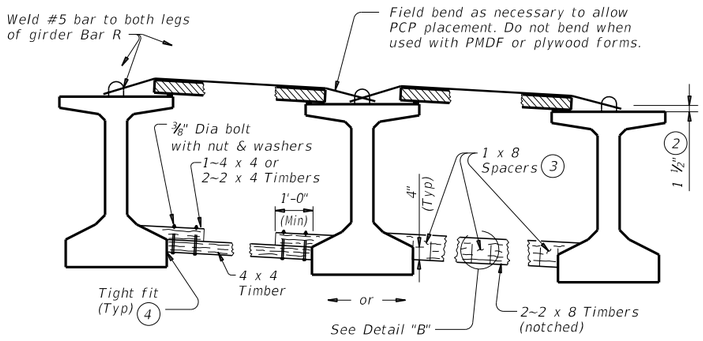
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

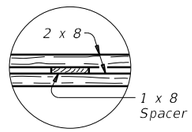
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



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 (¼ and ⅛ 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".

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		119

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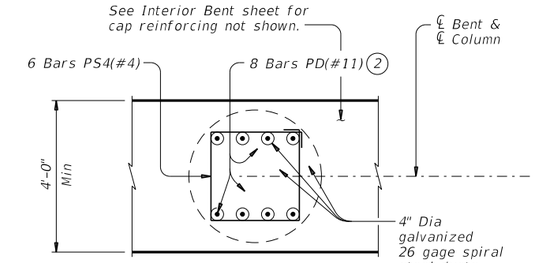
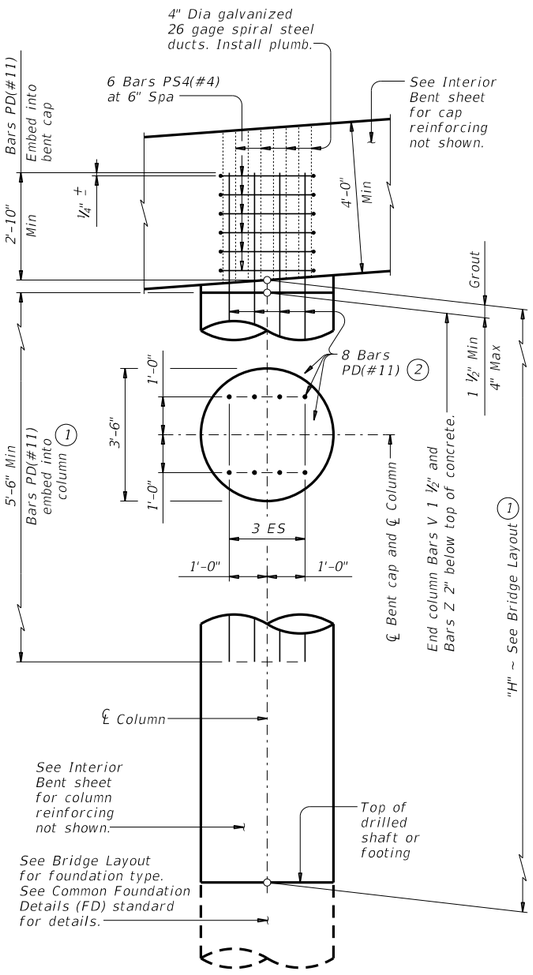
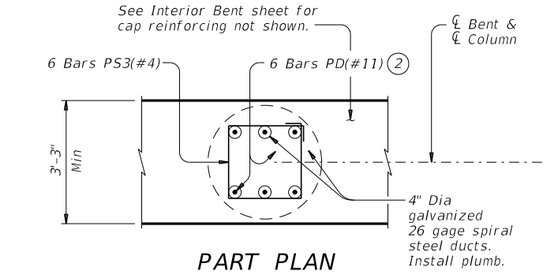


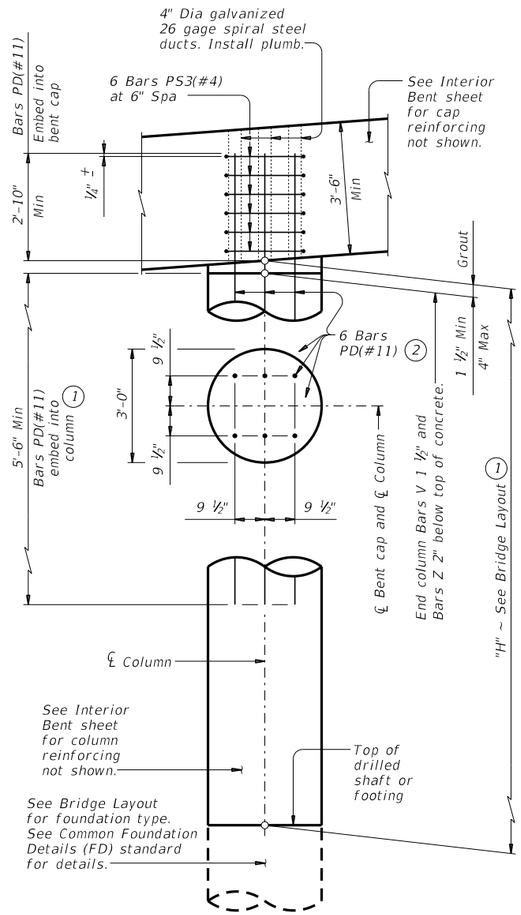
PART PLAN
(42" Dia Column)



PART ELEVATION
(42" Dia Column)



PART PLAN
(36" Dia Column)



PART ELEVATION
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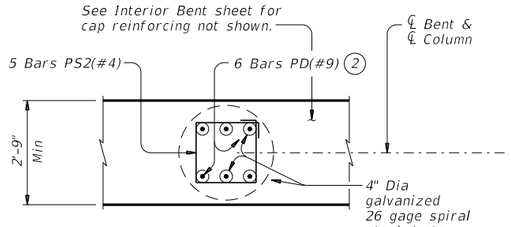
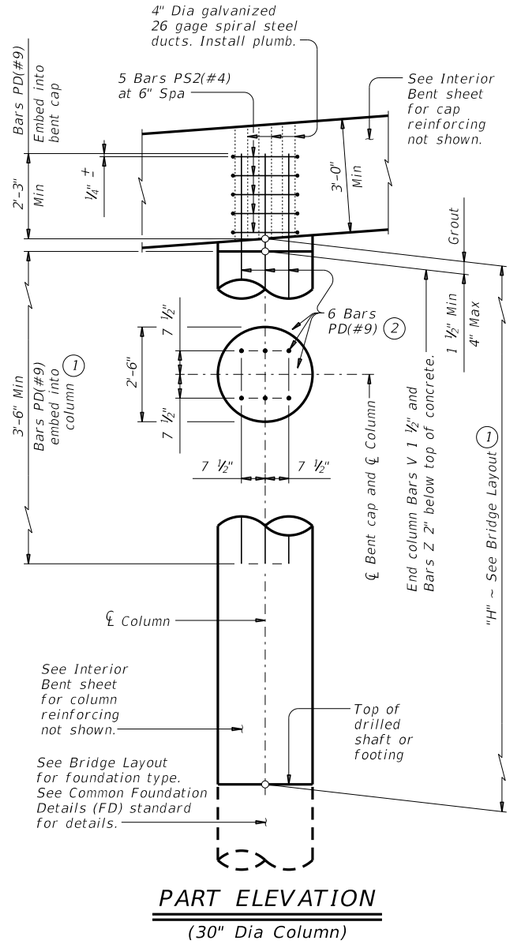
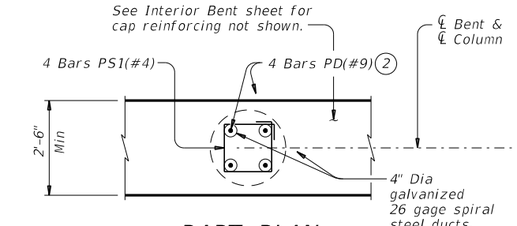


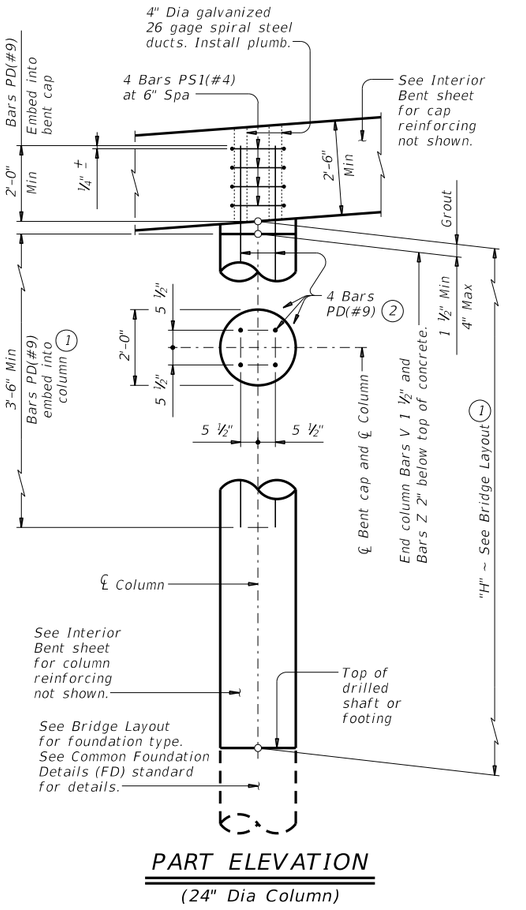
PART PLAN
(30" Dia Column)



PART ELEVATION
(30" Dia Column)



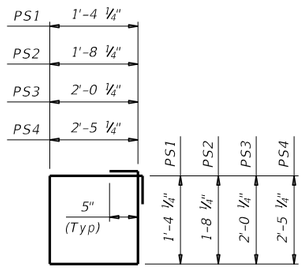
PART PLAN
(24" Dia Column)



PART ELEVATION
(24" Dia Column)

(1) Bars PD may need to be embedded in footing or drilled shaft for short columns.

(2) Location tolerance of dowels in columns/drilled shafts is ½" from plan location, transversely and longitudinally.



BARS PS (#4)

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

PBC-RC

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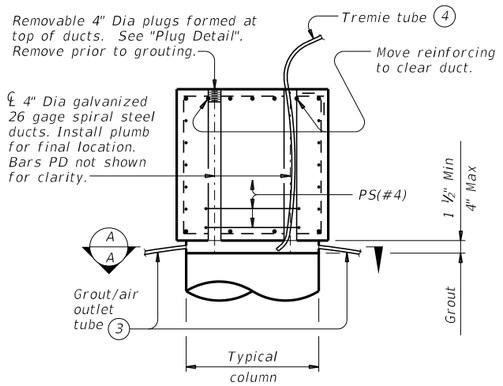
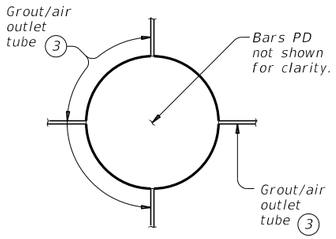
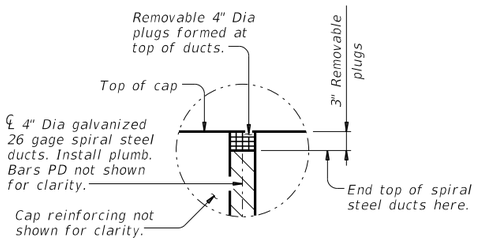


TYPICAL SECTION THRU CAP

(Showing example of ducts and cap reinforcing.)

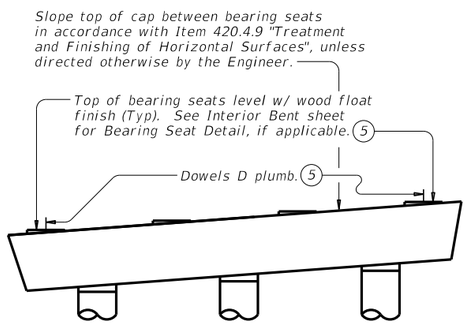


SECTION A-A

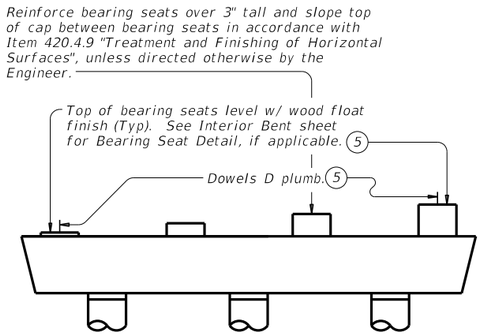


PLUG DETAIL

(Plug is used to keep concrete out of ducts during concrete placement. Remove prior to grouting)



CAP SET AT SLOPE



CAP SET LEVEL

EXAMPLES OF PRECAST BENTS WITH DOWELS D

(3) Provide at least 4 grout/air outlet tubes equally spaced around the perimeter of the column. Install at bottom of cap to avoid air entrapment. Seal off tubes sequentially when a steady flow of grout without air occurs. Secondary tubes to help drain water, located at top of column, may also be installed.

(4) Continuous gravity-flow grouting through a tremie tube is recommended. With this method, lower a flexible tremie tube through one of the vertical ducts to the bottom of the bedding layer and fill the connection from the bottom upward with a continuous flow of grout. This method requires a sufficient amount of grout to be mixed prior to grouting and that the funnel connected to the tremie tube have adequate volume capacity (4 quarts Min is recommended). A valve may be used to stop the flow during grouting to allow refilling the funnel or to tamp the grout. The tube should remain within the grout and gradually withdrawn as the level of the grout rises in the ducts. It is critical to ensure a continuous flow of grout to avoid air entrapment. Alternative methods, including pressure grouting with low pressure pumps, may be used provided they are proved effective in providing void-free connections during the mock-up phase.

(5) Unless otherwise shown.

CONSTRUCTION NOTES:

Cap Fabrication:

Construct and cure cap in accordance with Item 420, "Concrete Substructures". If fabricated at an offsite location, construct and cure cap in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Secure ducts to prevent their movement during concrete placement. Location tolerance of ducts is ½" from plan location, transversely and longitudinally. Seal ducts to prevent intrusion of concrete.

Bearing seats may be precast with the cap. Bearing seats over 3" in height must be reinforced as per Item 420.4.9. Do not locate lift points at bearing seats if bearing seats are precast.

Cap concrete must achieve a compressive strength of 2,500 psi prior to lifting. Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Do not stack caps. Caps that become cracked or otherwise damaged may be rejected.

Cap-to-Column Connection:

Make a trial batch of grout using the same material, equipment and personnel to be used for actual grouting operations and grout a mock-up of the connection at least one week before grouting and in the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids. Field test the trial batch grout to the same level required for the actual grouting.

Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to grouting. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.

Surfaces in contact with grout must be clean and in a saturated, surface-dry condition, immediately prior to grouting. Provide water tight forms. Fill the forms with water and drain just prior to grouting. Ponding or free-standing water is not permitted. Use compressed air to blow out excess water.

Mix grout in accordance with the manufacturer's directions. Evidence of frothing, foaming, or segregation is cause for rejection. Transport grout from mixer to final location by wheel barrow, bucket or pumping.

Perform sampling and testing of grout by trained personnel at the Contractor's expense and while witnessed by the Engineer. Grouted connections must be free of voids.

Trowel finish top surface of cap anchorage ducts flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

Friction collars may be removed, if used, and beams placed on the cap after the grout obtains a compressive strength of 2,500 psi. Subsequent loading can occur when the grout reaches its final required 28 day compressive strength.

MATERIAL NOTES:

Provide a pre-qualified grout from TxDOT's Material Producer List "Cementitious Grouts and Mortars for Miscellaneous Applications", conforming to DMS-4675.

Provide semi-rigid spirally crimped, corrugated duct of galvanized, cold rolled steel conforming to ASTM A653. Corrugations must have a minimum amplitude of 0.094".

Grout tubes and forms must be approved prior to grouting.

Provide Grade 60 reinforcing steel. Epoxy coat or galvanize all reinforcement if column reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

The Contractor has the option to provide precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses precast caps.

Submit shop drawings of precast caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.

Precast Concrete Bent Cap Option shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

See Interior Bent sheet for details and notes not shown.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

PBC-RC

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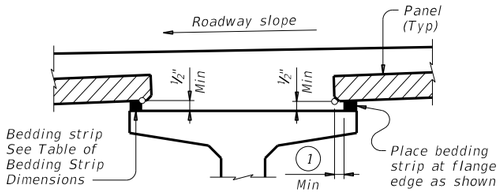
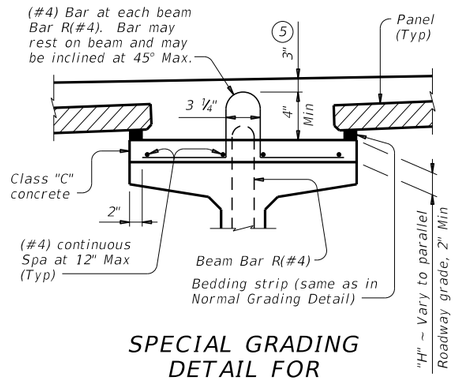


NORMAL GRADING DETAIL (3)

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



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

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

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" 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 ¼" 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 ¼". 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.

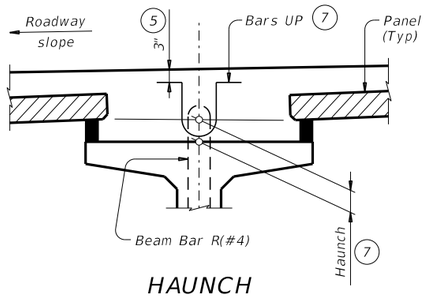
(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(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 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

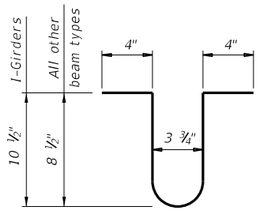
(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

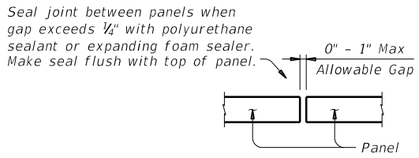


HAUNCH REINFORCING DETAIL

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

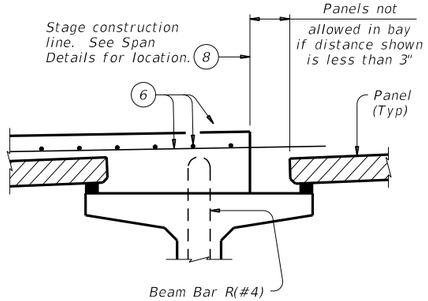


BARS UP (#4) (7)

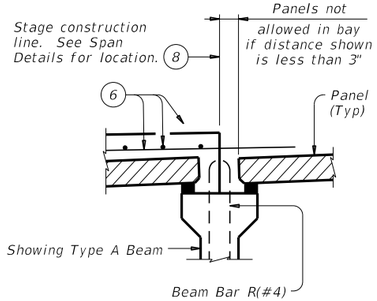


PANEL JOINTS

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



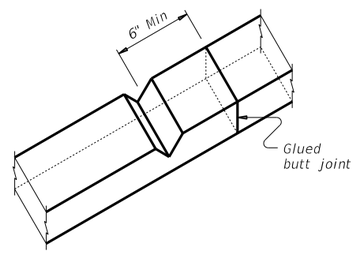
PRESTR CONC I-GIRDERS



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 ½" 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 ½". 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 reinforcement 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

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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	DIST	COUNTY		SHEET NO.
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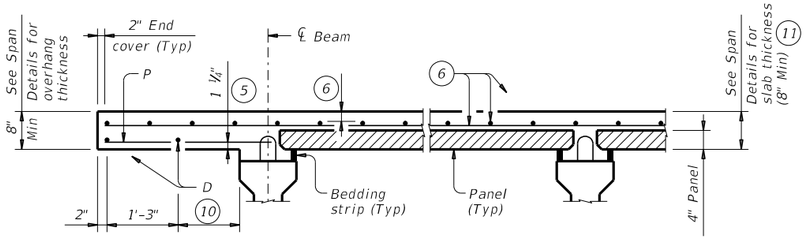
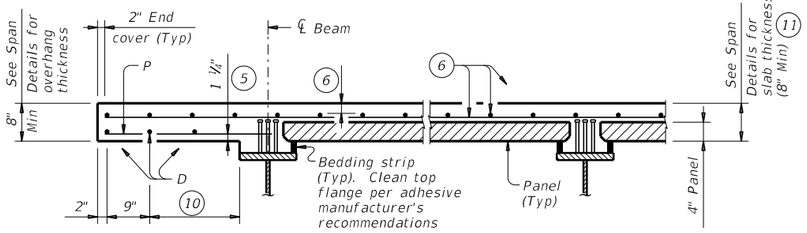
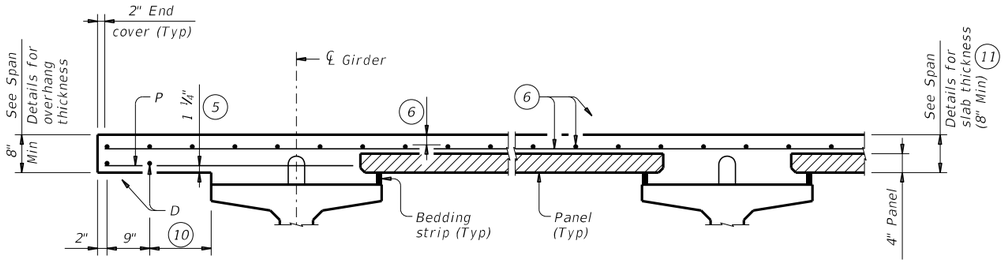


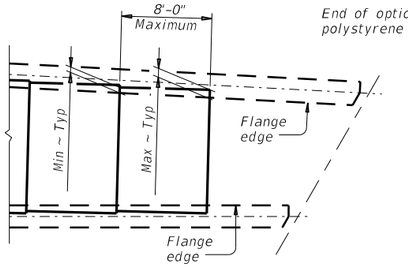
PRESTRESSED CONCRETE I-BEAMS



STEEL BEAMS

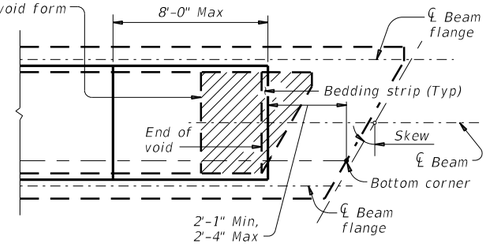


PRESTRESSED CONCRETE I-GIRDERS

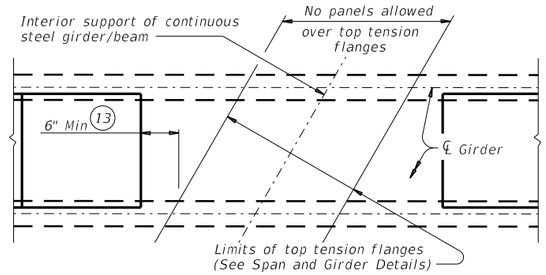


AT FLARED BEAMS OR GIRDERS

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



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

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.

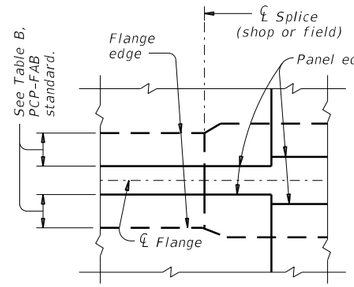
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(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.

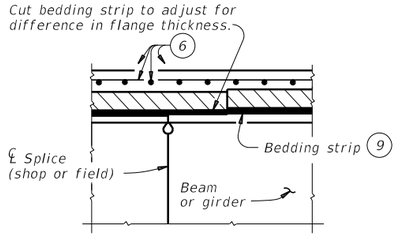
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



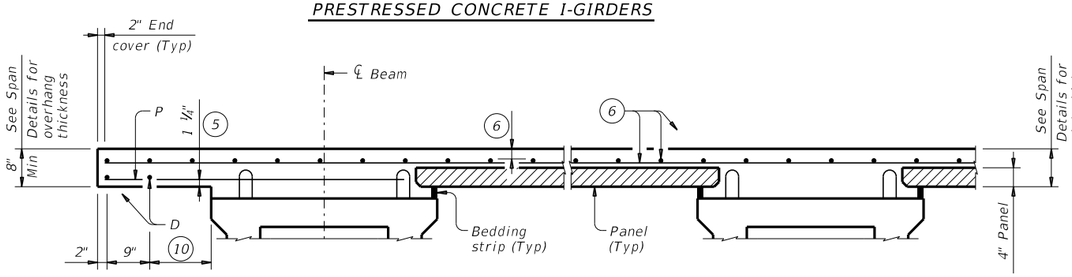
PLAN AT SPLICE

(Showing steel beams with flange width transition)

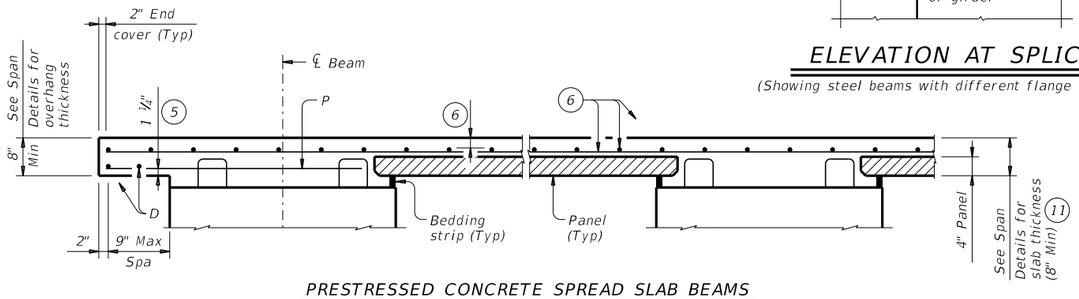


ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)

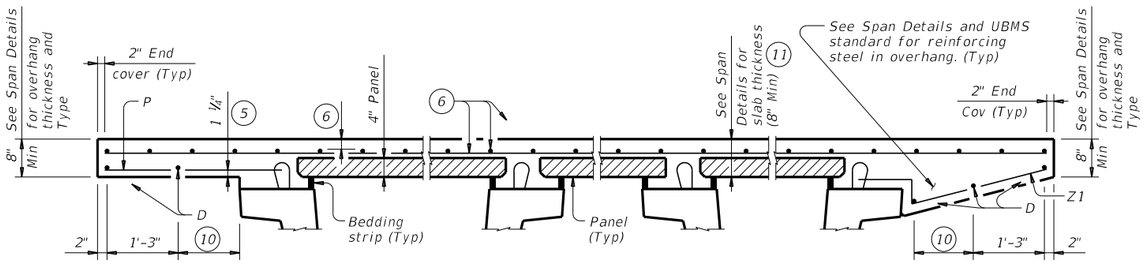


PRESTRESSED CONCRETE X-BEAMS



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

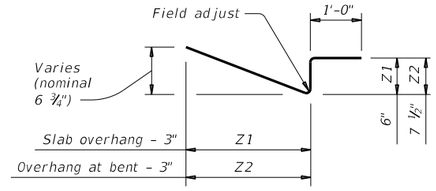
Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



BARS Z (#4) (12)

HL93 LOADING SHEET 2 OF 4

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PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	BRY	BURLESON		123

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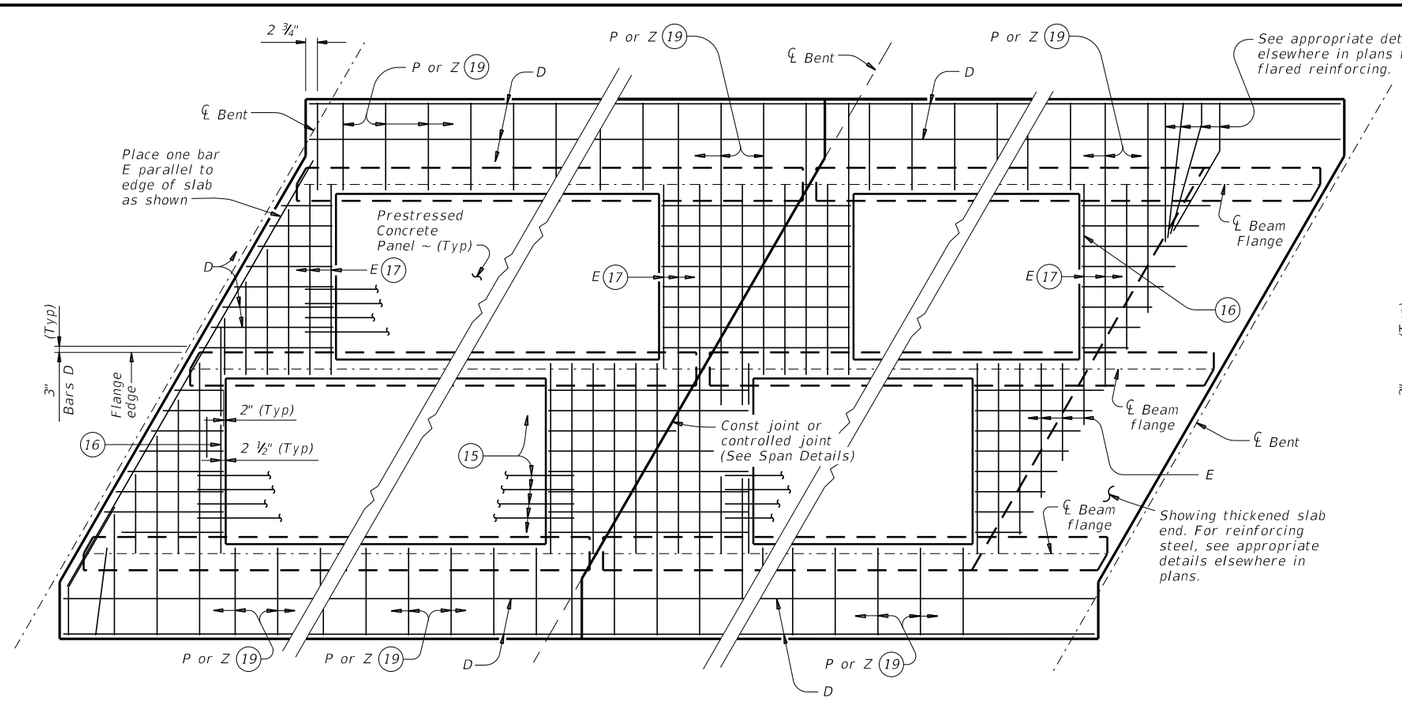
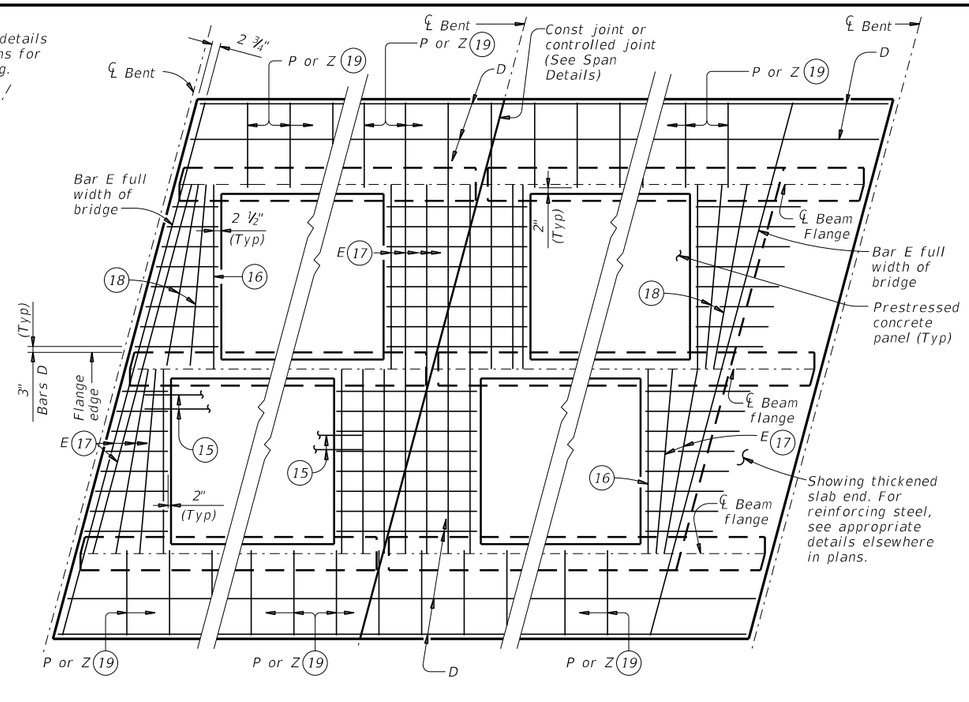


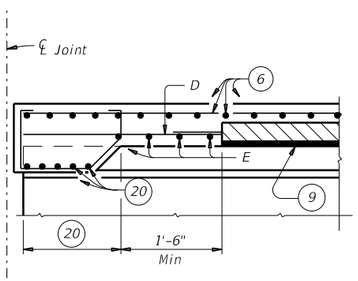
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

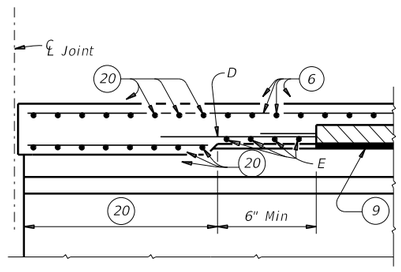


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

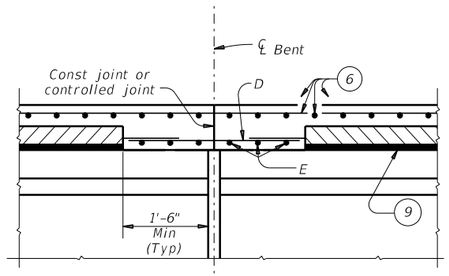
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



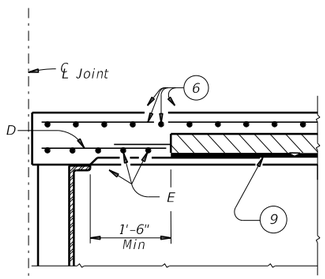
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



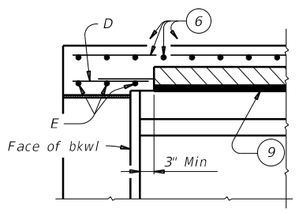
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



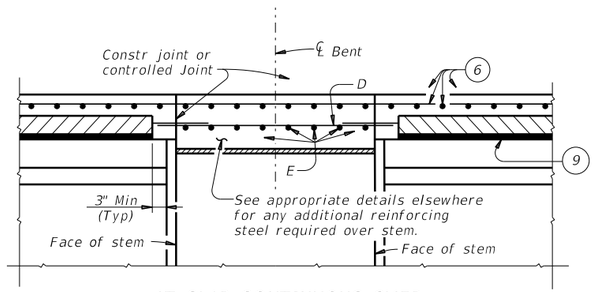
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



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 ¼" 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

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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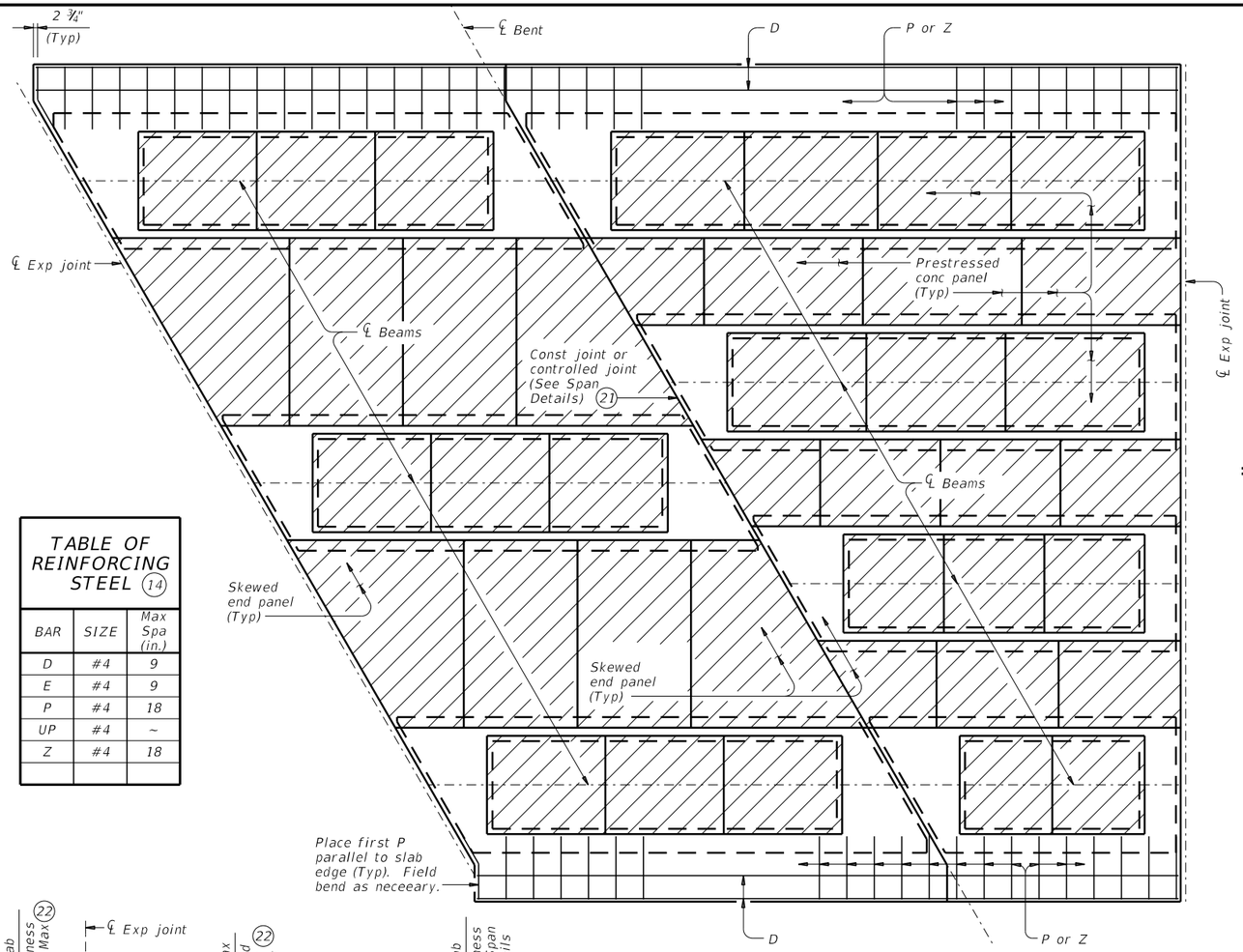
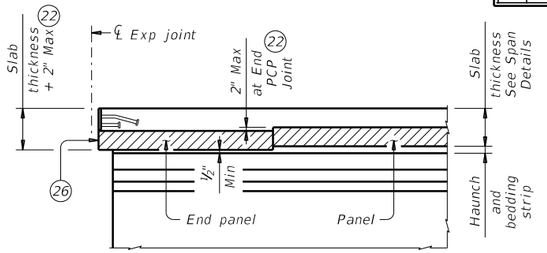


TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

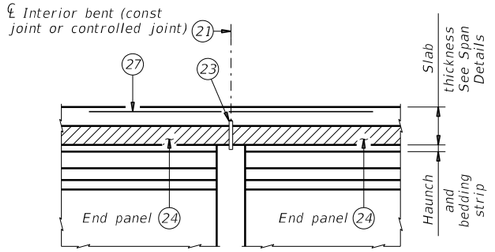
OPTION 2 ~ PLAN OF SLAB

(Showing U-Beams; other beams similar)



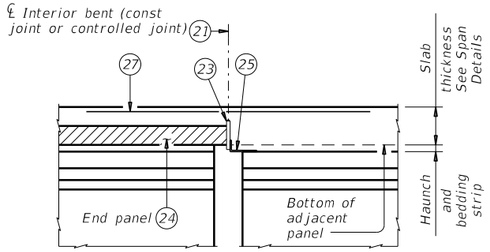
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



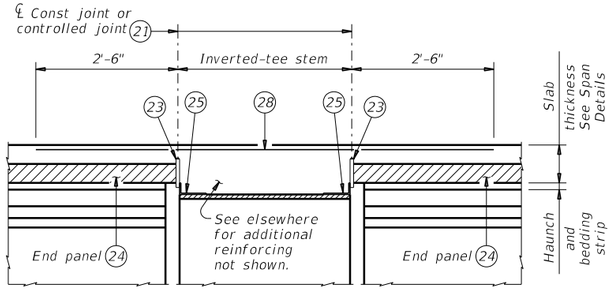
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

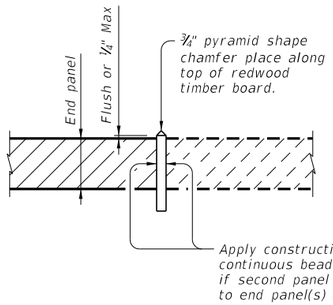
Panel against beam/girder end in adacent span.



INVERTED-T BENT

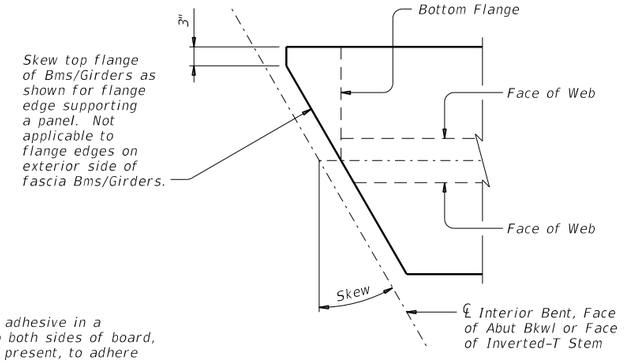
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



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

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

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" 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 ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" 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 ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened 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 ½".

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 0A from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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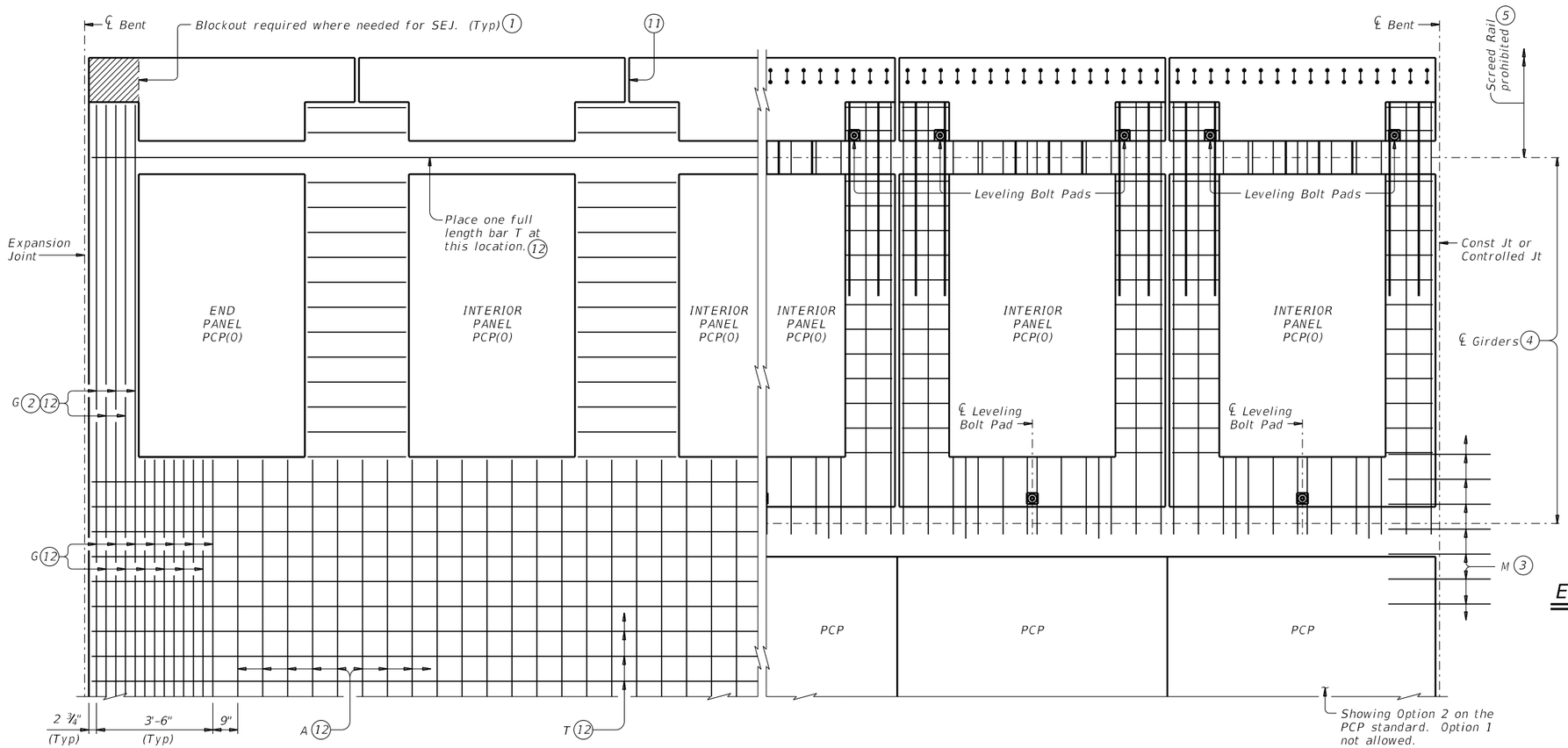


SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

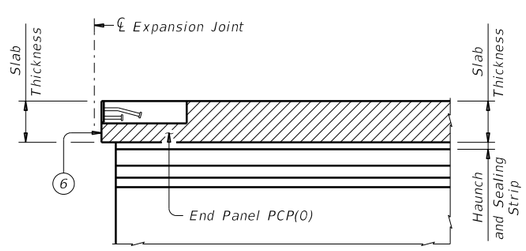
SHOWING PCP(O) EXPOSED REINFORCING STEEL

Field placed bars M shown for clarity.

PANEL LAYOUT

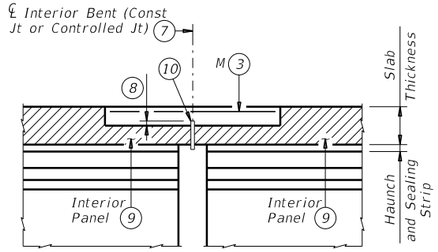
PCP(O) shown with gaps between panels for clarity.
The gap cannot be considered as a panel fabrication tolerance.

1. 1'-4" x 1'-6" x 4 ½" 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 ½" 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, ¾" Max, support as necessary.
9. Place panel within ½" of ¾" thick board.
10. ¾" thick wood/timber board, leave in place. Place straight, within ¼" 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 ½" End Cover. (Typ)



EXPANSION JOINT

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

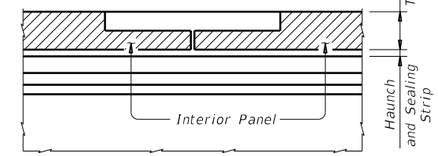


CONST JT OR CONTROLLED JT

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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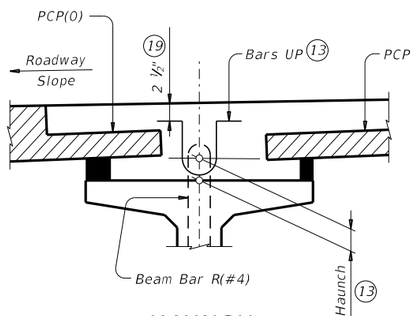
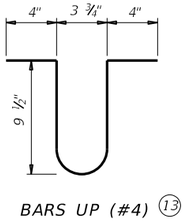


HAUNCH REINFORCING DETAIL (4)



BARS UP (#4) (13)

(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 ½" End Cover on bars. (Typ)

(13) Space bars UP(#4) with girder bars R(#4) in all areas where measured haunch exceeds 3 ½" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.

(14) 6" plus or minus.

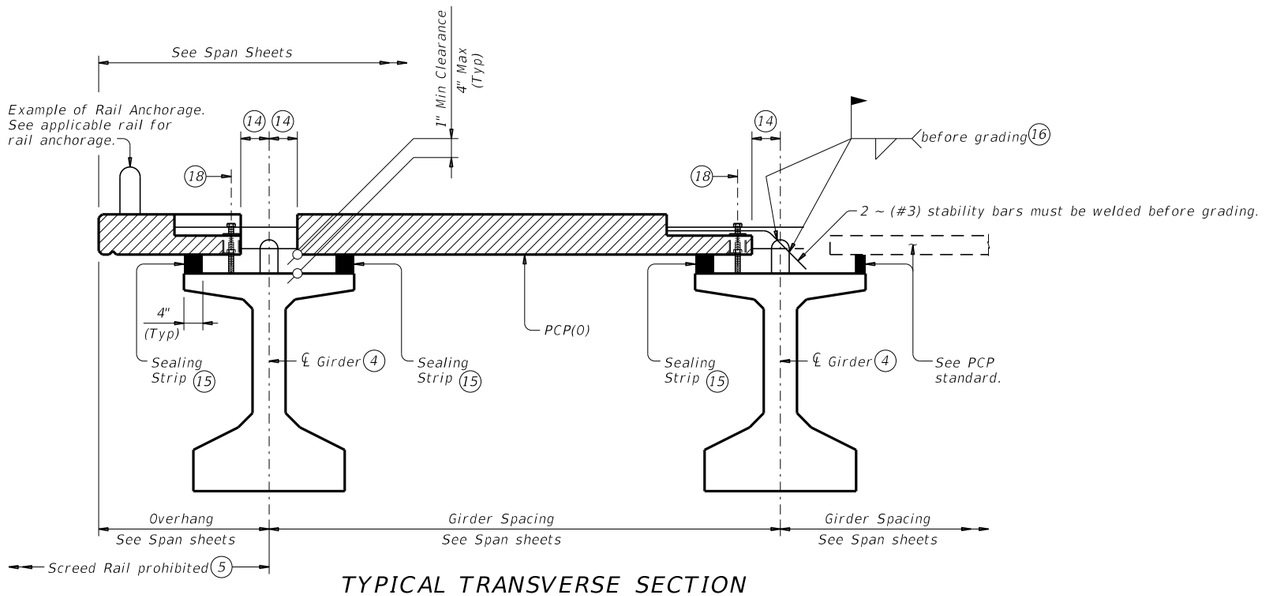
(15) Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and 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 ½" 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)

BAR TABLE		
BAR	SIZE	MAX SPA (IN)
A (12)(17)	#4	9"
G (12)(17)	#4	3½"
M	#4	9"
T (12)(17)	#4	9"

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(O)

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REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		127

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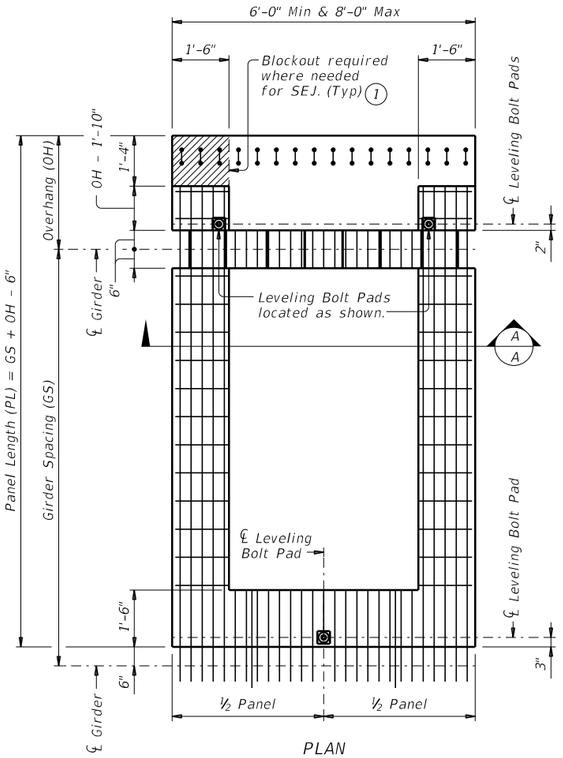
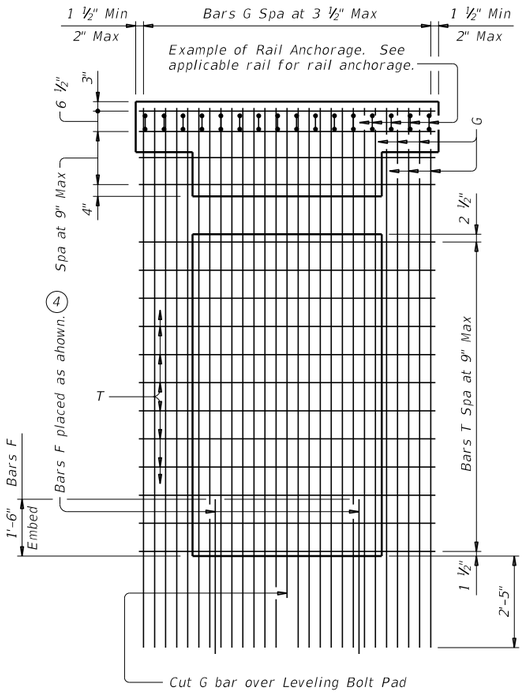
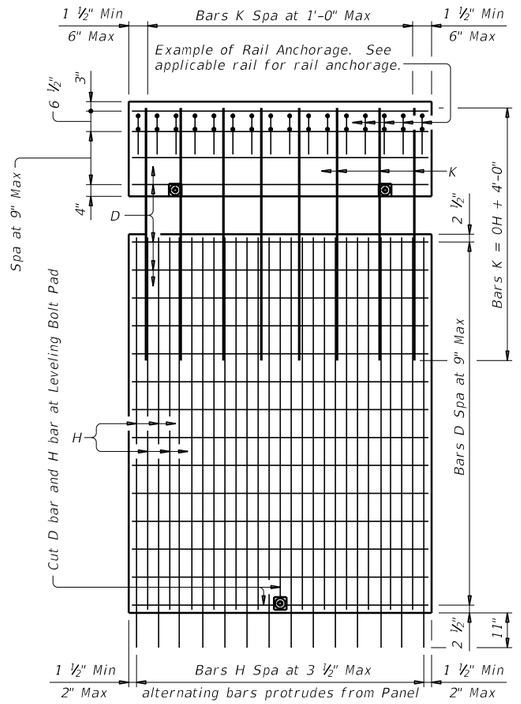


PLAN



TOP REINFORCING STEEL

END 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

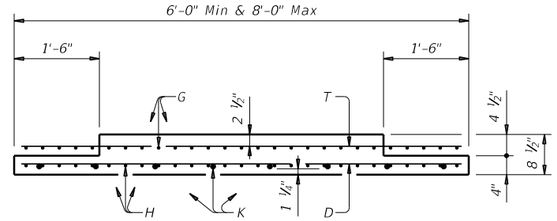
(1) 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.

(2) 1 ½" End Cover on bars. (Typ)

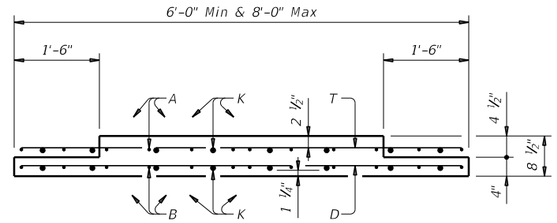
(3) Bars that are not allowed to have lap splices.

(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



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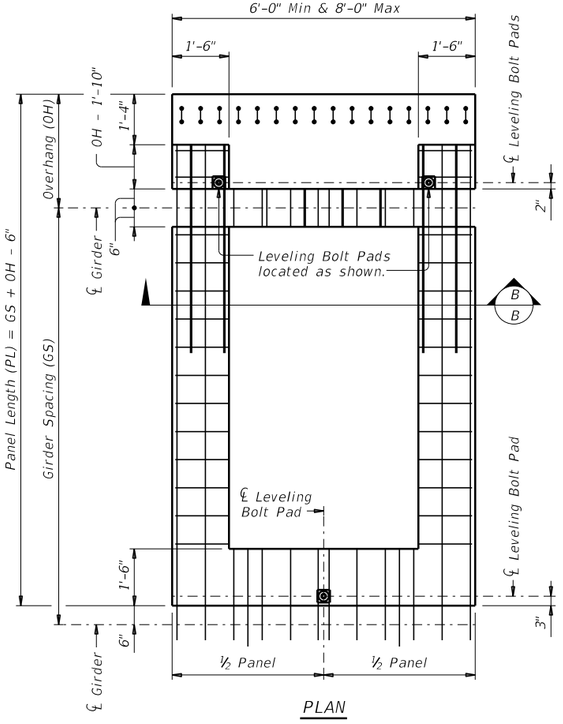

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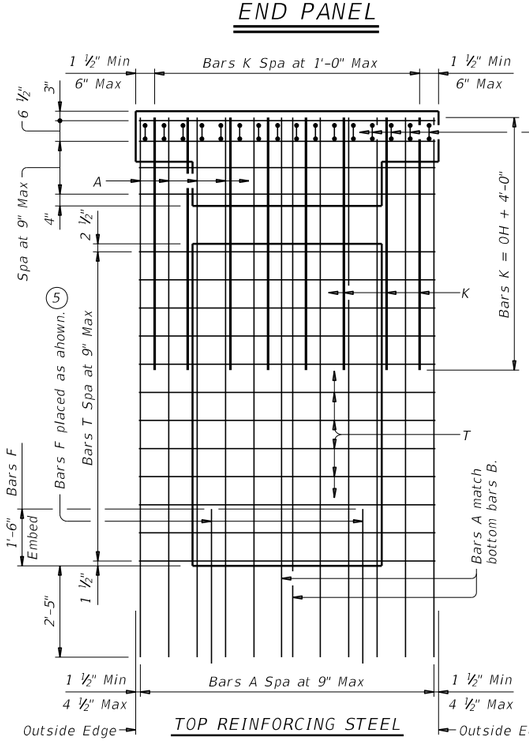
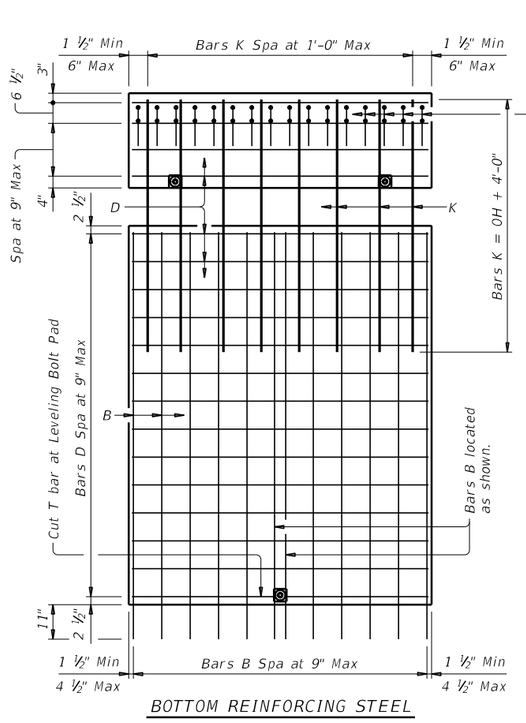


TOP REINFORCING STEEL

INTERIOR PANEL



BOTTOM REINFORCING STEEL

HL93 LOADING

Texas Department of Transportation

Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

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	BRY	BURLESON		128

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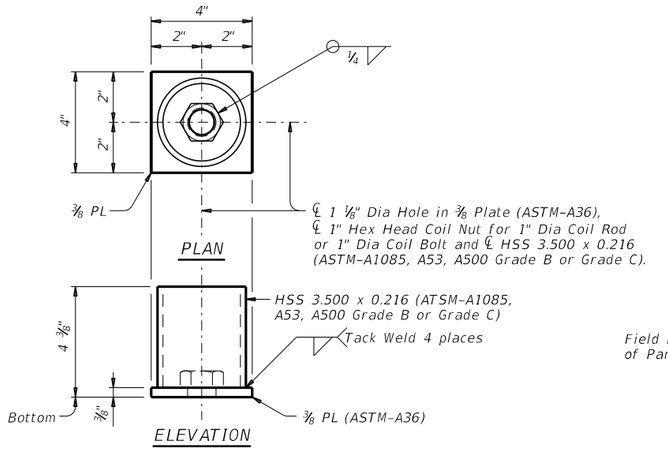
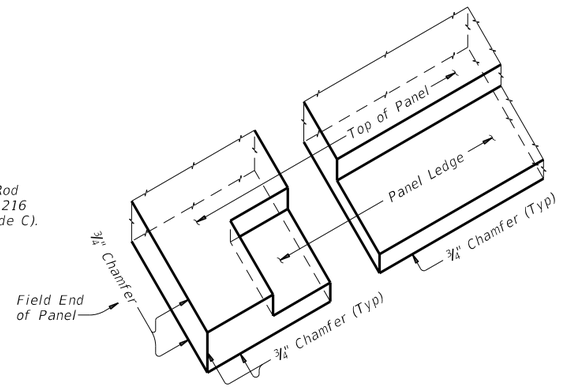


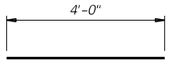
LEVELING BOLT PAD DETAILS

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

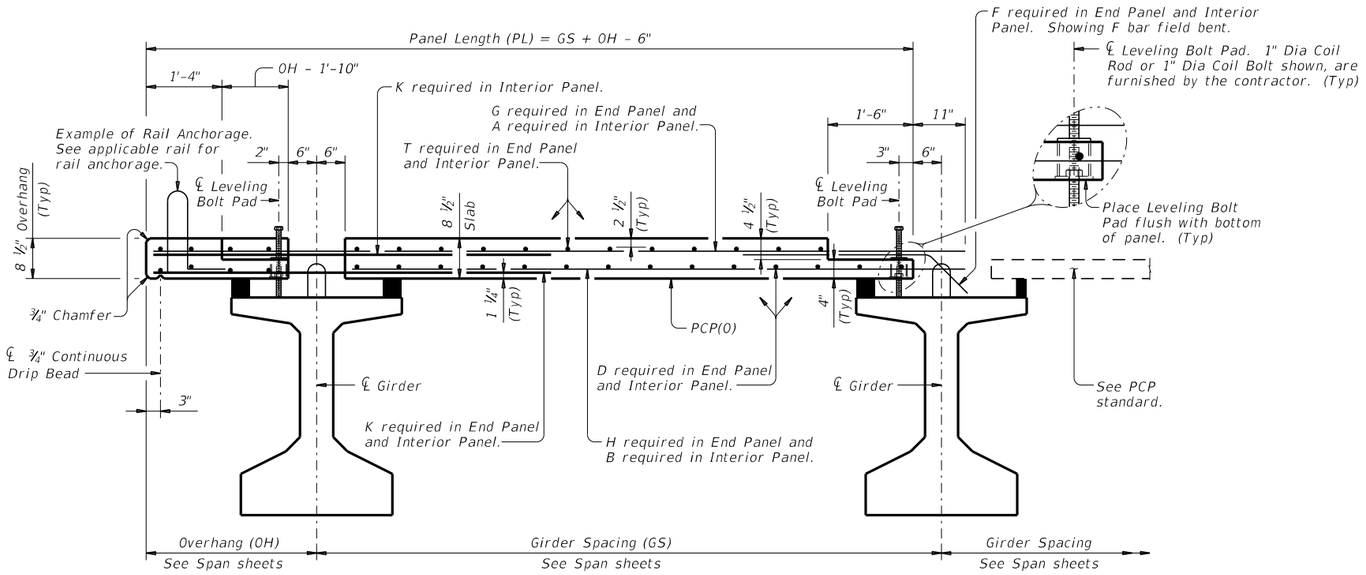


ISOMETRIC VIEW AT CORNER OF PANEL

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 ¾" 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.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

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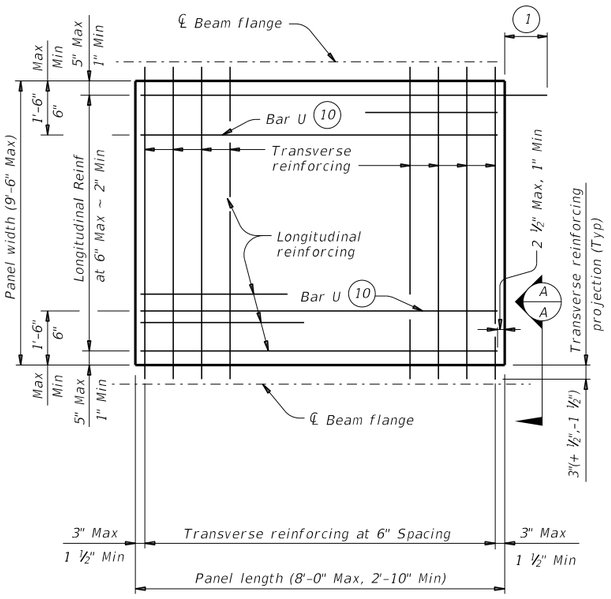
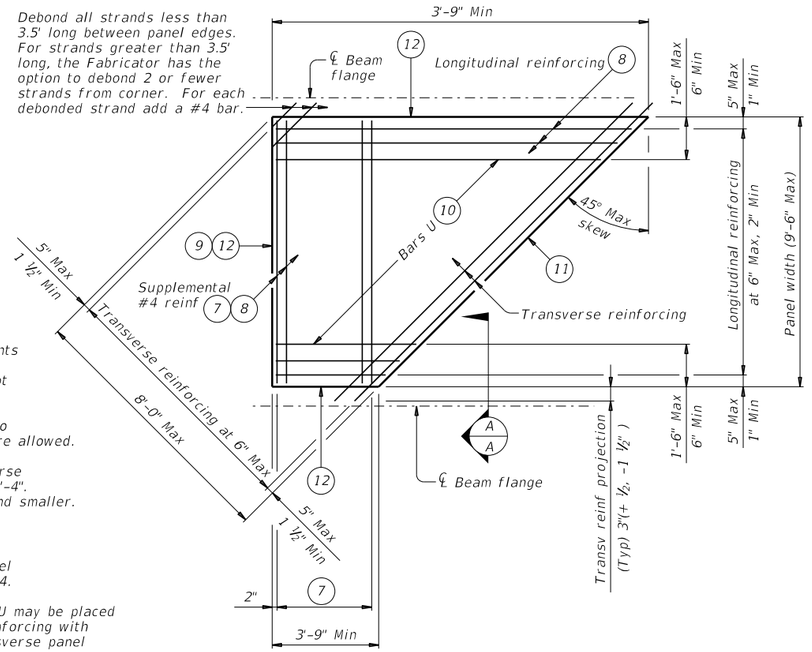


TYPICAL NON-SKEWED PANEL PLAN



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. ⅜" or ½" 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 ½" 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.

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

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 ¾" 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 ⅜" or ½" 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 ⅜" or ½" 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.

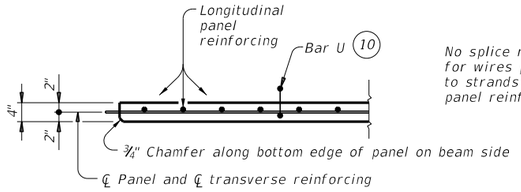
LONGITUDINAL PANEL REINFORCEMENT:

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. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

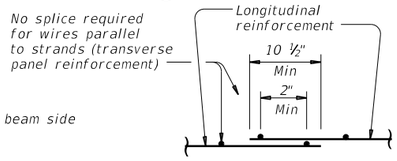
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

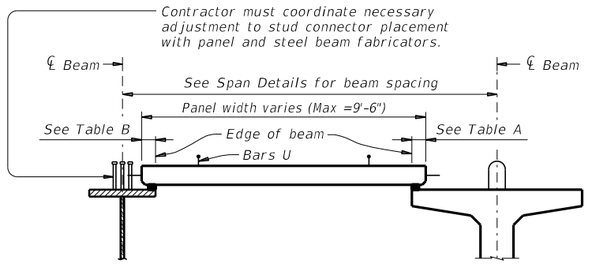


SECTION A-A

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



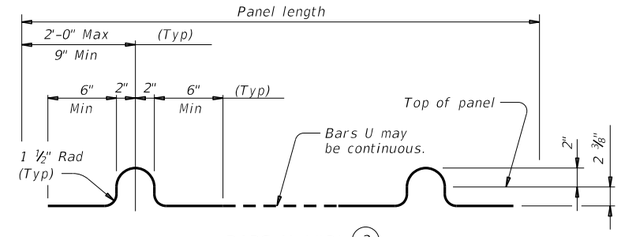
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



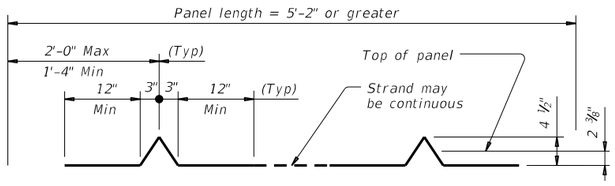
STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

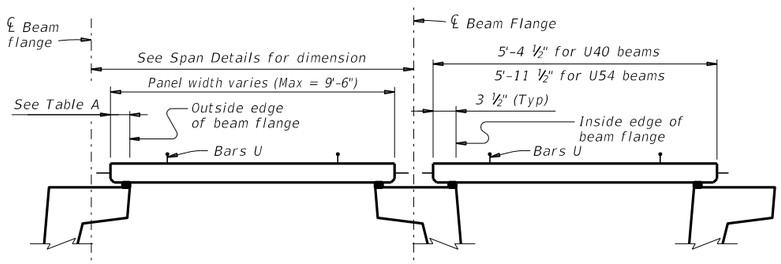
Typ unless noted otherwise



BARS U (#3) (2)



OPTIONAL STRAND FOR BARS U (3)



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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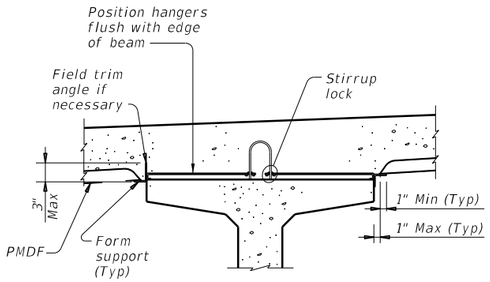
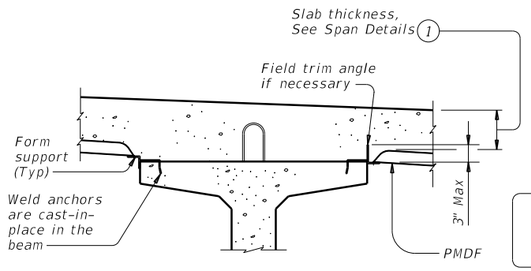


PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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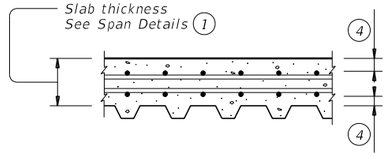
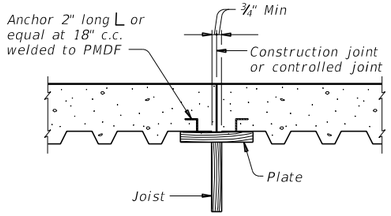
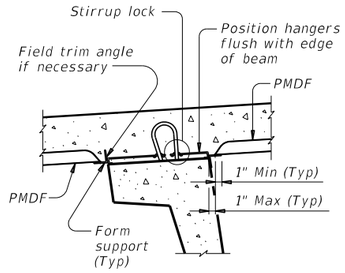


TYP LONGITUDINAL SLAB SECTION

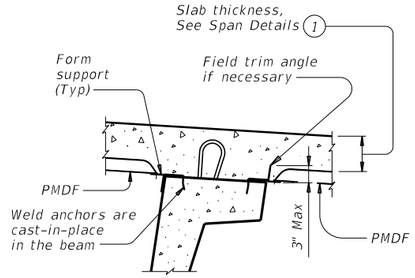


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

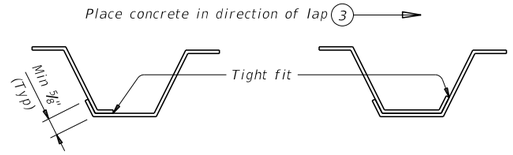
SECTION THRU CONSTRUCTION JOINT



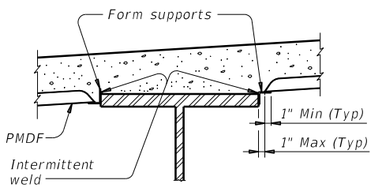
U-BEAMS WITH STIRRUP LOCKS



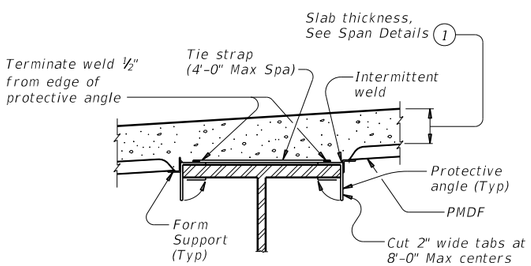
U-BEAMS WITH WELD ANCHORS



SIDE LAP DETAILS

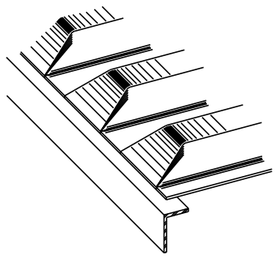


STEEL BEAMS AT COMPRESSION FLANGES



STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



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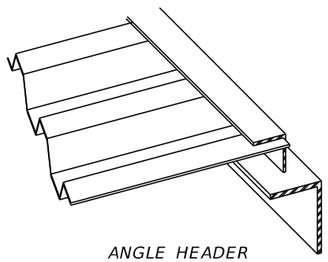

ANGLE HEADER

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

TYPES OF END CLOSURES

1. Slab thickness minus 3/8" 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.

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.

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.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	BRY	BURLESON		131

DATE: 11/22/2022 8:16:31 PM
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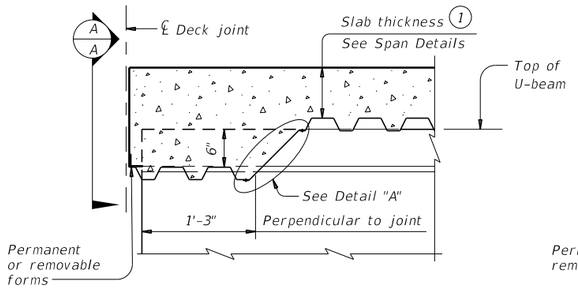
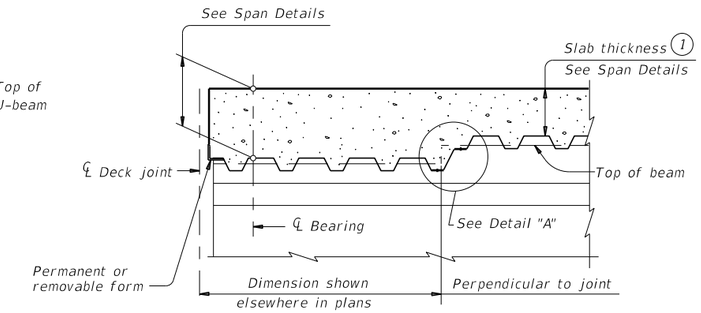
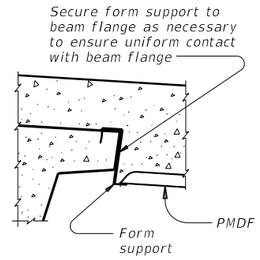


AT THICKENED SLAB END FOR U-BEAMS

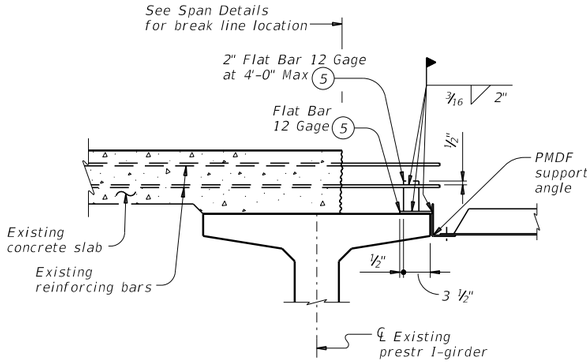


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

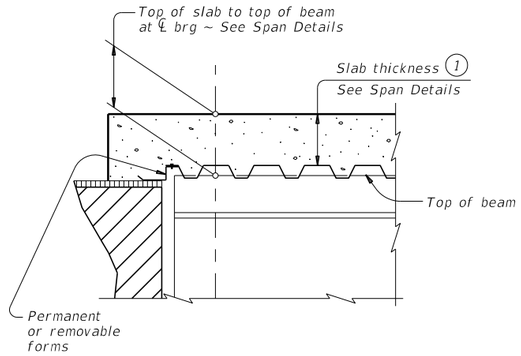
Showing I-beam block-out. No block-out for I-girders or steel beams.



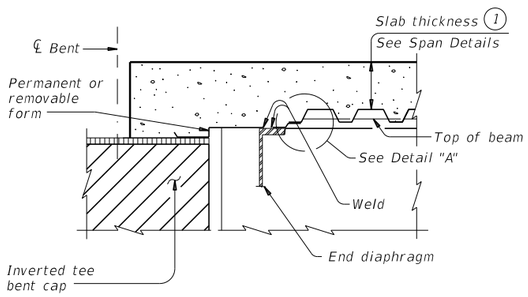
SECTION A-A



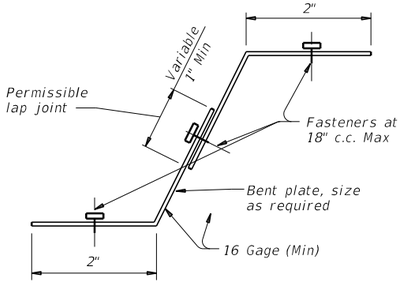
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



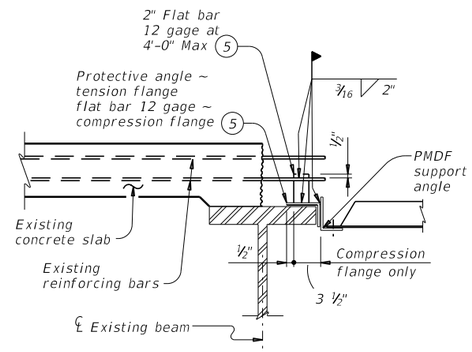
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



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

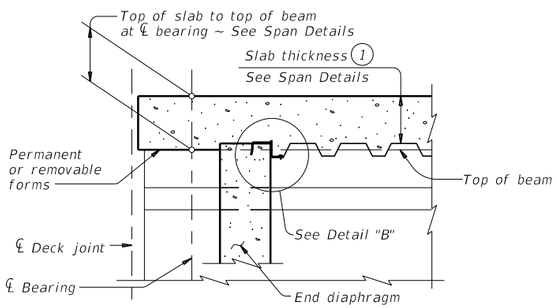


DETAIL "A"

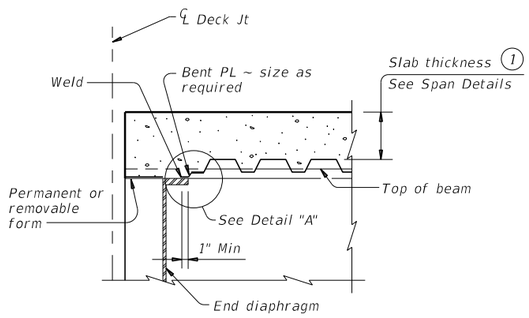


SHOWING STEEL BEAMS

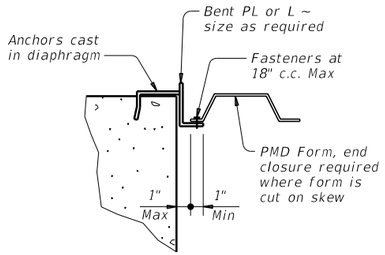
WIDENING DETAILS



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 ⅜" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	BRY	BURLESON		132

DATE: 11/22/2022 8:16:41 PM
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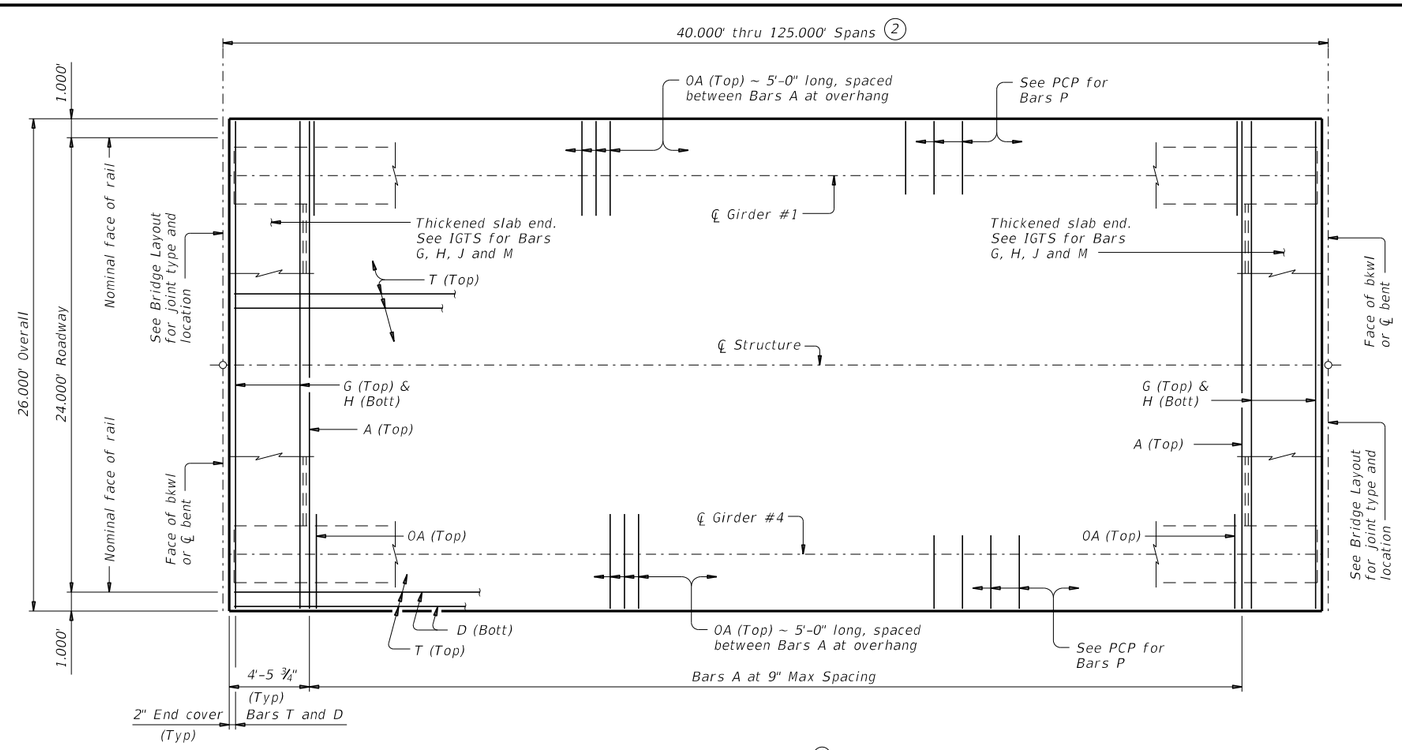


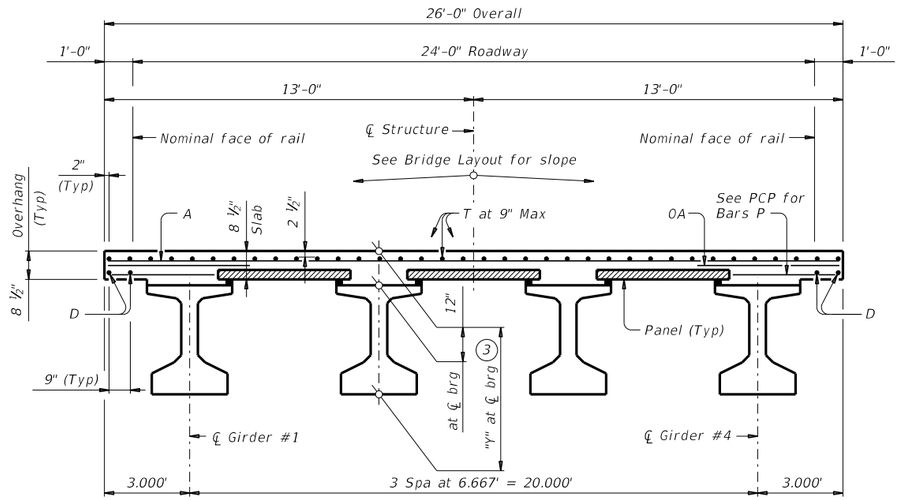
PLAN (1)

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#5
P	#4
T	#4

(1) If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see standard IGCS for adjustment to slab reinforcement and quantities.

(2) Span lengths for Prestressed Concrete I-Girder type:
Type Tx28 for spans lengths 40.000' thru 75.000'.
Type Tx34 for spans lengths 40.000' thru 85.000'.
Type Tx40 for spans lengths 40.000' thru 100.000'.
Type Tx46 for spans lengths 40.000' thru 115.000'.
Type Tx54 for spans lengths 40.000' thru 125.000'.

(3) "Y" value shown is based on theoretical girder camber, dead load deflection from an 8 ½" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve and/or if precast overhang panel (PCP(0)) option is use.



TYPICAL TRANSVERSE SECTION

(Showing girder type Tx46)

TABLE OF SECTION DEPTHS	
GIRDER TYPE	"Y" AT ℄ BRG (3)
	Ft/In
Tx28	3'-4"
Tx34	3'-10"
Tx40	4'-4"
Tx46	4'-10"
Tx54	5'-6"

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

24' ROADWAY

SIG-24

FILE: sig01sts-19.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Increased "X" and "Y" Values	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		133

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TABLE OF DEAD LOAD DEFLECTIONS

TYPE Tx28 GIRDERS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.007	0.010
45	0.012	0.017
50	0.019	0.027
55	0.028	0.040
60	0.041	0.057
65	0.056	0.079
70	0.077	0.108
75	0.102	0.143

TYPE Tx34 GIRDERS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.004	0.006
45	0.007	0.010
50	0.011	0.016
55	0.017	0.024
60	0.024	0.034
65	0.033	0.047
70	0.046	0.064
75	0.061	0.085
80	0.079	0.111
85	0.102	0.143

TYPE Tx40 GIRDERS

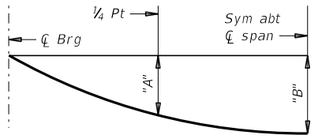
Span Length	"A"	"B"
Ft	Ft	Ft
40	0.003	0.004
45	0.005	0.007
50	0.007	0.010
55	0.011	0.016
60	0.016	0.022
65	0.022	0.031
70	0.030	0.042
75	0.040	0.056
80	0.052	0.073
85	0.066	0.093
90	0.084	0.118
95	0.105	0.147
100	0.130	0.182

TYPE Tx46 GIRDERS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.002	0.003
45	0.004	0.005
50	0.005	0.007
55	0.008	0.011
60	0.011	0.015
65	0.015	0.021
70	0.021	0.029
75	0.027	0.038
80	0.036	0.050
85	0.046	0.064
90	0.057	0.080
95	0.071	0.100
100	0.088	0.124
105	0.108	0.151
110	0.130	0.182
115	0.156	0.219

TYPE Tx54 GIRDERS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.001	0.002
45	0.002	0.003
50	0.004	0.005
55	0.005	0.007
60	0.007	0.010
65	0.010	0.014
70	0.014	0.019
75	0.018	0.025
80	0.024	0.033
85	0.030	0.042
90	0.038	0.053
95	0.047	0.066
100	0.058	0.082
105	0.071	0.100
110	0.086	0.121
115	0.103	0.144
120	0.123	0.172
125	0.145	0.203



DEAD LOAD DEFLECTION DIAGRAM

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

TABLE OF ESTIMATED QUANTITIES

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

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

(5) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and standard IGCS.

See IGTS standard for Thickened Slab End details and quantity adjustments.

See PCP and PCP-FAB for panel details not shown.

See PCP(0) and PCP(0)-FAB for precast overhang panel details if this option is used.

See IGMS standard for miscellaneous details.

See applicable rail details for rail anchorage in slab.

See PMDF standard for details and quantity adjustments if this option is used.

This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).

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

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, OA, P or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

24' ROADWAY

SIG-24

FILE: sig01sts-19.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Increased "A" and "F" Values	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		134

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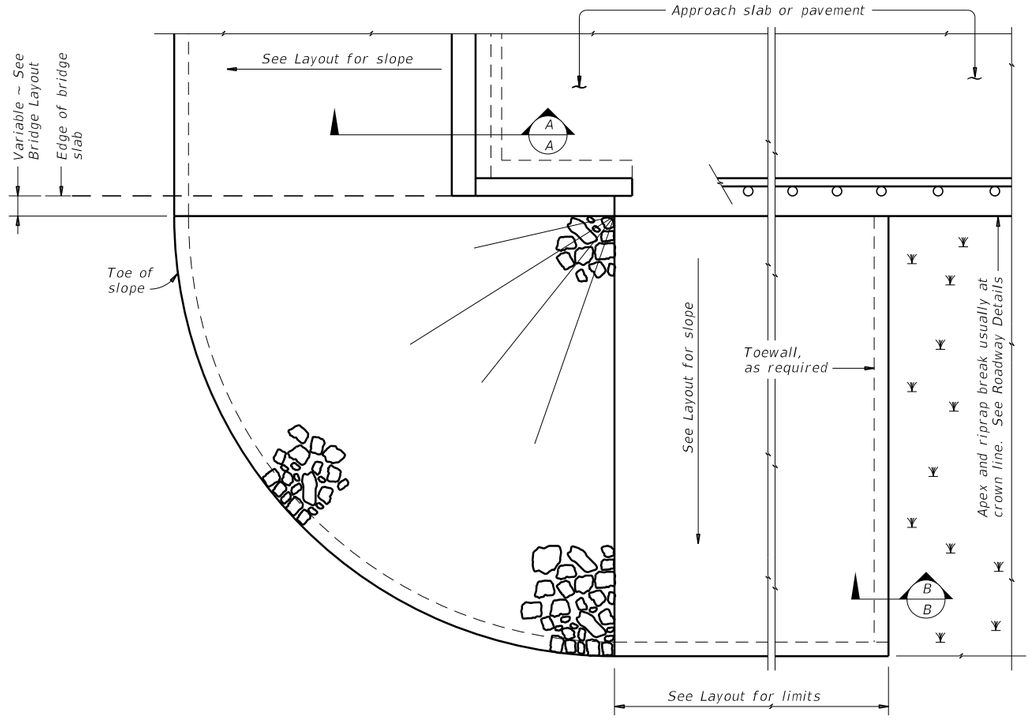
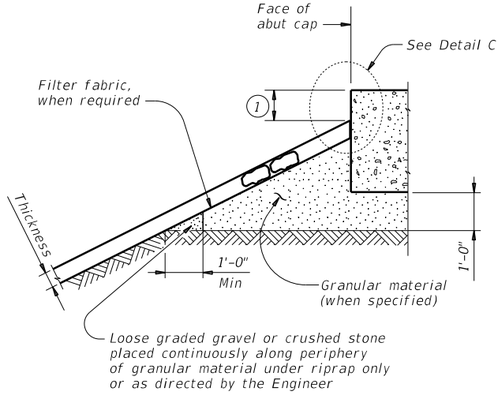
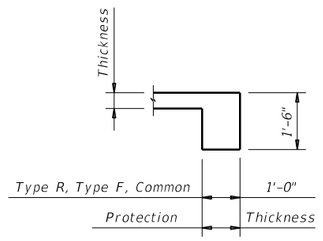


PLAN

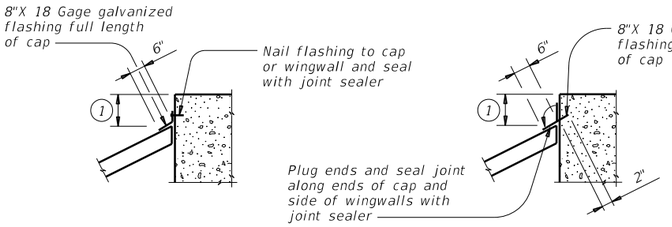


SECTION A-A AT CAP



SECTION B-B

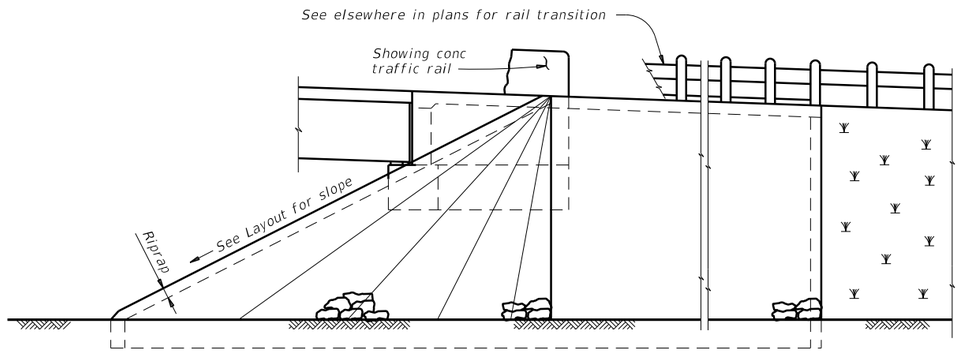
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
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	BRY	BURLESON		135

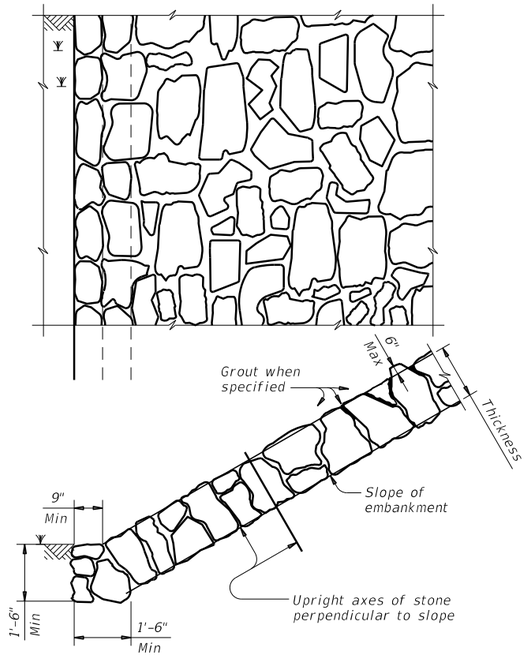


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

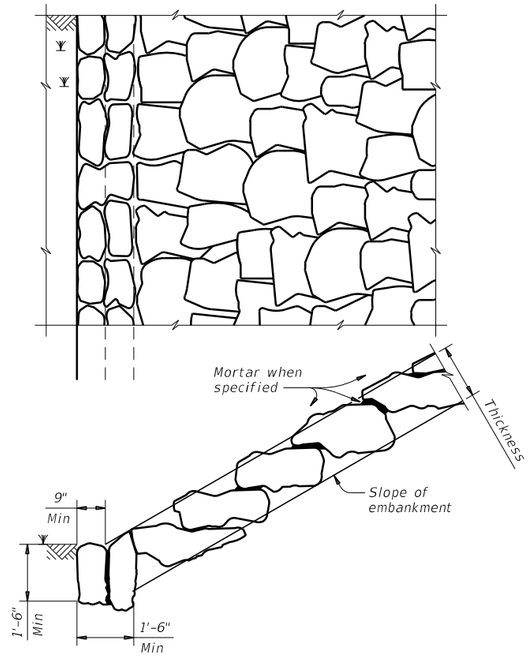


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

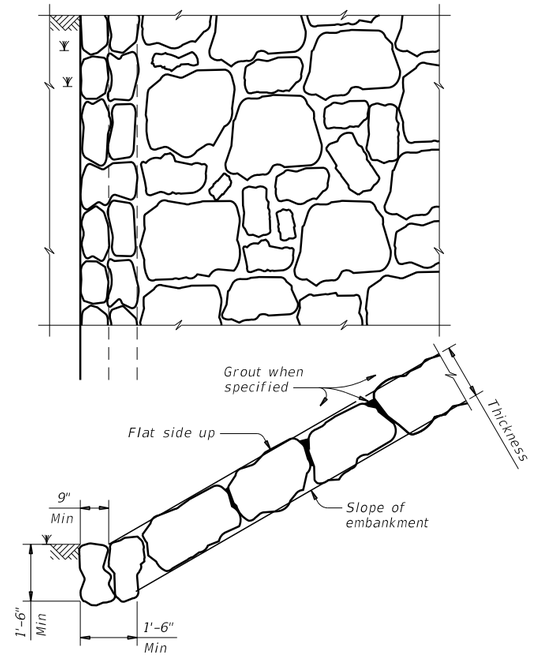


FIGURE 3 ~ TYPE F STONE RIPRAP

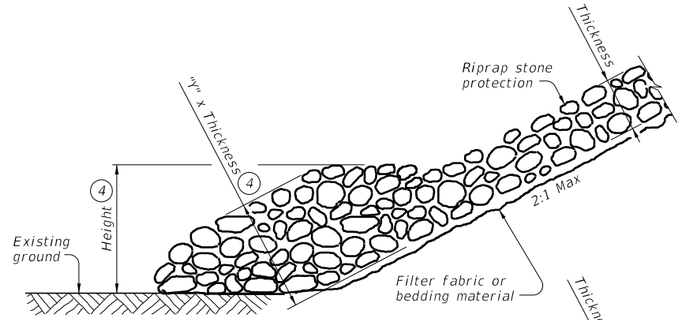
grouted

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

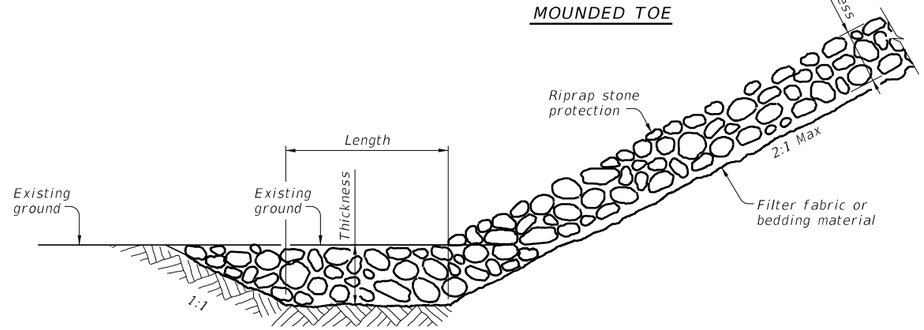
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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

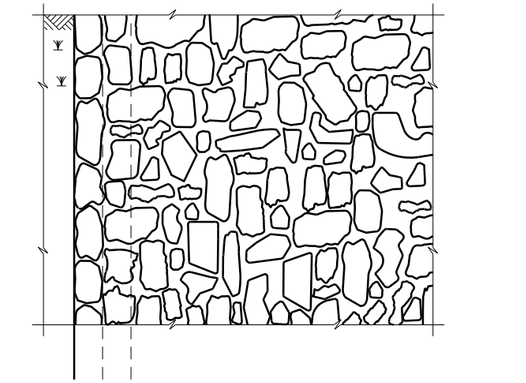


MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS 5



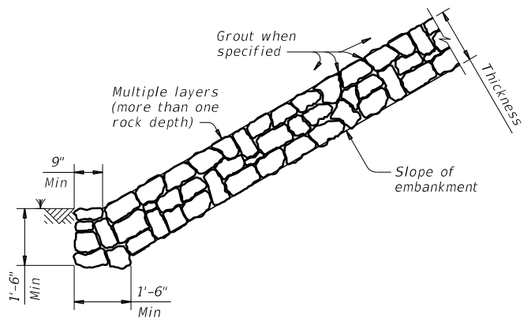
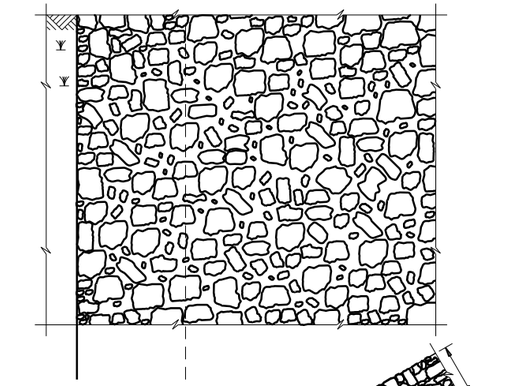


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted



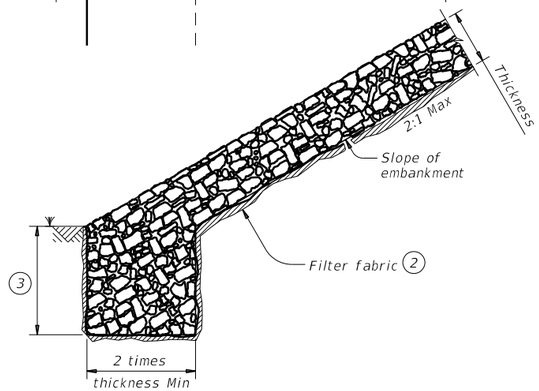


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
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	BRY	BURLESON		136

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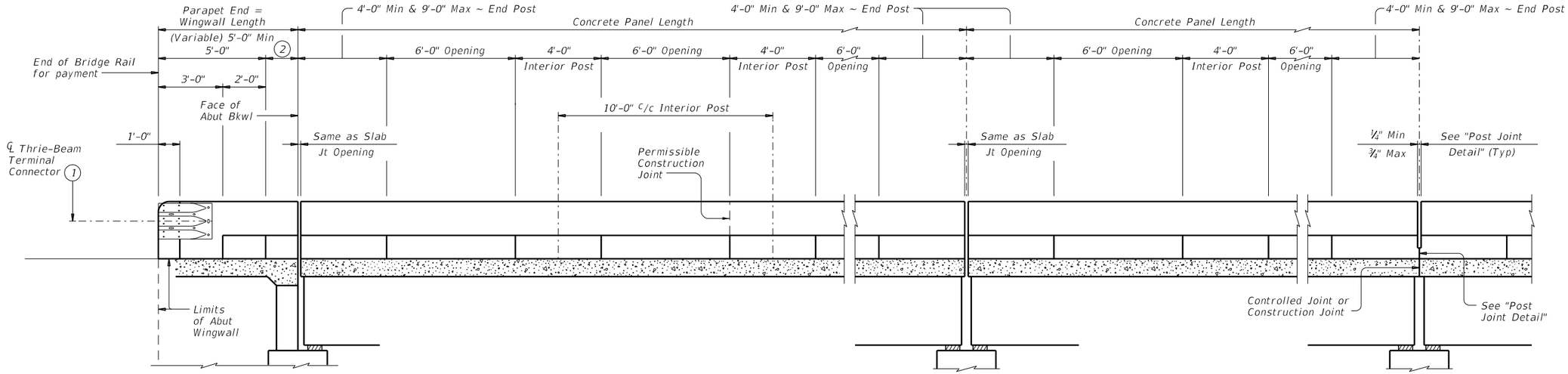
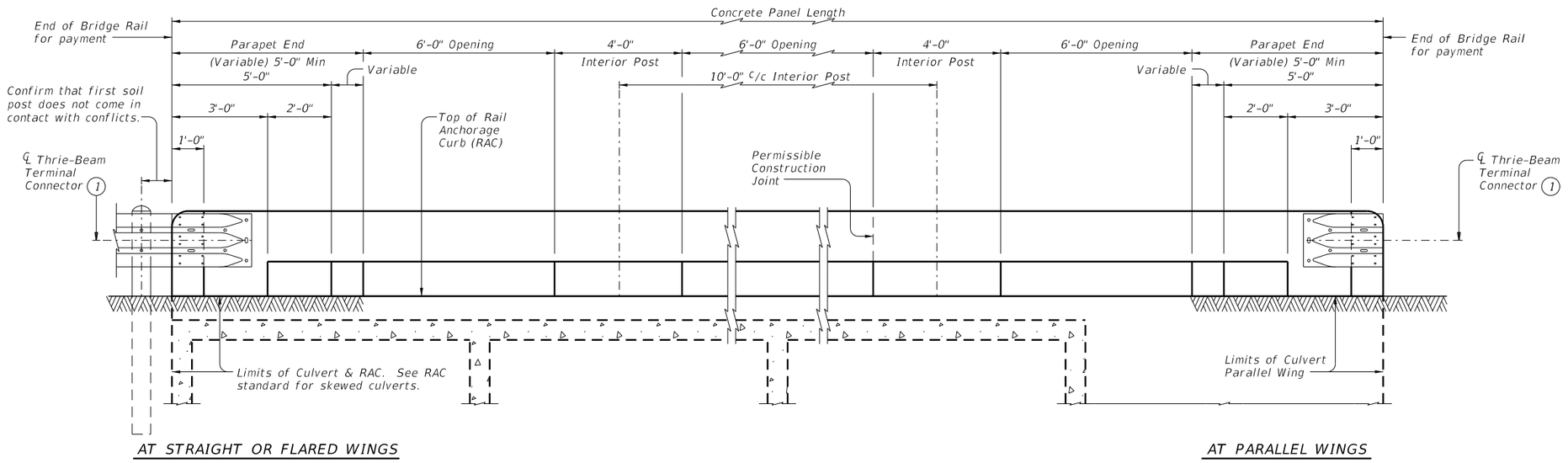


ROADWAY ELEVATION OF RAIL ON BRIDGE



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)

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		137

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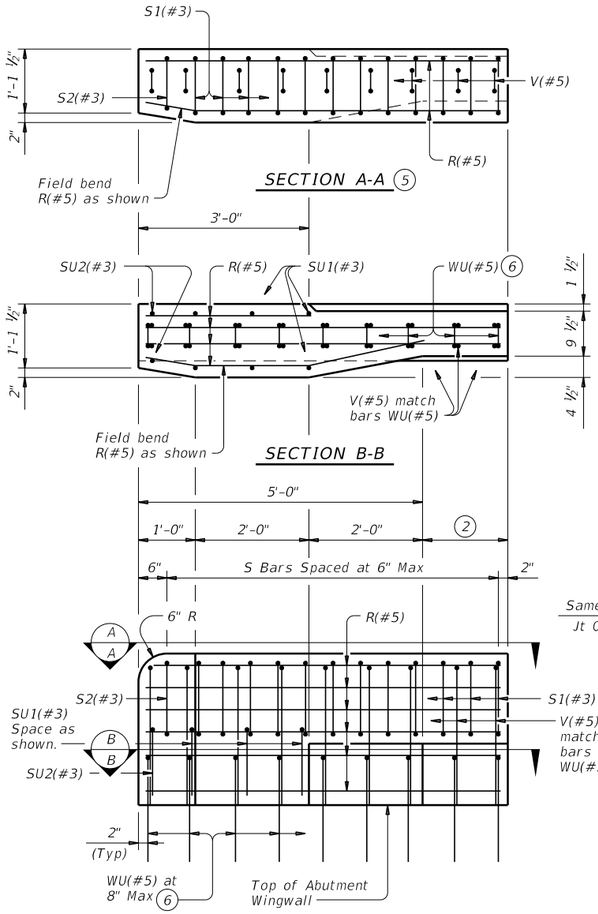
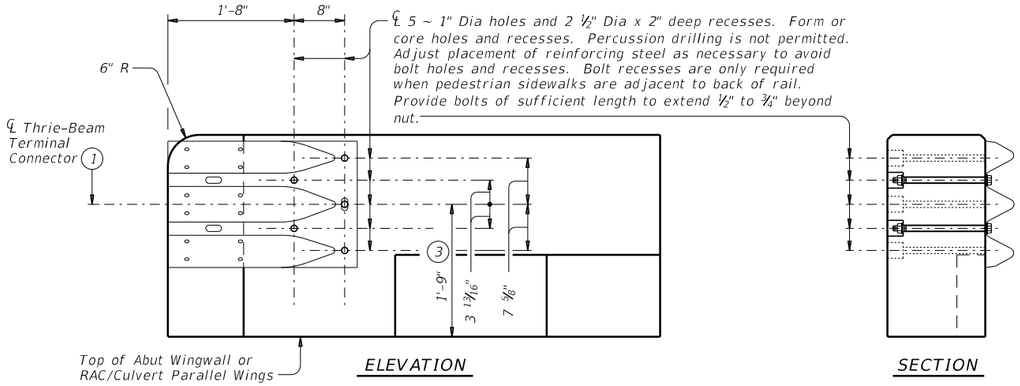
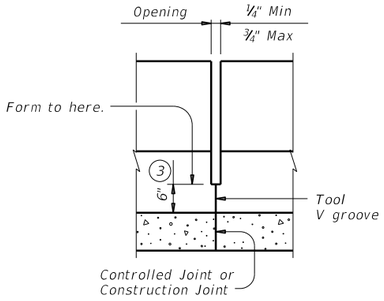


PARAPET END AT ABUT WINGWALL (6)

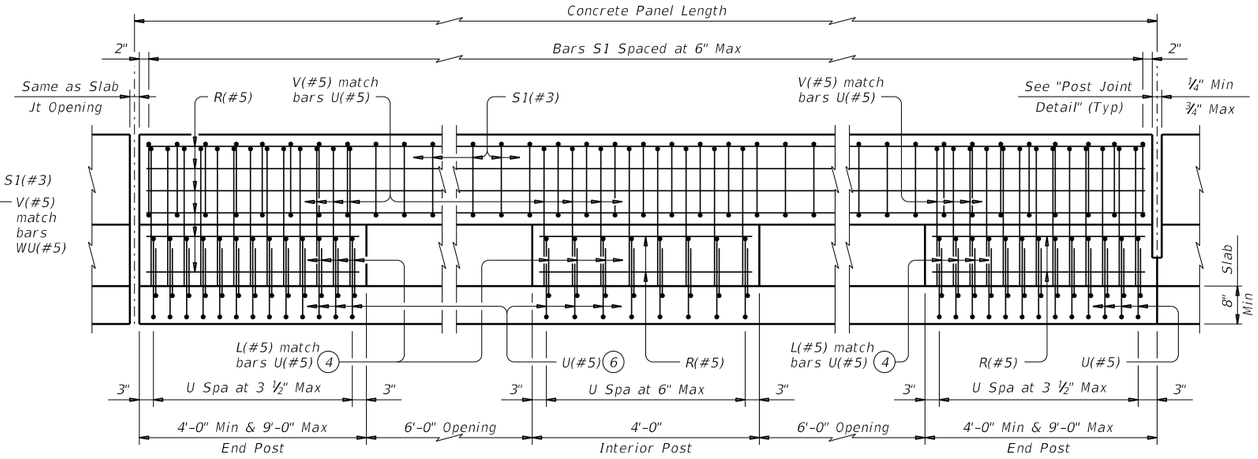


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(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) Increase 2" for structures with overlay.

(4) 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.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DN: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		138

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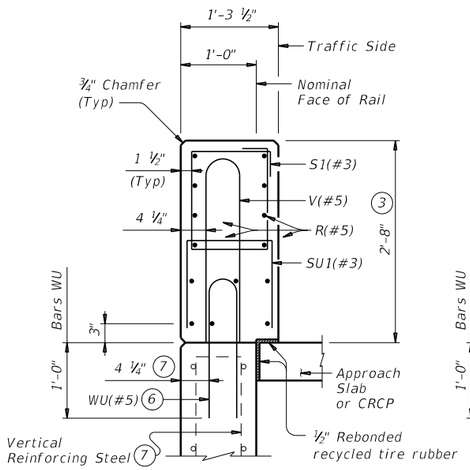
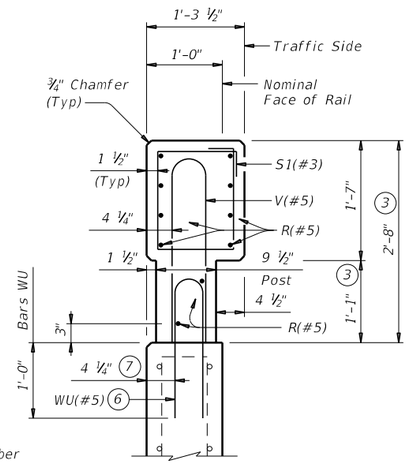
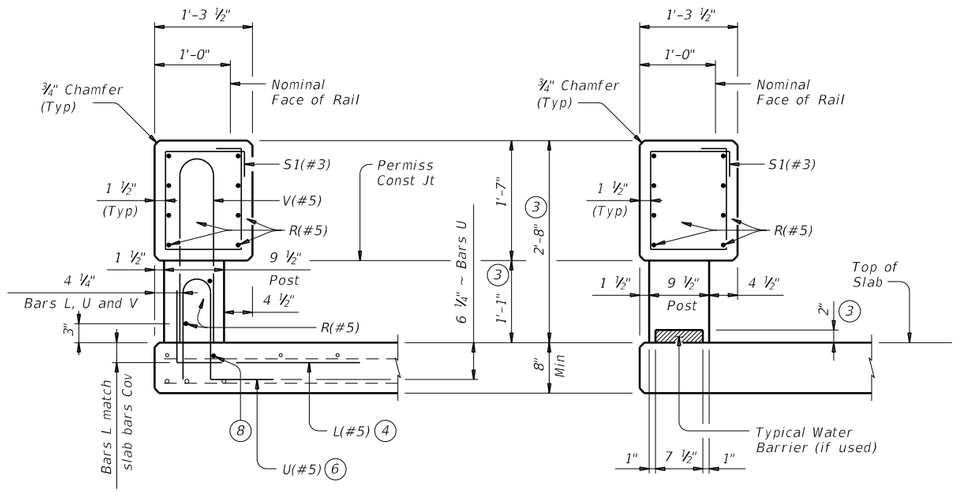


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

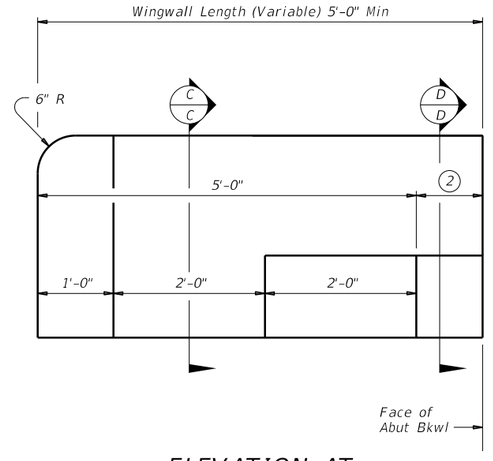


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

CONSTRUCTION NOTES:

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

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.

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.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

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.

Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

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

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

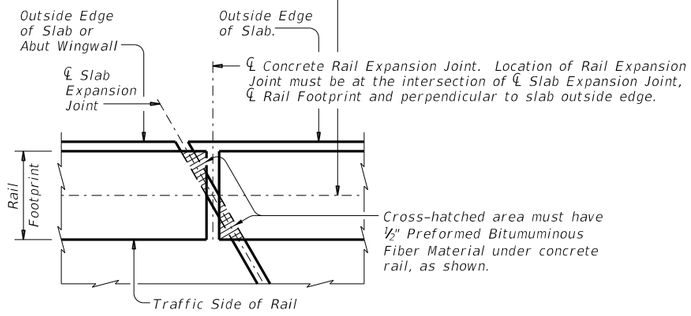
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) 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.

(7) 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.

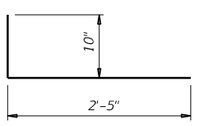
(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.

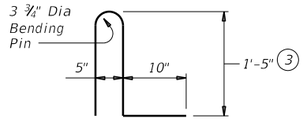


PLAN OF RAIL AT EXPANSION JOINTS

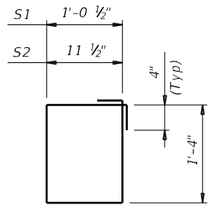
Example showing Slab Expansion Joints without breakbacks.



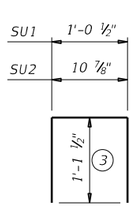
BARS L (#5)



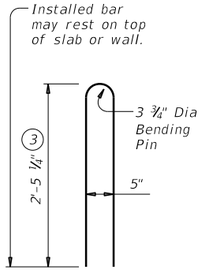
BARS U (#5) (9)



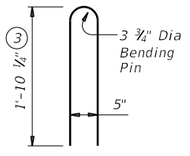
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
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		BRY	BURLESON		139

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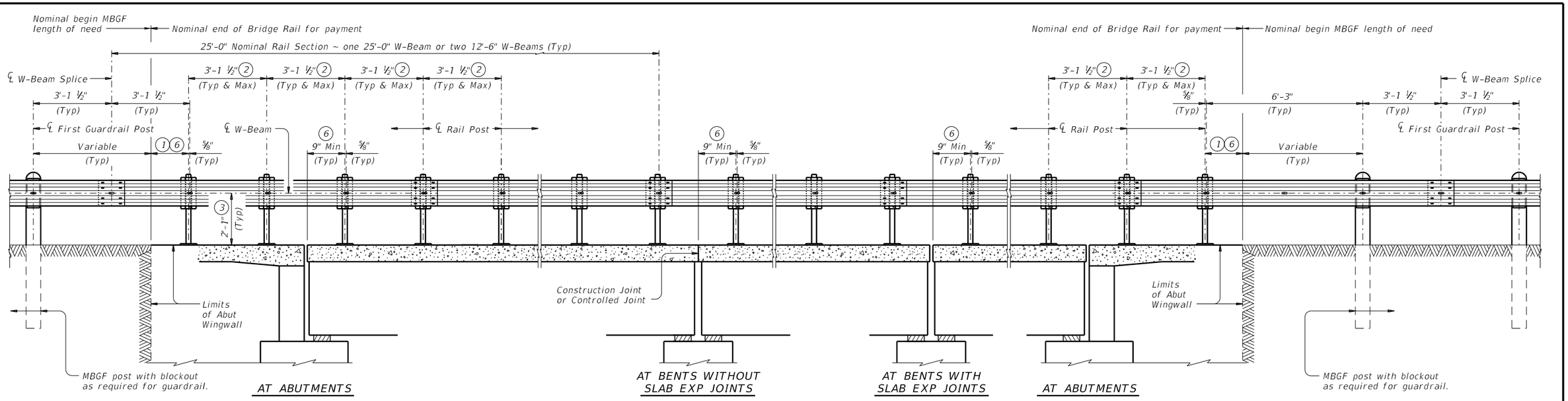
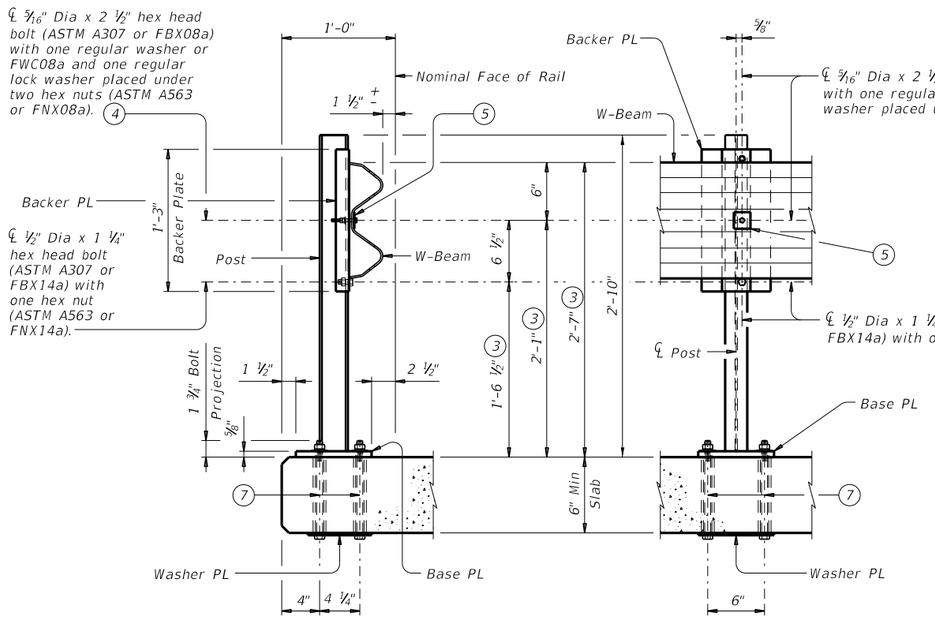


ROADWAY ELEVATION OF RAIL

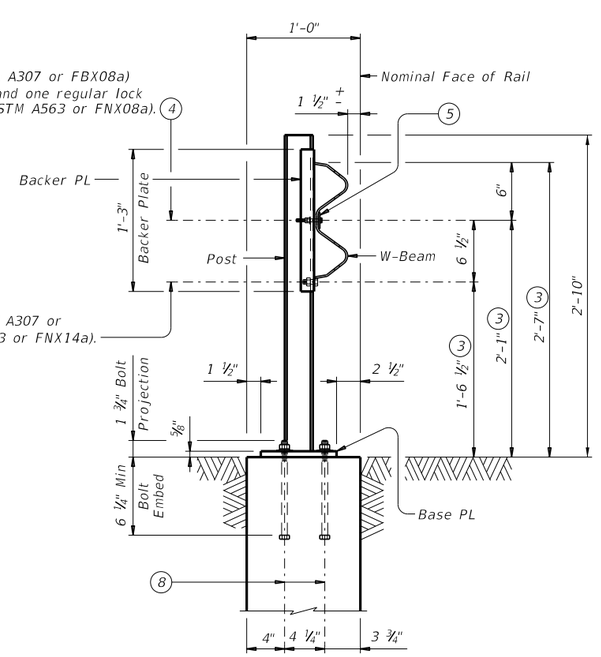
Showing without overlay.



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

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

(2) Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

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

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

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

(7) ℄ ⅞" Dia formed holes for ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		140

DATE: 11/22/2022 8:17:15 PM
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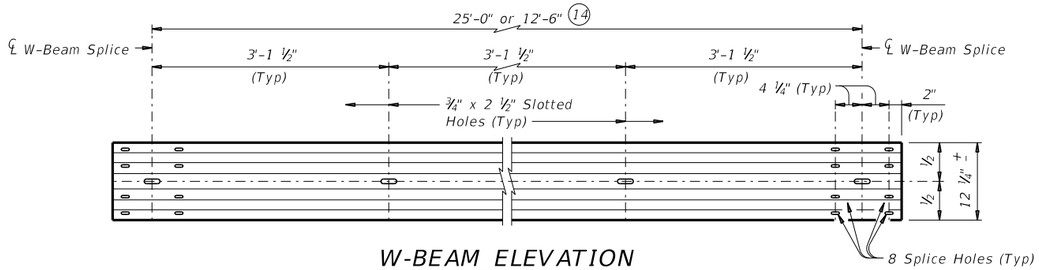
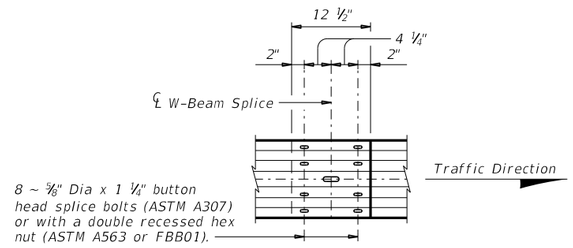
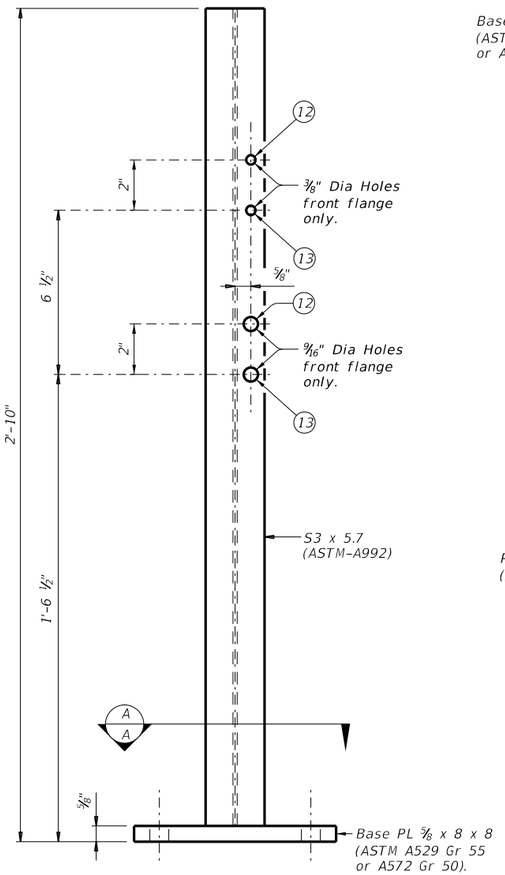


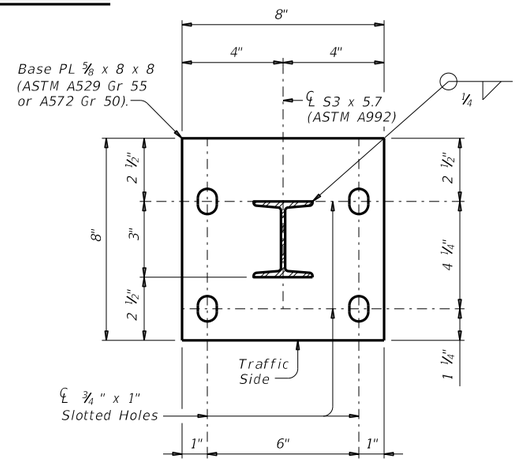
W-BEAM ELEVATION



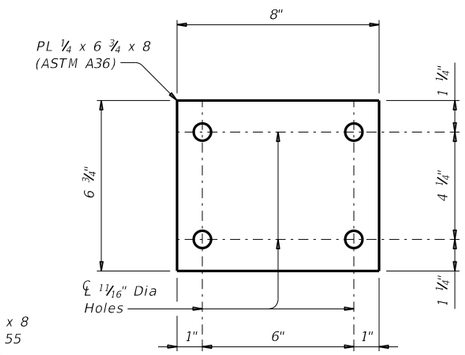
W-BEAM SPLICE ELEVATION



POST ELEVATION

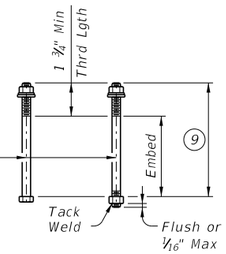


SECTION A-A

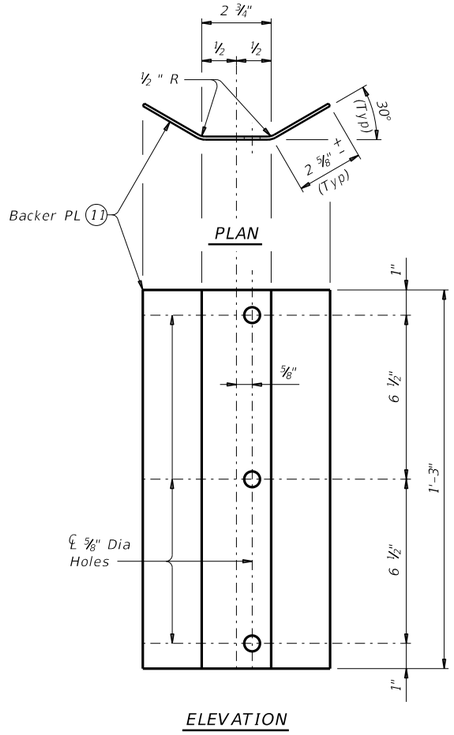


WASHER PLATE DETAIL

℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



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



BACKER PLATE

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

(10) See "Material Notes" for anchor bolt information.

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

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment.

CONSTRUCTION NOTES:

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

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

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

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

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

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

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

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0" or 12'-6" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

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

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

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

Average weight of railing with no overlay: 20 plf total.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631

FILE: rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059,ETC.	MALLARD RD, ETC.
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		141

SITE DESCRIPTION

PROJECT LIMITS:

FROM MALLARD ROAD AT BERRY CREEK TO STR# 17-026-0-AA07-44-101
, 0.36 MI. NE OF BERRY RIDGE RD S
PROJECT LENGTH = 646 FT. = 0.122 MILES
LATITUDE: 30^26'27.38"N LONGITUDE: 96^33'34.75"W

PROJECT DESCRIPTION:

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACING BRIDGE AND APPROACHES, GRADING, ACP BASE & SURFACE, AND MBGF.

SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES:

TOPSOIL REMOVAL, SUBGRADE WIDENING, STRUCTURE WORK, AND TOPSOIL WORK FOR SEEDING, UTILITY RELOCATIONS.

TOTAL PROJECT AREA: 0.82 AC

TOTAL AREA TO BE DISTURBED: 0.82 ACRES (100%)

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

THE EXISTING SOIL CONSISTS OF SOFT TO SLIGHTLY COMPACT CLAYEY SAND. NATIVE GRASSES, BRUSH AND TREES COVER THE EXISTING SOIL WITH APPROXIMATELY 32% OF COVER.

NAME OF RECEIVING WATERS:

MALLARD ROAD - ALL RUNOFF FROM BERRY CREEK EVENTUALLY FLOWS INTO DAVIDSON CREEK (SEGMENT 1211A) WHICH FLOWS INTO BRAZOS RIVER (SEGMENT 1242)

ANTICIPATED EFFECT OF STORM WATER ON THREATENED AND ENDANGERED SPECIES AND WILDLIFE HABITAT:

SEE ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) SHEET.

EROSION AND SEDIMENT CONTROLS AND TCEQ 401 CERTIFICATION

I. SOIL STABILIZATION PRACTICES AND EROSION CONTROL:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [X] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES
- [ ] SUBSURFACE DRAINS

OTHER:

II. STRUCTURAL PRACTICES AND SEDIMENTATION CONTROL: (T/P) *

- [T] SEDIMENT CONTROL FENCES
- [ ] HAY BALES
- [ ] ROCK BERMS
- [ ] STORM SEWERS
- [ ] CURBS AND GUTTERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] SAND BAG BERM
- [ ] GRAVEL BAG BERM
- [ ] BRUSH BERMS
- [ ] TRIANGULAR FILTER DIKE
- [ ] STONE OUTLET SEDIMENT TRAPS
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [T] ROCK FILTER DAMS
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES

* T means Temporary - P means Permanent

OTHER:

P - STONE PROTECTION RIPRAP

III. POST CONSTRUCTION: (IF COE PERMIT IS ISSUED)

- [ ] RETENTION/IRRIGATION
- [ ] EXTENDED DETENTION BASINS
- [ ] VEGETATION FILTER STRIPS
- [ ] CONSTRUCTION WETLANDS
- [ ] WET BASINS
- [X] VEGETATION LINED DRAINAGE DITCHES
- [ ] GRASSY SWALES
- [ ] SAND FILTER SYSTEMS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

1. INSTALL EROSION AND SEDIMENTATION CONTROLS PRIOR TO SOIL DISTURBANCE WHENEVER POSSIBLE.

2. ONCE BEGUN, EARTHWORK ACTIVITIES SHALL BE PROGRESSED WITHOUT DELAY, UNLESS APPROVED BY THE ENGINEER, UNTIL FINAL GRADING IS ACCOMPLISHED.

3. EROSION CONTROL MEASURES SHALL BE APPLIED IMMEDIATELY UPON COMPLETION OF THE EMBANKMENT PLACEMENT TO MINIMIZE POTENTIAL WATER QUALITY IMPACTS.

STORM WATER MANAGEMENT:

STORM WATER DRAINAGE WILL BE PROVIDED BY GRASS FLAT BOTTOM AND V-BOTTOM DITCHES. THIS SYSTEM WILL CARRY THE DRAINAGE WITHIN THE RIGHT-OF-WAY TO BERRY CREEK.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE DONE AT THE EARLIEST DATE POSSIBLE BUT NO LATER THAN 7 CALENDAR DAYS AFTER THE SURROUNDING EXPOSED GROUND HAS DRIED SUFFICIENTLY TO PREVENT FURTHER DAMANGE FROM HEAVY EQUIPMENT. THE AREAS ADJACENT TO CREEKS AND DRAINAGEWAYS SHALL HAVE PRIORITY. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%.

INSPECTION:

INSPECTION WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

DESCRIPTION OF CONSTRUCTION MATERIALS TO BE STORED ON-SITE AND CONTROLS TO PREVENT THESE FROM ENTERING STORM WATER:

STORE ALL CONSTRUCTION MATERIALS (WOOD, FLEX BASE, AGGREGATE, ETC.) IN LOCATIONS WHERE THEY WILL NOT ENTER STORM WATER RUNOFF. STRUCTURAL CONTROLS MAY BE REQUIRED FOR THE FLEX BASE, AGGREGATE, AND EARTH STOCKPLIES.

WASTE MATERIALS:

ALL WASTE MATERIALS WILL BE COLLECTED, STORED AND DISPOSED OF IN A LEGAL AND PROPER MANNER. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS. PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR MUST BE CONTACTED IMMEDIATELY.

SANITARY WASTE:

ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

REMARKS:

DISPOSAL AREAS AND STOCKPILES SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL SEDIMENT FROM ENTERING RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERBODY OR STREAMBED. CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED TO MINIMIZE THE RUNOFF OF POLLUTANTS.

STATE OF TEXAS
ADAM N. KORANSKY
95988
LICENSED
PROFESSIONAL ENGINEER
11/22/2022

PRINT DATE	REVISION DATE
11/22/2022	05/13/2022

Texas Department of Transportation
Bryan District

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	MALLARD ROAD

STATE	DISTRICT	COUNTY	
TEXAS	BRY	BURLESON	
CONTROL	SECTION	JOB	SHEET NO.
0917	30	059, ETC.	142

SITE DESCRIPTION

PROJECT LIMITS:

FROM CR 244 AT SESSUMS BRANCH TO STR# 17-026-0-AA01-85-101
, 0.36 MI. W OF CR 244 AND CR 246 JUNCTION
PROJECT LENGTH = 330 FT. = 0.0625 MILES
LATITUDE: 30^29'59.44"N LONGITUDE: 96^32'55.81"W

PROJECT DESCRIPTION:

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACING BRIDGE AND APPROACHES, GRADING, ACP BASE & SURFACE, AND MBGF.

SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES:

TOPSOIL REMOVAL, SUBGRADE WIDENING, STRUCTURE WORK, AND TOPSOIL WORK FOR SEEDING, UTILITY RELOCATIONS.

TOTAL PROJECT AREA: 0.42 AC

TOTAL AREA TO BE DISTURBED: 0.42 ACRES (100%)

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

THE EXISTING SOIL CONSISTS OF LOOSE TO SLIGHTLY COMPACT CLAY AND SAND. NATIVE GRASSES, BRUSH AND TREES COVER THE EXISTING SOIL WITH APPROXIMATELY 24% OF COVER.

NAME OF RECEIVING WATERS:

CR 244 - ALL RUNOFF FROM SESSUMS CREEK EVENTUALLY FLOWS INTO CARRINGTON CREEK WHICH FLOWS INTO BRAZOS RIVER (SEGMENT 1242)

ANTICIPATED EFFECT OF STORM WATER ON THREATENED AND ENDANGERED SPECIES AND WILDLIFE HABITAT:

SEE ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) SHEET.

EROSION AND SEDIMENT CONTROLS AND TCEQ 401 CERTIFICATION

I. SOIL STABILIZATION PRACTICES AND EROSION CONTROL:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [X] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES
- [ ] SUBSURFACE DRAINS

OTHER:

II. STRUCTURAL PRACTICES AND SEDIMENTATION CONTROL: (T/P) *

- [T] SEDIMENT CONTROL FENCES
- [ ] HAY BALES
- [ ] ROCK BERMS
- [ ] STORM SEWERS
- [ ] CURBS AND GUTTERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] SAND BAG BERM
- [ ] GRAVEL BAG BERM
- [ ] BRUSH BERMS
- [ ] TRIANGULAR FILTER DIKE
- [ ] STONE OUTLET SEDIMENT TRAPS
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [T] ROCK FILTER DAMS
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES

* T means Temporary - P means Permanent

OTHER:

P - STONE PROTECTION RIPRAP

III. POST CONSTRUCTION: (IF COE PERMIT IS ISSUED)

- [ ] RETENTION/IRRIGATION
- [ ] EXTENDED DETENTION BASINS
- [ ] VEGETATION FILTER STRIPS
- [ ] CONSTRUCTION WETLANDS
- [ ] WET BASINS
- [X] VEGETATION LINED DRAINAGE DITCHES
- [ ] GRASSY SWALES
- [ ] SAND FILTER SYSTEMS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

1. INSTALL EROSION AND SEDIMENTATION CONTROLS PRIOR TO SOIL DISTURBANCE WHENEVER POSSIBLE.

2. ONCE BEGUN, EARTHWORK ACTIVITIES SHALL BE PROGRESSED WITHOUT DELAY, UNLESS APPROVED BY THE ENGINEER, UNTIL FINAL GRADING IS ACCOMPLISHED.

3. EROSION CONTROL MEASURES SHALL BE APPLIED IMMEDIATELY UPON COMPLETION OF THE EMBANKMENT PLACEMENT TO MINIMIZE POTENTIAL WATER QUALITY IMPACTS.

STORM WATER MANAGEMENT:

STORM WATER DRAINAGE WILL BE PROVIDED BY GRASS FLAT BOTTOM AND V-BOTTOM DITCHES. THIS SYSTEM WILL CARRY THE DRAINAGE WITHIN THE RIGHT-OF-WAY TO SESSUMS CREEK.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE DONE AT THE EARLIEST DATE POSSIBLE BUT NO LATER THAN 7 CALENDAR DAYS AFTER THE SURROUNDING EXPOSED GROUND HAS DRIED SUFFICIENTLY TO PREVENT FURTHER DAMANGE FROM HEAVY EQUIPMENT. THE AREAS ADJACENT TO CREEKS AND DRAINAGEWAYS SHALL HAVE PRIORITY. SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50%.

INSPECTION:

INSPECTION WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

DESCRIPTION OF CONSTRUCTION MATERIALS TO BE STORED ON-SITE AND CONTROLS TO PREVENT THESE FROM ENTERING STORM WATER:

STORE ALL CONSTRUCTION MATERIALS (WOOD, FLEX BASE, AGGREGATE, ETC.) IN LOCATIONS WHERE THEY WILL NOT ENTER STORM WATER RUNOFF. STRUCTURAL CONTROLS MAY BE REQUIRED FOR THE FLEX BASE, AGGREGATE, AND EARTH STOCKPLIES.

WASTE MATERIALS:

ALL WASTE MATERIALS WILL BE COLLECTED, STORED AND DISPOSED OF IN A LEGAL AND PROPER MANNER. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS. PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR MUST BE CONTACTED IMMEDIATELY.

SANITARY WASTE:

ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

REMARKS:

DISPOSAL AREAS AND STOCKPILES SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL SEDIMENT FROM ENTERING RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERBODY OR STREAMBED. CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED TO MINIMIZE THE RUNOFF OF POLLUTANTS.

STATE OF TEXAS
ADAM N. KORANSKY
95988
LICENSED
PROFESSIONAL ENGINEER
11/23/2022

PRINT DATE	REVISION DATE
11/23/2022	05/12/2022

Texas Department of Transportation
Bryan District

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR 244

STATE	DISTRICT	COUNTY	
TEXAS	BRY	BURLESON	
CONTROL	SECTION	JOB	SHEET NO.
0917	30	059, ETC.	143

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.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. 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. Berry Creek - Sta. 43+77

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. Limit the clearing of vegetation and topsoil to only the areas needed to accomplish the project or activity.
2. Re-vegetation of disturbed areas in compliance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping. Re-vegetation efforts would provide appropriate and sustainable cover to prevent erosion and siltation.

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. BMPs for Federal and State Listed Species will be discussed at the preconstruction meeting.

2. Migratory Birds - The contractor's attention is directed to the fact that there is the possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The contractor shall remove all old migratory bird nests from any woody vegetation or structures between September 1 and March 1 while the nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting between March 2 and August 31.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

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

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
MALLARD RD

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 144

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. 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.Sessums Creek - Sta. 55+85

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. Limit the clearing of vegetation and topsoil to only the areas needed to accomplish the project or activity.
2. Re-vegetation of disturbed areas in compliance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping. Re-vegetation efforts would provide appropriate and sustainable cover to prevent erosion and siltation.

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. BMPs for Federal and State Listed Species will be discussed at the preconstruction meeting.

2. Migratory Birds - The contractor's attention is directed to the fact that there is the possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The contractor shall remove all old migratory bird nests from any woody vegetation or structures between September 1 and March 1 while the nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting between March 2 and August 31.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

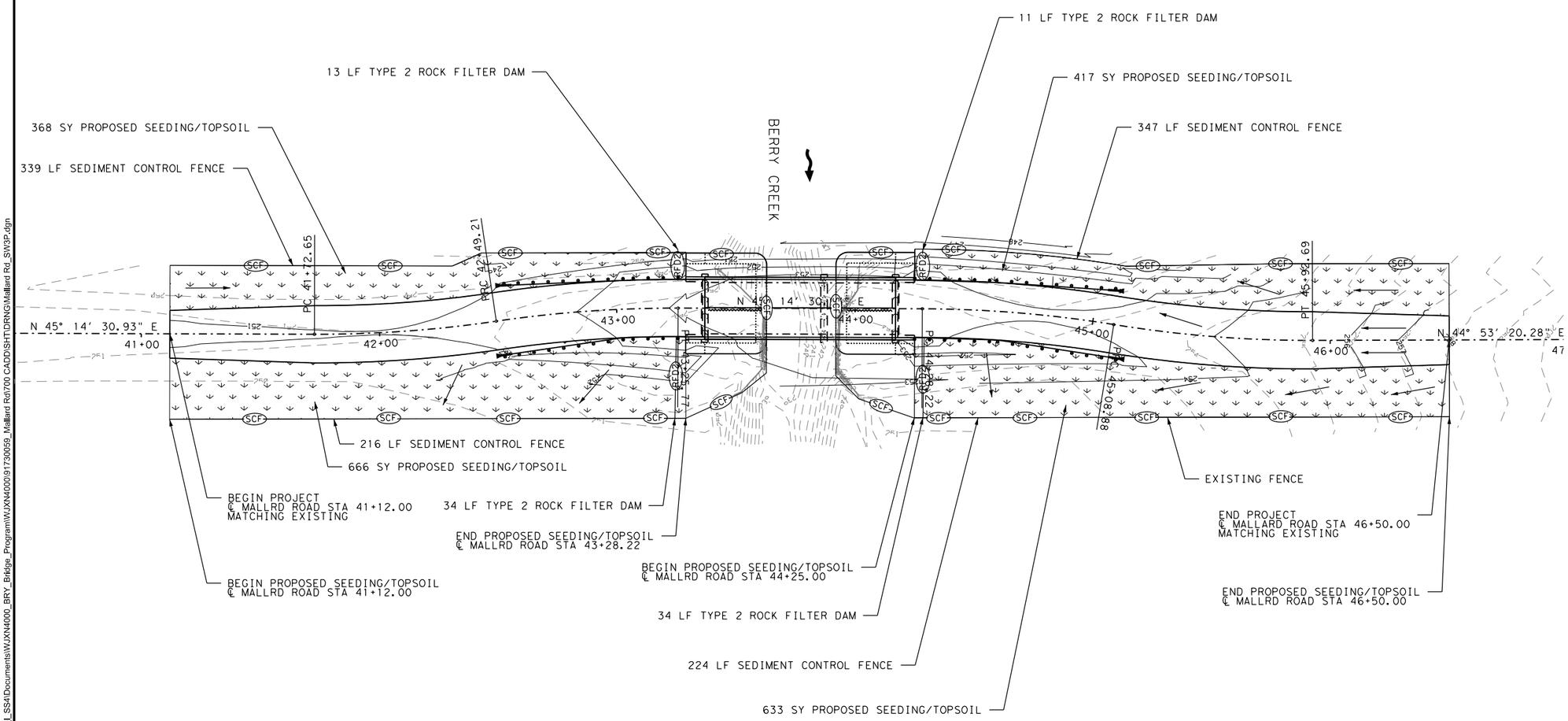
PRINT DATE	REVISION DATE
11/22/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
CR 244

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 145



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LEGEND

- DIRECTION OF FLOW
- RFD2 — TYPE 2 ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- SEEDING/TOPSOIL AREA
- EXIST CONTOUR

47 NOTES:

1. EROSION CONTROL DEVICE INSTALLATION, MAINTENANCE AND REMOVAL SHALL BE IN ACCORDANCE WITH TXDOT STANDARDS FOR EROSION CONTROL.
2. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
3. LOCATIONS OF EROSION CONTROL DEVICES ARE APPROXIMATIONS. ACTUAL LOCATIONS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. OVERALL SW3P INSTALLATION SHALL FOLLOW TCP PHASING AND CONSTRUCTION SEQUENCE.

STATE OF TEXAS
ADAM N. KORANSKY
95988
LICENSED
PROFESSIONAL ENGINEER
11/23/2022

PRINT DATE	REVISION DATE
11/23/2022	

Jacobs
2705 BEE CAVE RD, SUITE 300
AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

SW3P LAYOUT

MALLARD RD AT BERRY CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 146

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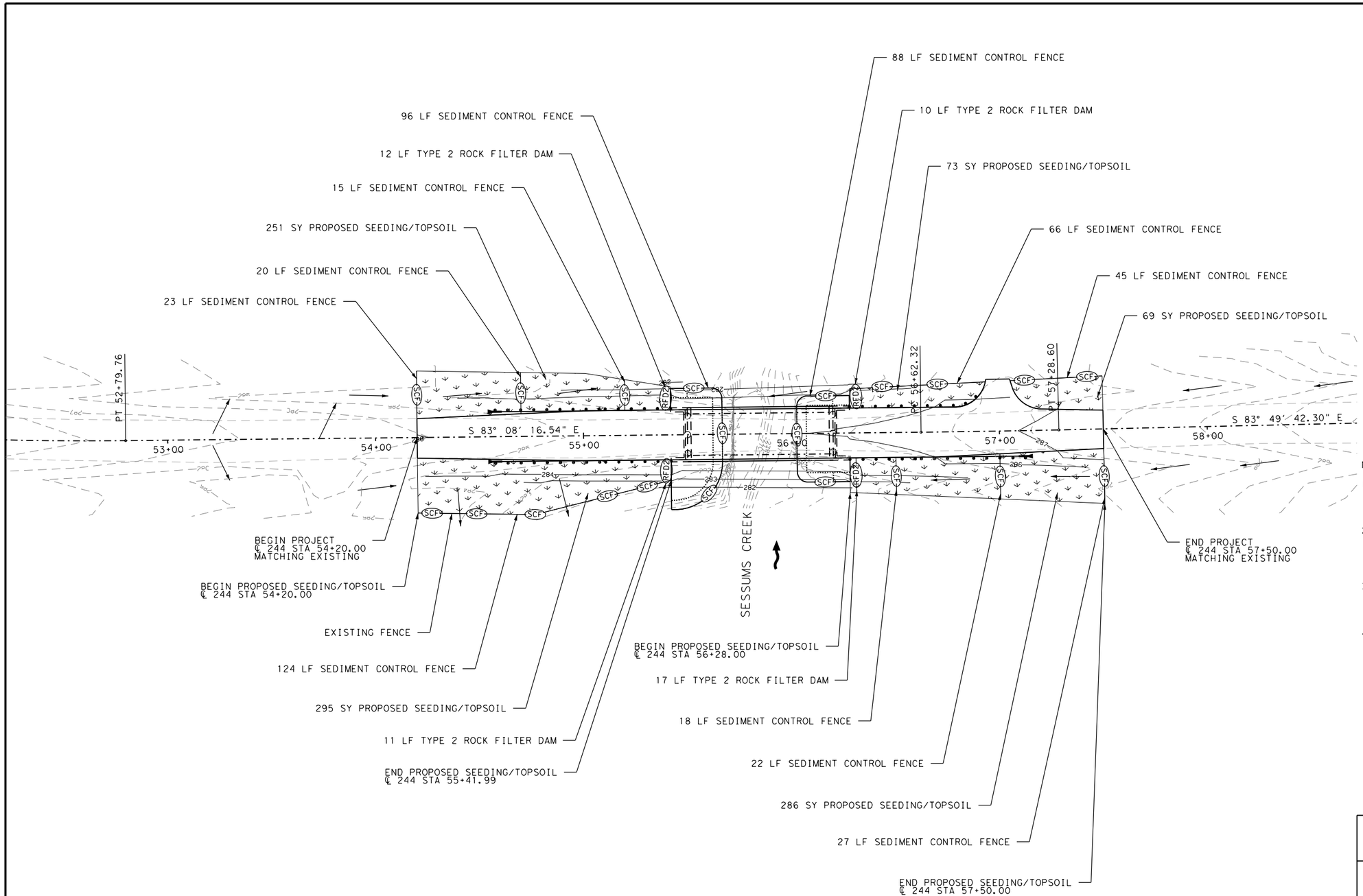

NOTES:

1. EROSION CONTROL DEVICE INSTALLATION, MAINTENANCE AND REMOVAL SHALL BE IN ACCORDANCE WITH TXDOT STANDARDS FOR EROSION CONTROL.
2. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
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STATE OF TEXAS
ADAM N. KORANSKY
95988
LICENSED
PROFESSIONAL ENGINEER
11/23/2022

PRINT DATE	REVISION DATE
11/23/2022	

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AUSTIN TX 78746
FIRM REGISTRATION F-2966

Texas Department of Transportation
Bryan District

SW3P LAYOUT

CR 244 AT SESSUMS CREEK

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	BR 2021(237), ETC.	CR
STATE	DISTRICT	COUNTY
TEXAS	BRY	BURLESON
CONTROL	SECTION	JOB / SHEET NO.
0917	30	059, ETC. / 147

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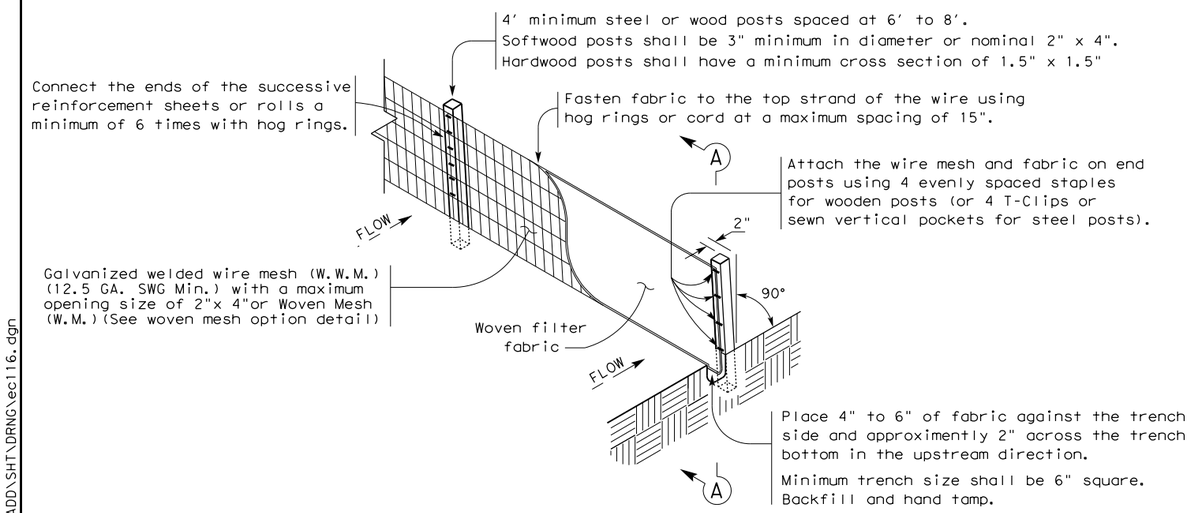
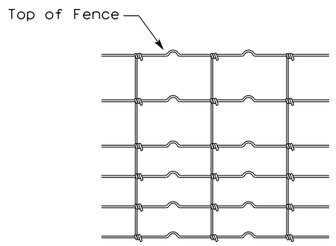
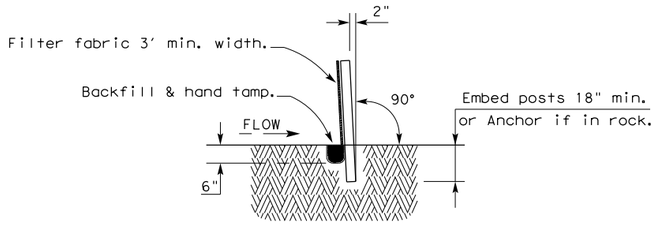
REVISIONS



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

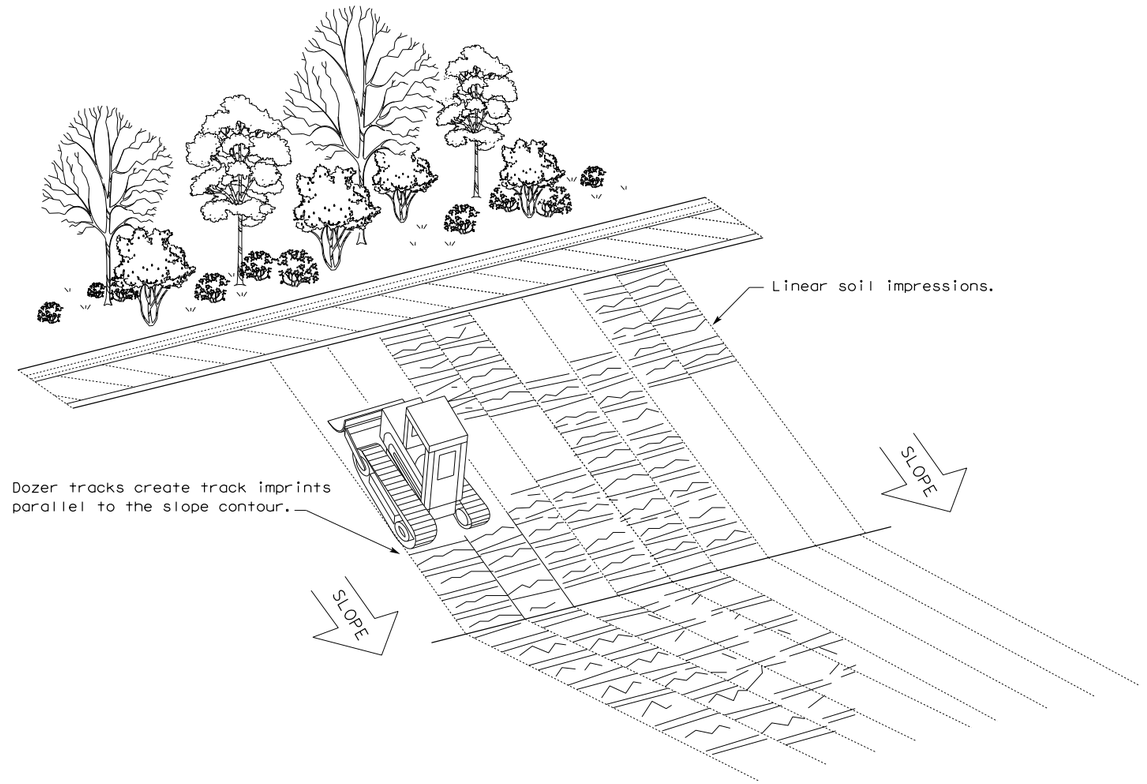
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

CONT	SECT	JOB	HIGHWAY
0917	30	059, ETC.	CR

DIST	COUNTY	SHEET NO.
BRY	BURLESON	148

DATE: 11/23/2022
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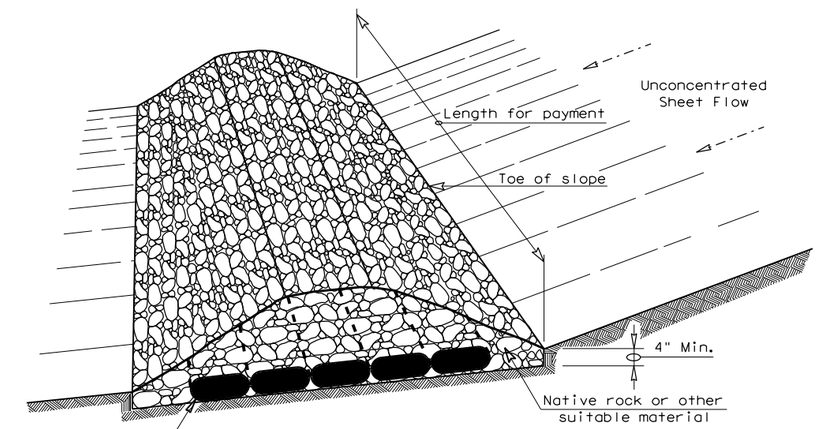
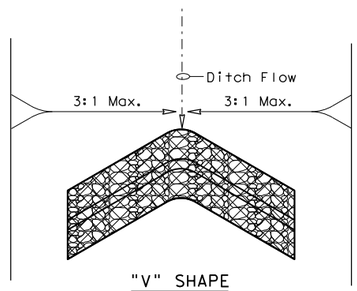
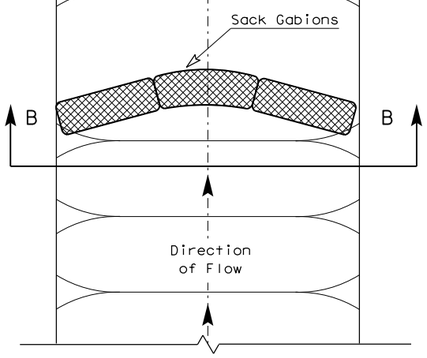


FILTER DAM AT TOE OF SLOPE

RFD1



"V" SHAPE
PLAN VIEW



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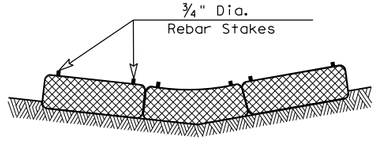
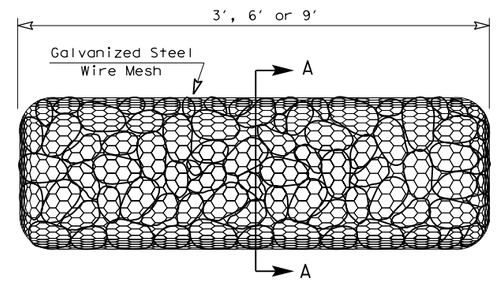
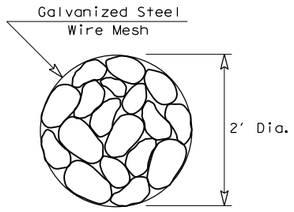


SECTION B-B

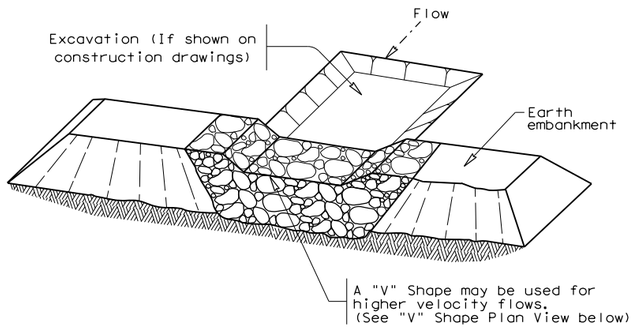


TYPE 4 (SACK GABIONS)

RFD4

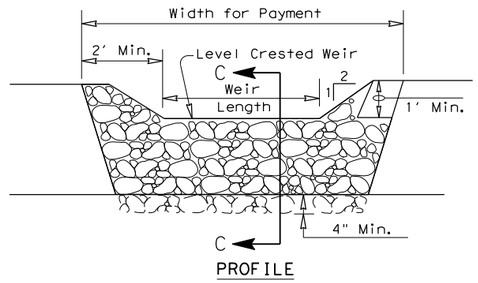


SECTION A-A

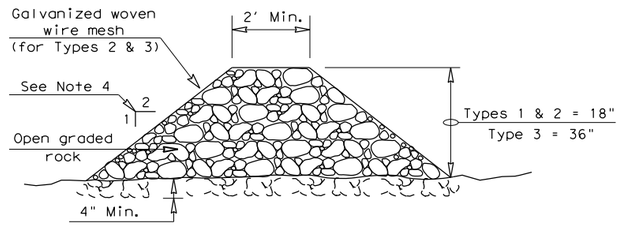


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

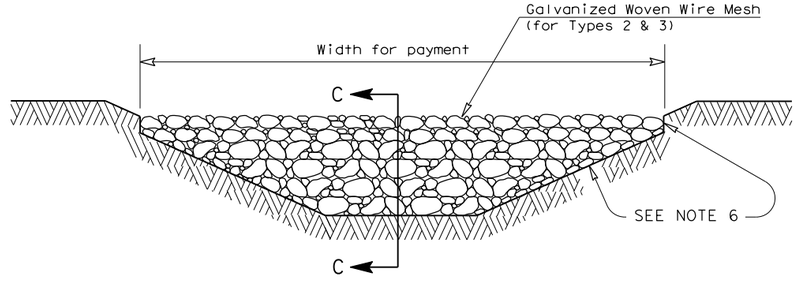
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

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

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0917	30	059, ETC.	CR
	DIST	COUNTY		SHEET NO.
	BRY	BURLESON		149