TIME: 1:05:11 PM
DATE: 1/18/2023

DESIGN	FED.RD. DIV.NO.	FEDERAL AID or STATE PROJECT NO.		HIGHWAY NO.
MBT	6	BR1502 (322)		CS
GRAPHICS BDG	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK JDB	TEXAS	FTW	TARRANT	1
CHECK PKC	CONTROL	SECTION	JOB	
	0902	48	894	

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT NO. BR1502 (322)

CS (E. LONG AVENUE)

TARRANT COUNTY

LIMITS: AT LITTLE FOSSIL CREEK

DESIGN SPEED = 40 MPH

AADT(2019) = 6,143
AADT(2040) = 8,600

FUNCTIONAL CLASS: MINOR URBAN ARTERIAL

TDLR INSPECTION REQUIRED

INDEX OF SHEETS
(SEE SHEET 2)

FINAL PLANS

NAME OF CONTRACTOR: _____

DATE OF LETTING: _____

DATE WORK BEGAN: _____

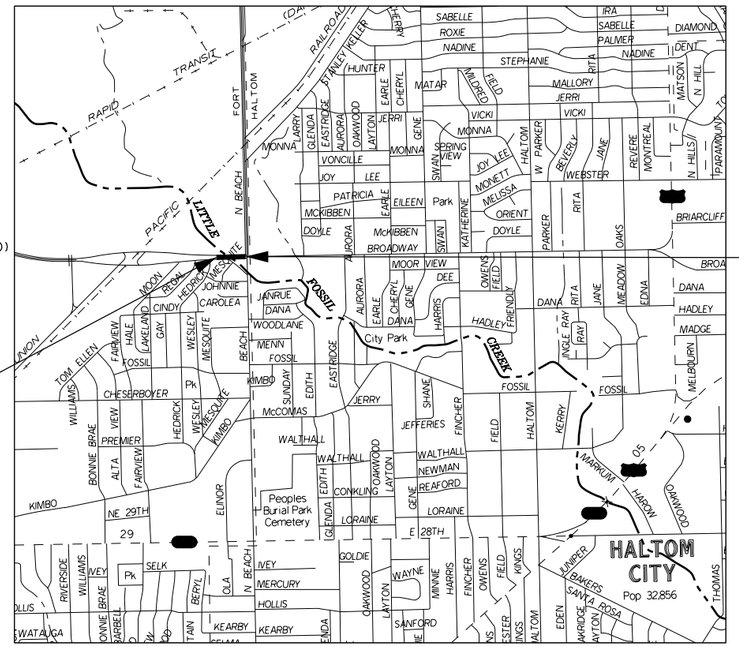
DATE WORK COMPLETED: _____

DATE WORK ACCEPTED: _____

TOTAL LENGTH OF PROJECT =

ROADWAY	= 412.00 FT.	= 0.078 MI.
BRIDGE	= 200.00 FT.	= 0.037 MI.
TOTAL	= 612.00 FT.	= 0.115 MI.

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



NOT TO SCALE

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

BEGIN PROJECT
CSJ 0902-48-894
STA 13+66.00
N = 6,980,516.2373
E = 2,339,813.3774

END PROJECT
CSJ 0902-48-894
STA 19+78.00
N = 6,980,517.8997
E = 2,340,289.6141

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

REGISTERED ACCESSIBILITY SPECIALIST (RAS)
INSPECTION REQUIRED TDLR NO. EABPRJ: TABS2023003851

NOTE:

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

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

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

_____, P.E.
Signature of Registrant & Date

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

SUBMITTED FOR LETTING 2/7/2023
_____, P.E.
PROJECT MANAGER

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING 5/3/2023
DocuSigned by:
_____, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

SUBMITTED FOR LETTING 2/23/2023
DocuSigned by:
_____
AREA ENGINEER

APPROVED FOR LETTING: 5/4/2023
DocuSigned by:
David M Salazar, P.E.
DISTRICT ENGINEER

FILE: ...\WFXQ8702 - WA2\GEN\894TSOI.sht

TIME: 11:29:42 AM
DATE: 2/6/2023

INDEX OF SHEETS

SHEET	DESCRIPTION
I. GENERAL	
1	TITLE SHEET
2 - 3	INDEX OF SHEETS
4	PROJECT LAYOUT
5	EXISTING TYPICAL SECTIONS
6 - 7	PROPOSED TYPICAL SECTIONS
8, 8A - 8J	GENERAL NOTES
9, 9A - 9C	ESTIMATE & QUANTITIES
10 - 11	QUANTITY SUMMARIES
12	CRASH CUSHION SUMMARY SHEET
II. TRAFFIC CONTROL	
13 - 14	TRAFFIC CONTROL NARRATIVE
15	TRAFFIC CONTROL ADVANCE WARNING SIGNS
16 - 17	TRAFFIC CONTROL TYPICAL SECTIONS
18 - 27	TRAFFIC CONTROL PHASE 1 - PHASE 4
28	TRAFFIC CONTROL PHASE 2 CROSS OVER
29	TRAFFIC CONTROL PHASE 3 CROSS OVER
30 - 31	TRAFFIC CONTROL TEMP SPECIAL SHORING LAYOUT
TRAFFIC CONTROL STANDARDS	
32 - 43	*BC(1)-21 TO BC(12)-21
44 - 45	*LPCB-13
46	*TCP(2-5)-18
47	*TCP(3-2)-13
48	*TCP(3-3)-14
49	*TCP(3-4)-13
50	*WZ(BRK)-13
50A	*WZ(RS)-22
51	*WZ(STPM)-13
52	*WZ(TD)-17
53	*WZ(UL)-13
54	TREATMENT FOR VARIOUS EDGE CONDITIONS
III. ROADWAY	
55	CONTROL DATA INDEX SHEET
56	HORIZONTAL AND VERTICAL CONTROL
57	ROADWAY REMOVAL PLANS
58	ROADWAY PLAN AND PROFILE
59	ROADWAY GRADING LAYOUT
60	ROADWAY MISC DETAILS
ROADWAY STANDARDS	
61	#BED-14
62	#CCCG(FTW)
63	#CDD (FTW)
64	#CP-TEP (FTW)
65 - 66	#CRCP(1)-20
67	#CSWD (FTW)
68	#GF(31)-19
69	#GF(31)DAT-19
70	#GF(31)MS-19
71	#GF(31)TRTL2-19
72	#JS (FTW)
73 - 76	#PED-18
77	#RAIL-ADJ(1)-19
78	#SGT(10S)31-16
79	#SGT(11S)31-18
80	#SGT(12S)31-18
81	#SGT(15)31-20
82	#HEART-16
83	#QGELITE(M10)(N)-20
84	#REACT(W)-16
85	#SMTC(N)-16
86	#TAU-II-R(N)-16
87	#TAU-II-R(W)-16
88	#TRF

SHEET	DESCRIPTION
IV. DRAINAGE	
89	ONSITE DRAINAGE AREA MAP
90	DRAINAGE COMPUTATIONS
91	DRAINAGE PLAN
92	DRAINAGE PROFILE
93 - 98	BRIDGE HYDRAULIC DATA SHEET
DRAINAGE STANDARDS	
99	&CH-PW-0
100	&SETP-PD
101	&PB
102	&PBGC
103	&PJB
104	&PDD
105 - 106	&PCU
107	&CGT-PCU
V. UTILITIES	
108	EXISTING UTILITY LAYOUTS
109	EXISTING UTILITY LEGEND AND NOTES
VI. BRIDGES	
110	BORINGS LONG AVE AT LITTLE FOSSIL CREEK
111	BRIDGE LAYOUT EB LONG AVE AT LITTLE FOSSIL CREEK
112	TYPICAL TRANSVERSE SECTIONS EB LONG AVE AT LITTLE FOSSIL CREEK
113	FOUNDATION LAYOUT EB LONG AVE AT LITTLE FOSSIL CREEK
114	ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS EB LONG AVE AT LITTLE FOSSIL CREEK
115	ABUTMENT 1 EB LONG AVE AT LITTLE FOSSIL CREEK
116	ABUTMENT 4 EB LONG AVE AT LITTLE FOSSIL CREEK
117	ABUTMENT DETAILS EB LONG AVE AT LITTLE FOSSIL CREEK
118 - 119	BENT 2 AND 3 EB LONG AVE AT LITTLE FOSSIL CREEK
120	BRIDGE FRAMING PLAN EB LONG AVE AT LITTLE FOSSIL CREEK
121 - 122	200.00' PRESTRESSED CONCRETE GIRDER UNIT EB LONG AVE AT LITTLE FOSSIL CREEK
123	IGND
124	BRIDGE LAYOUT WB LONG AVE AT LITTLE FOSSIL CREEK
125	TYPICAL TRANSVERSE SECTIONS WB LONG AVE AT LITTLE FOSSIL CREEK
126	FOUNDATION LAYOUT WB LONG AVE AT LITTLE FOSSIL CREEK
127	ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS WB LONG AVE AT LITTLE FOSSIL CREEK
128	ABUTMENT 1 WB LONG AVE AT LITTLE FOSSIL CREEK
129	ABUTMENT 4 WB LONG AVE AT LITTLE FOSSIL CREEK
130	ABUTMENT DETAILS WB LONG AVE AT LITTLE FOSSIL CREEK
131 - 132	BENT 2 AND 3 WB LONG AVE AT LITTLE FOSSIL CREEK
133	BRIDGE FRAMING PLAN WB LONG AVE AT LITTLE FOSSIL CREEK
134 - 135	200.00' PRESTRESSED CONCRETE GIRDER UNIT WB LONG AVE AT LITTLE FOSSIL CREEK
136	IGND

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

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

STATE OF TEXAS
ALEC J. PAGAN
134772
LICENSED
PROFESSIONAL ENGINEER

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

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

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

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

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

Texas Department of Transportation

E. LONG AVENUE

INDEX OF SHEETS

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	2
BDG	0902	48	894	
CHECK				
PKC				

FILE: ...\GEN\894INDX01.sht

TIME: 11:29:51 AM
DATE: 2/6/2023

INDEX OF SHEETS

SHEET	DESCRIPTION
BRIDGE STANDARDS	
137	$AJ
138	$BAS-C
139 - 140	$BRSM
141	$BS-EJCP
142	$CSAB(FTW)
143 - 144	$FD
145	$IGCS
146 - 147	$IGD
148 - 150	$IGEB
151 - 152	$IGFRP
153 - 154	$IGMS
155	$IGSK
156	$IGTS
157 - 158	$MEBR(C)
159 - 162	$PCP
163	$PCP-FAB
164 - 165	$PCP(O)
166 - 167	$PCP(O)FAB
168 - 169	$PMDF
170	$CRR
171 - 174	$TYPE C223
175 - 177	$TYPE T223
VII. TRAFFIC ITEMS	
178 - 184	TRAFFIC SIGNAL LAYOUT
185 - 187	SIGNING AND PAVEMENT MARKINGS
188	SUMMARY OF SMALL SIGNS
TRAFFIC STANDARDS	
189	&ED(1)-14
190	&ED(2)-14
191	&ED(3)-14
192	&ED(4)-14
193	&ED(8)-14
194	OMITTED
195	OMITTED
196 - 199	#D & OM(1)-20 THRU D & OM(4)-20
200	#D & OM(6)-20
201	#D & OM(VIA)-20
202	#SMD(GEN)-08
203 - 205	#SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
206 - 208	#PM(1)-22 THRU PM(3)-22
209	#PM(4)-22A
VIII. ENVIRONMENTAL	
210 - 211	STORM WATER POLLUTION PREVENTION PLAN (SW3P)
212	EROSION CONTROL PLAN
ENVIRONMENTAL STANDARDS	
213	ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)
214	*EC(1)-16
215	*EC(3)-16
216 - 218	*EC(9)-16

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

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

Jacobs Engineering Group
STATE OF TEXAS
EDWARD J. PULTORAK
93881
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

, P.E. 02/08/2023
Signature of Registrant & Date

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

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

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

Texas Department of Transportation

E. LONG AVENUE

INDEX OF SHEETS

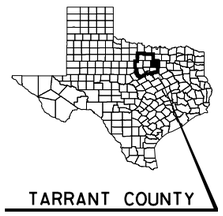
SCALE: N.T.S. SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	
BDG				3
CHECK	0902	48	894	
PKC				

FILE: ...\GEN\894INDX02.sht

TIME: 1:06:53 PM
DATE: 1/18/2023

TXDOT
FORT WORTH DISTRICT



STATE MAP
N. T. S.

0 50 100
SCALE IN FEET

LEGEND
- PROPOSED PAVEMENT/BRIDGE
- PROPOSED RIPRAP

TARRANT COUNTY MAP
N. T. S.

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

E. LONG AVENUE

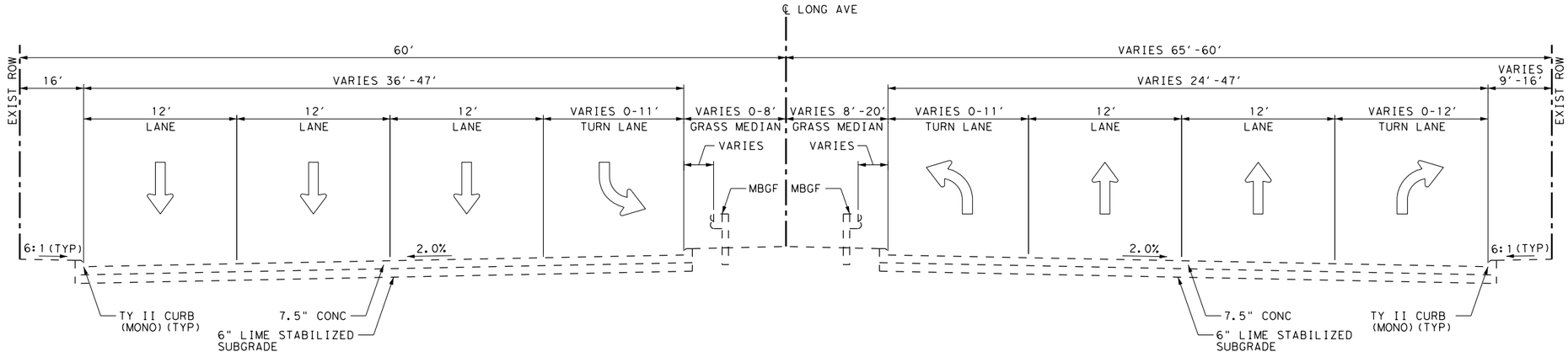
PROJECT LAYOUT

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	4
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\WFXQ8702 - WA2\GEN\894PL01.sht

TIME: 1:07:30 PM
DATE: 1/18/2023



WESTBOUND LONG AVE

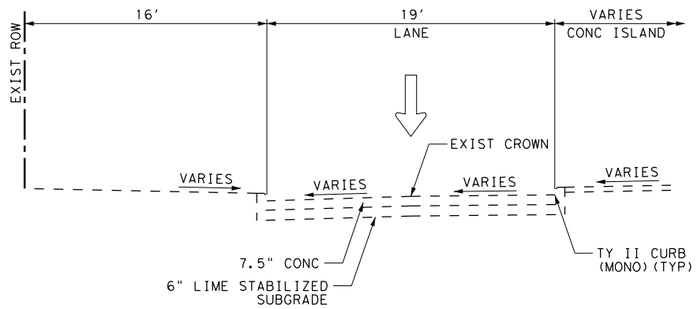
EASTBOUND LONG AVE

EXISTING TYPICAL SECTION

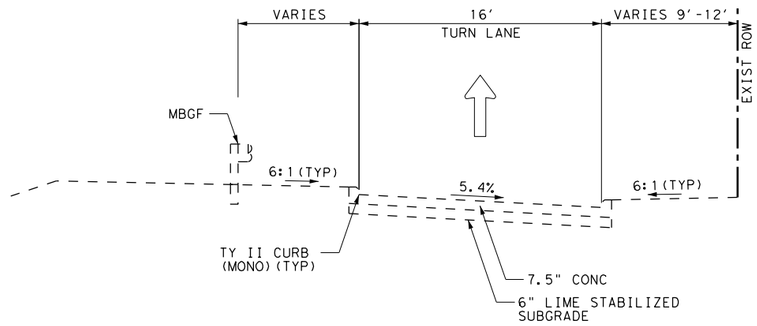
STA 13+66.00 - STA 16+85.87
STA 18+65.18 - STA 19+55.00
BRIDGE LIMITS (SEE BRIDGE LAYOUTS): STA 16+85.87 - STA 18+65.18

NOTES:

1. EXISTING PAVEMENT STRUCTURE OBTAINED FROM BORING LOG INFORMATION AND FROM CITY OF FORT WORTH AS-BUILTS FILE K-636.
2. EXISTING RIGHT-OF-WAY IS APPROXIMATE AND OBTAINED FROM AS-BUILT PLANS AND EXISTING FEATURES.



EXISTING TYPICAL SECTION
BEACH ST RTL



EXISTING TYPICAL SECTION
BROADWAY AVE RAMP

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

E. LONG AVENUE

EXISTING TYPICAL SECTIONS

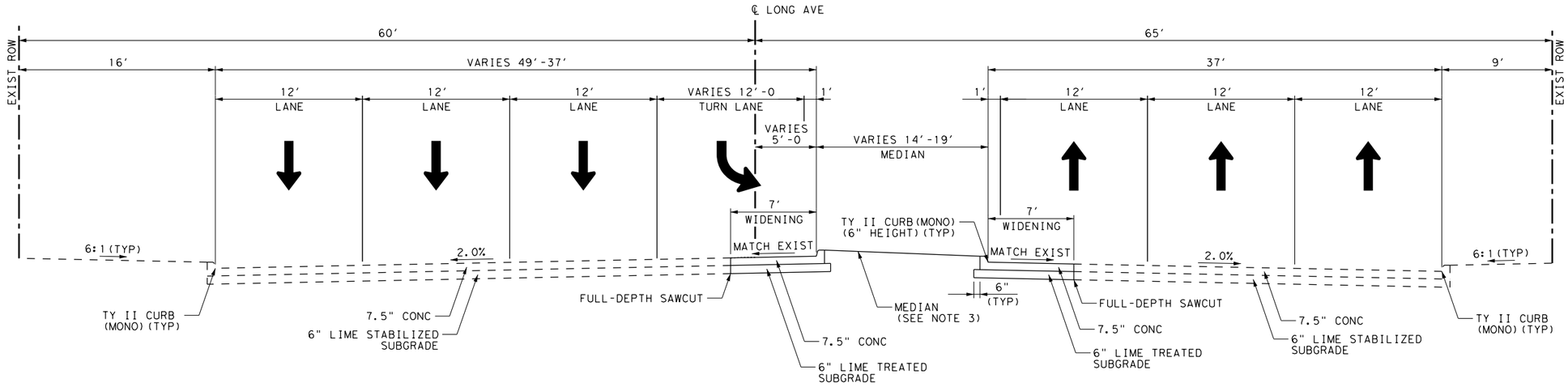
SCALE: N.T.S.

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	5
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\GEN\894RTS01.sht

TIME: 9:35:05 AM
DATE: 3/27/2023



WESTBOUND LONG AVE

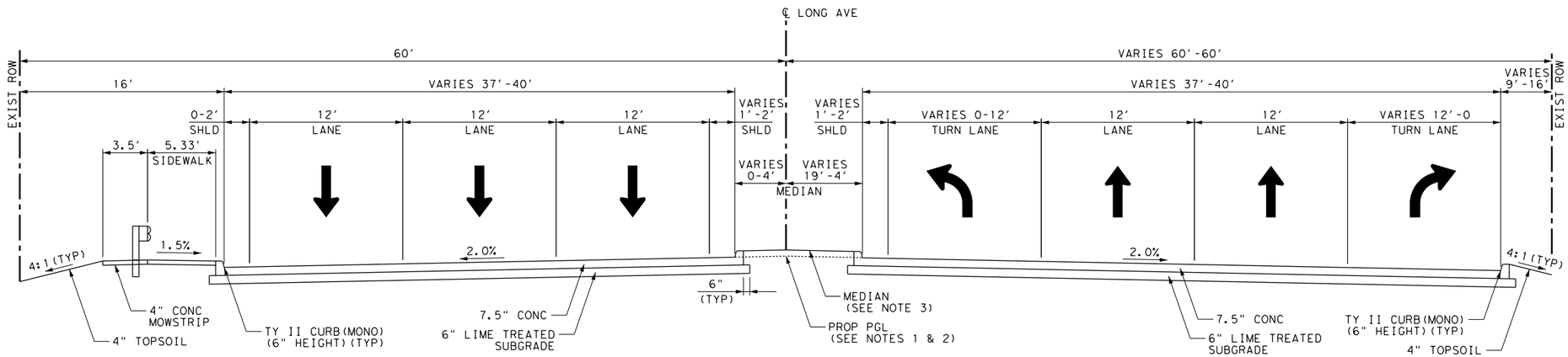
PROPOSED TYPICAL SECTION

STA 13+66.00 - STA 15+25.00

EASTBOUND LONG AVE

NOTES:

1. FOR PGL LOCATION, PROJECT PAVEMENT CROSS SLOPE TO CENTERLINE OF LONG AVE.
2. THE AXIS OF ROTATION FOR ALL PAVEMENTS IS LOCATED AT THE PGL.
3. REFER TO PLAN & PROFILE FOR SPECIFIC LIMITS OF RIPRAP, MBGF, RAILS, MOW STRIP, FLUMES, AND CONCRETE MEDIANS.
4. ALL SAWCUTS TO BE FULL DEPTH AND AWAY FROM WHEELPATHS. REFER TO REMOVAL LAYOUT FOR SAWCUT LOCATIONS.
5. EXISTING PAVEMENT STRUCTURE OBTAINED FROM BORING LOG INFORMATION AND FROM CITY OF FORT WORTH AS-BUILTS FILE K-636.
6. EXISTING RIGHT-OF-WAY IS APPROXIMATE AND OBTAINED FROM AS-BUILT PLANS AND EXISTING FEATURES.



WESTBOUND LONG AVE

PROPOSED TYPICAL SECTION

STA 15+25.00 - STA 16+72+50
BRIDGE LIMITS (SEE BRIDGE LAYOUTS): STA 16+72.50 - STA 18+72.50

EASTBOUND LONG AVE

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966

03/27/2023

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

Texas Department of Transportation

E. LONG AVENUE

PROPOSED TYPICAL SECTIONS

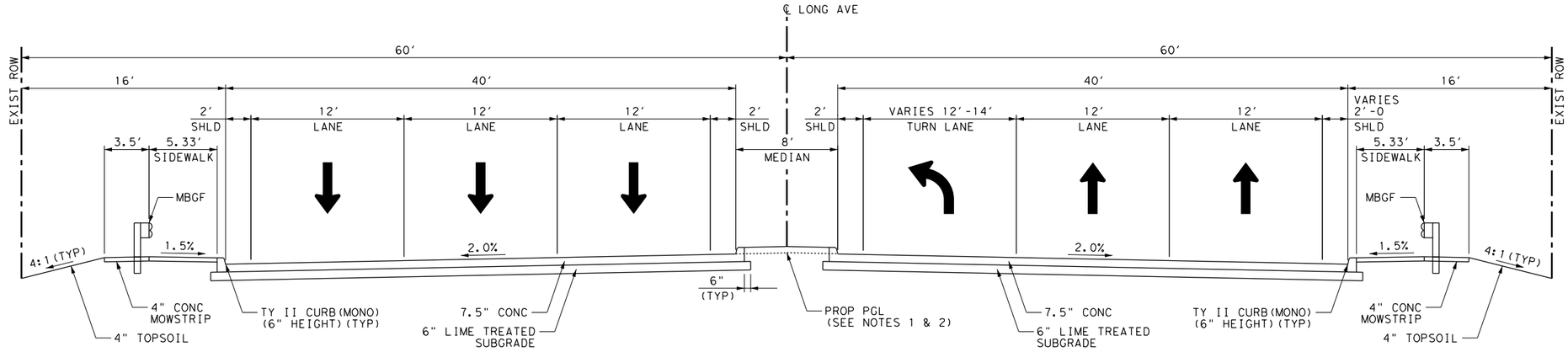
SCALE: N.T.S.

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	6
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\GEN\894RTS02.sht

TIME: 8:32:45 AM
DATE: 1/20/2023

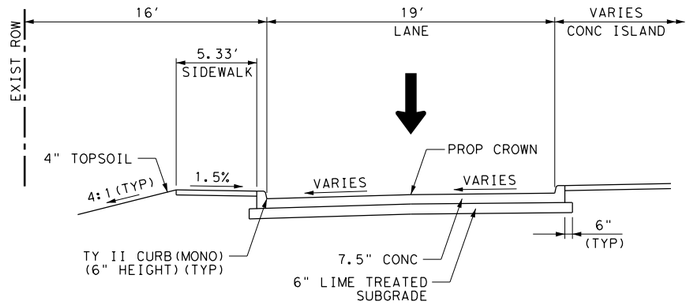


WESTBOUND LONG AVE

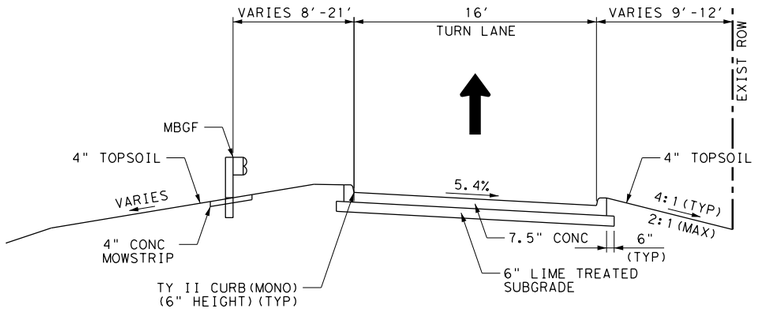
EASTBOUND LONG AVE

PROPOSED TYPICAL SECTION

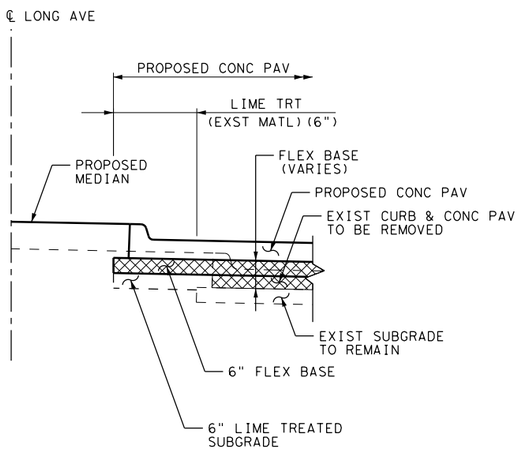
STA 18+72.50 - STA 19+55.00
BRIDGE LIMITS (SEE BRIDGE LAYOUTS): STA 16+72.50 - STA 18+72.50



PROPOSED TYPICAL SECTION
BEACH ST RTL



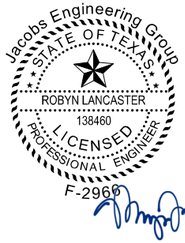
PROPOSED TYPICAL SECTION
BROADWAY AVE RAMP



SUBGRADE DETAIL

NOTES:

1. FOR PGL LOCATION, PROJECT PAVEMENT CROSS SLOPE TO CENTERLINE OF LONG AVE.
2. THE AXIS OF ROTATION FOR ALL PAVEMENTS IS LOCATED AT THE PGL.
3. REFER TO PLAN & PROFILE FOR SPECIFIC LIMITS OF RIPRAP, MBGF, RAILS, MOW STRIP, FLUMES, AND CONCRETE MEDIANS.
4. ALL SAWCUTS TO BE FULL DEPTH AND AWAY FROM WHEELPATHS. REFER TO REMOVAL LAYOUT FOR SAWCUT LOCATIONS.
5. EXISTING PAVEMENT STRUCTURE OBTAINED FROM BORING LOG INFORMATION AND FROM CITY OF FORT WORTH AS-BUILTS FILE K-636.
6. EXISTING RIGHT-OF-WAY IS APPROXIMATE AND OBTAINED FROM AS-BUILT PLANS AND EXISTING FEATURES.



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

Texas Department of Transportation

E. LONG AVENUE

PROPOSED TYPICAL SECTIONS

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	7
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\GEN\894RTS03.sht

Specification Data

Basis of Estimate

Item	Description	Rate	Unit
166	Fertilizer (16-8-8)	600 lb./acre**	ton
168	Vegetative Watering	169,400 gal./acre	1,000 gal.
260	Lime (Hydrated lime (slurry))	150 lb./cu. yd.	ton
3076	Hot Mix (All Types)	115 lb./sq. yd.-in.	ton
3076	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.

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

Compaction Requirements for Base Courses

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

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

Special Notes

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

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

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

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/. Access is read-only.

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

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

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

Area Engineer's Email: Minh.Tran@txdot.gov
Assistant Area Engineer's Email: Daniel.Poole@txdot.gov
Design Manager's Email: Sam.Yacoub@txdot.gov

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

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

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

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

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

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

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

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.
When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

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

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

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

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

All driveway openings will be determined by the Engineer and will conform with Texas Department of Transportation "Regulations for Access Driveways to State Highways" adopted September 1953, and revised June 2004.
Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines, and grades are to be established in the field.

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

Remove the grass from the crown of shoulders or pavement edges by blading or other approved methods. Payment for this work will not be made directly, but will be subsidiary to the various items of the contract.

Locations shown for drainage structures refer to the control points of structures as follows:

1) Manholes, Inlets, and Junction Boxes—Locations are at the centroid of the structure; when two structure types are specified, location is at the centroid of the top structure. Bottom structure may be positioned as required to align with top structure, storm drain pipes and other adjacent structures.

2) Street Inlets—Locations are at the face of curb at a distance of L/2 from the end of the inlet.

3) Headwalls—Locations are to the outside face of the headwall at the centerline of the pipe or box structure. For pipe headwalls with Type "P" or "C" safety end treatment, locations are on the centerline of the pipe structure at the limit of payment for pipe.

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

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

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

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

Item 4 – Scope of Work

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

Item 5. Control of the Work

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

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

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

Prior to contract letting, bidders may obtain a free computer diskette or a computerized transfer of files (from the Engineer’s office) that contains the earthwork information in ASCII format, plain text files. If copies of the actual cross-sections are requested, in addition to, or instead of the diskette, they will be available at the Engineers office for borrowing by copying companies for the purpose of making copies for the bidder, at the bidder’s expense.

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

Item 6. Control of Materials

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

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

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

Item 7. Legal Relations and Responsibilities

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to haul roads, equipment staging areas, borrow and disposal sites. "Associated" as defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The contractor will be responsible for all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the Department with a copy of all consultations or approvals from the USACE prior to initiating activities.
The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

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

(1) Restricted Use of Materials for Previously Evaluated Permit Areas. Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:

a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;

b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:

a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 2.09 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

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

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

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

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

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

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

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

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

Event Lane Closure Restrictions 3 PM the day before Event to 9 AM the day after the Event
Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)
Grapevine Festivals (Including but not limited to: Carol of Lights, Black Friday Weekend, Christmas Parade, and weekends during Christmas Capital of Texas)

Item 8. Prosecution and Progress

The maximum number of working days for the completion of the project is 254 days.

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

Use a Critical Path Method (CPM) schedule in P6 format for this project. Submit baseline the schedule and obtain approval prior to beginning construction. The baseline schedule working days will be the same as the number of working days established by the Contract. The Estimate will be held if a monthly schedule update is not submitted. Also submit the XER file.

Nighttime work is not allowed.

The road-user cost liquidated damages is $106 per day.

Item 100. Preparing Right of Way

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

Item 104. Removing Concrete

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

Item 110. Excavation

Cross-sections for pay quantity determination of earthwork may be developed photogrammetrically.

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

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

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

Off-Site Borrow Sources. In addition to meeting pertinent specification requirements, test off-site borrow sources for sulfate content. Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E and provide documentation that supports compliance with previously stated requirements. The Engineer will perform additional testing for sulfates of this

material upon delivery to the project. Only material that is placed within one foot vertically or laterally of subgrade treatment will require testing for sulfates. Remove and replace failing material (sulfate concentrations >7,000 PPM by dry weight).

Item 132. Embankment

Provide Type D embankment material free from vegetation and other objectionable material, with a Plasticity Index (PI) between 5 and 25.

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

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

1. At the "beginning of bridge" or "end of bridge" station (if abutment is on retaining wall, location may be adjusted by not more than 5 feet.)
2. At 25-foot intervals for a distance of 150 feet in advance of the "beginning of bridge" station.
3. At 25-foot intervals for a distance of 150 feet after the "end of bridge" station.

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

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

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

Item 161. Compost

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

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

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

Blending compost on site is not permitted.

Item 164. Seeding for Erosion Control

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

Item 168. Vegetative Watering

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

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

Average weekly rainfall rates for the District are:

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

County: Tarrant

Highway: CS

Item 247. Flexible Base

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

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

Item 260. Lime Treatment (Road-Mixed)

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

Item 360. Concrete Pavement

When using the Hardy Chair-Lok to support reinforcing steel, chair spacing may be increased to 1.67 sq. yd. per chair, placed in a diamond or square pattern. Do not exceed 60" longitudinal spacing.

The provisions of Article 360.6.2, “Deficient Thickness Adjustment,” will not be a requirement and the pavement will not be cored.

Include the approved mix design number on each delivery ticket.

Item 400. Excavation and Backfill for Structures

Class B bedding will be permitted in lieu of Class C bedding.

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

Item 420. Concrete Substructures

Restrict large aggregate size to ¾” maximum for class “C” concrete used in aesthetic details requiring form liners.

Provide weepholes at bridge ends in the wingwalls as directed.

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

County: Tarrant

Highway: CS

Item 421. Hydraulic Cement Concrete

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

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

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

Concrete will not be rejected for low air content. Adjustment to the dosage of air entrainment will be as directed or allowed by the Engineer.
Include the approved mix design number on each delivery ticket.

Item 427. Surface Finishes for Concrete

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

Item 432. Riprap

Provide weep holes as directed.

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

An toe wall is required at the exposed edges of all concrete riprap, per CRR standard, unless otherwise directed.

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

Use rebar for all reinforcement. Do not use wire mesh or synthetic fiber.

Item 440. Reinforcement for Concrete

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

County: Tarrant

Highway: CS

Item 454. Bridge Expansion Joints

For header-type expansion joints refer to the following TxDOT website for the approved systems:
http://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html

Item 464. Reinforced Concrete Pipe

All bends and connections in pipe must be prefabricated.

Item 465. Manholes and Inlets

Do not use precast tops for inlets.

Item 466. Headwalls and Wingwalls

Do not use precast headwalls/wingwalls.

Item 496. Removing Structures

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

Notify the Texas Department of State Health Services (DSHS) prior to demolition or renovation of bridges or other structures, using DSHS Form APB#5, “Demolition/Renovation Notification Form”. The form and instructions may be found on the DSHS Asbestos Programs Branch web page at http://www.dshs.state.tx.us/asbestos/notification.shtm. The DSHS notification form must be hand-delivered or mailed to (received at) the DSHS Austin office at least ten working days (10) days prior to commencing demolition or renovation. Fax or e-mail notifications will not be accepted. For projects with multiple bridges, a single notification, with a listing of all bridges or structures to be demolished or renovated and the expected start dates of their demolition or renovation (the start date is defined as the first date of visible demolition activities). Notify the DSHS Regional or Local inspector of all start date changes. The expected project completion date may be used as the “end” date.

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

County: Tarrant

Highway: CS

Item 502. Barricades, Signs, and Traffic Handling

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

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

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

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

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

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

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

Item 504. Field Office and Laboratory

The Contractor shall furnish the following structures for this project:

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

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

a) Minimum of 6 desks with chairs
b) A meeting table capable of seating 10 people with chairs
c) Two (2) equipment storage closets. Each closet shall provide a minimum of 3ftx3ft of floor space or equivalent and shall have provisions for locking securely.

d) Three (2) four drawer metal locking filing cabinets
e) One (1) refrigerator (minimum 18 CF)
f) One (1) microwave oven
g) One (1) water cooler with water service
h) One Wireless Capable Plain Paper Copier/Printer/Scanner/Fax machine, 30 ppm, 2GB memory, and 11x17 paper size capable.
i) Two (2) Laptop Computers.
j) Internet Service with minimum of 30 GB connectivity.
k) Wireless Router
l) Weekly janitorial service
m) Minimum 4Ft x 4 Ft top and bottom landing at all steps to field office

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

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

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

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

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

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

Item 512. Portable Concrete Traffic Barrier

"*Furnish and Install*" barrier in compliance with Concrete Safety Barrier (CSB), Single-Slope Concrete Barrier (SSCB), or Low Profile Concrete Barrier (LPCB) standards as shown on the plans.

Furnish Class H Concrete with a minimum 28 day compressive strength of 3,600 psi.

Provide the hardware assemblies to join barrier sections, including barrier from stockpile.

Provide welded tie bar assembly at the assembly joints when using slotted-end PCTB as shown on Fort Worth Standard PCTB(1)-03(FW) joint tie details.

For permanent installations, grout the joints with an approved non-shrink grout material when using slotted-end PCTB.

Provide (2) 1-1/4" x 2'2" threaded rods, (4) standard USS washers, grade 5, (4) 1-1/4" hex nuts, and (2) 5" x 10" x 3/8" plate washers for each section of LPCB.

Connection hardware will remain the property of the State upon completion of the project and will not be paid for directly but will be subsidiary to Item 512,"Portable Concrete Traffic Barrier". Deliver hardware to the location specified by the Engineer.

Delineate all barriers in accordance with Barricade and Construction (BC) Standard sheets. Barrier delineation will not be paid for directly, but will be subsidiary to Item 512,"Portable Concrete Traffic Barrier".

Remove and replace traffic barrier damaged by the traveling public and no longer serviceable as directed. Replace traffic barrier with Department-furnished barrier from designated stockpile as directed. Additional payment will be provided as compensation to remove and replace the traffic barrier damaged by the traveling public in accordance with Item 512. Return the damaged traffic barrier to the stockpile site as directed.

Items 530 And 531. Intersections, Driveways and Turnouts, and Sidewalks

The furnishing and installation of the sand cushion in proposed sidewalks, sidewalk ramps, and driveways will not be paid for directly but will be subsidiary to this bid item.

Item 540. Metal Beam Guard Fence

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

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

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

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing

and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

When connecting a Thrie-Beam to a concrete wingwall, bridge rail, CTB, etc., drill the holes for bolt placement using rotary or core type equipment. Use a core type drill when reinforcing steel is encountered. Do not use percussion or impact drilling. Repair damage to the concrete and spalls exceeding ½" from the edge of the hole.

Item 542. Removing Metal Beam Guard Fence

Remove existing metal beam guard fence only when authorized.

Item 585. Ride Quality for Pavement Surfaces

Ride quality requirements are waived.

Item 618:

The polymer concrete barrier box will not be paid for separately, but will be considered subsidiary to ITEM 618, "CONDUIT". Mount the polymer concrete junction boxes shown on the Concrete Safety Barrier (CSB) standard sheets recessed (- ¼ ", - ¾ ") and weld a ¼" steel plate to the captive bolts so that it is flush (+0", - ¼ ") with surface of concrete barrier.

Place conduit under railroad tracks to maintain a minimum of 42" below the bottom of the ties

The location of conduits and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed.

Secure permission and approval from the proper authority prior to cutting into or removing any sidewalks or curbs for installation of this Item.

When holes are drilled through concrete structures, use a coring device. Do not use masonry or concrete drills.

Structurally mount junction boxes as shown on the plans. When used for traffic signal installations, use boxes 12"x12"x8", or as approved.

Place conduit under existing pavement by an approved boring method. Do not place boring pits closer than 2 feet from the edge of the pavement unless otherwise directed. Do not use water jetting. When conduits are bored, do not exceed 18 inches in the vertical and horizontal tolerances as measured from the intended target point.

Do not use a pneumatically driven device for punching holes beneath the pavement (commonly known as a "missile").

Furnish and install a non-metallic mule tape in conduit runs in excess of 50 feet. Also furnish and install non-metallic mule tape in conduit installed for future use and cap using standard weather-tight conduit caps, as approved. Furnish Garvin # PT-1250-3K, ComStar PUL 1250P3K, Ideal Part No. 31-315 or equal as approved by the Engineer. This work will not be paid for directly, but is subsidiary to this Item.

Use a colored cleaner-primer on all PVC to PVC joints before application of PVC cement.

Seal all conduit ends with a permanently soft, non-toxic duct seal. Use a duct seal that does not adversely affect other plastic materials or corrode metals.

Seal all conduit ends with lighting circuits with at least three feet of polyurethane foam approved by the Engineer that will not adversely affect other plastic materials or corrode metals.

Existing conduit is proposed for reuse in this project. Conduit prep will be paid for under Item 6027 as directed by the Engineer.

When using existing conduit, ensure that all conduits have bushings and are cleaned of mud and debris. Restrap conduit that is being relocated to new timber poles as if it were a new installation. This work will not be paid for directly, but is subsidiary to this Item.

Communications cable shall be installed in a separate conduit and bored separately.

2" Schedule 80 PVC will be used at the power pole to supply electricity to underground services.

Item 620:

The equipment grounding conductor shall be identified by a continuous green colored jacket insulation or bare wire. Grounded conductors (Neutral) shall be identified by a continuous white colored jacket. Ungrounded conductors (Hot) in a 120/240v or 240/480v system shall be identified by each pole or leg. For 240-volt branch circuit fed from 120/240 source and 480-volt branch circuit fed from 240/480 source, ensure one leg is identified by a continuous black colored jacket and the other leg by a continuous red colored jacket.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holder as shown on the Texas Department of Transportation (TxDOT) - Construction Division's (CST) materials producers list. Category is "Roadway Illumination and Electrical Supplies." Fuse holder is shown on list under Items 610 & 620. Provide 10 amp time delay fuses.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected

on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Item 684:

Provide 18 AWG Type C signal cables for loop detector lead-ins.

Provide stranded 14 AWG Type A signal cables for LED signal heads and stranded 12 AWG Type C cables for APS units.

Provide a separate multi-conductor signal cable (14 AWG) inside pedestal poles and signal poles from the terminal strip to each signal head as shown on the plans.

Identify each cable as shown on the plans (cable 1, etc.) with permanent marking labels (Panduit Type PLM standard single marker tie, Thomas&Betts Type 548M, or equal) at each ground box, pole base, and controller.

Item 690:

Multiple single conductors in the same conduit shall be considered one (1) cable for the purpose of removals and installation.

Item 3076. Dense-Graded Hot-Mix Asphalt

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

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

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the base course.

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

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

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

Grade substitution per Table 5 is not allowed.

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

Include the approved mix design number on each delivery ticket.

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

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

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

Item 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.
Four electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

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

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

Item 6027: Preparation of Existing Conduits, Ground Boxes, or Manholes:

The Contractor is responsible for damage done to existing cable during the preparation of existing conduit. The Contractor will repair or replace damage done to existing cables. The

repairing or replacing of damage to existing cables will be done at the expense of the Contractor, and to the satisfaction of the Engineer.

Item 6185. Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 1 additional shadow vehicle(s) with TMA for TCP (2-5)-18 as detailed on General Note of this standard sheet.

Therefore, 2 total shadow vehicles with TMA will be required for this type of work. Determine if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0902-48-894 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY LONG

			CONTROL SECTION JOB		**0902-48-894**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00037909**		
			COUNTY		**Tarrant**		
			HIGHWAY		**LONG**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	6.120		6.120	
	104-6001	REMOVING CONC (PAV)	SY	2,179.000		2,179.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	2,313.000		2,313.000	
	104-6011	REMOVING CONC (MEDIANS)	SY	50.000		50.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	13.000		13.000	
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	4.000		4.000	
	110-6001	EXCAVATION (ROADWAY)	CY	515.000		515.000	
	132-6008	EMBANKMENT (FINAL)(DENS CONT)(TY D)	CY	186.000		186.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	1,190.000		1,190.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	1,190.000		1,190.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)	SY	595.000		595.000	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)	SY	595.000		595.000	
	168-6001	VEGETATIVE WATERING	MG	42.000		42.000	
	247-6236	FL BS (RDWY DEL)(TY A GR 1-2)(FNAL POS)	CY	313.000		313.000	
	260-6002	LIME (HYDRATED LIME (SLURRY))	TON	3.000		3.000	
	260-6027	LIME TRT (EXST MATL)(8")	SY	110.000		110.000	
	305-6005	SALV, HAUL & STKPL RCL APH PV (6 TO 8")	SY	806.000		806.000	
	310-6001	PRIME COAT (MULTI OPTION)	GAL	161.000		161.000	
	360-6010	CONC PVMT (CONT REINF - CRCP) (7.5")	SY	1,875.000		1,875.000	
	400-6005	CEM STABIL BKFL	CY	588.000		588.000	
	403-6001	TEMPORARY SPL SHORING	SF	850.000		850.000	
	416-6001	DRILL SHAFT (18 IN)	LF	216.000		216.000	
	416-6004	DRILL SHAFT (36 IN)	LF	868.000		868.000	
	420-6009	CL A CONC (COLLAR)	EA	1.000		1.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	153.300		153.300	
	420-6030	CL C CONC (CAP)(HPC)	CY	124.800		124.800	
	420-6038	CL C CONC (COLUMN)(HPC)	CY	78.800		78.800	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY	4.000		4.000	
	422-6002	REINF CONC SLAB (HPC)	SF	19,200.000		19,200.000	
	422-6014	BRIDGE SIDEWALK (HPC)	SF	3,746.000		3,746.000	
	422-6016	APPROACH SLAB (HPC)	CY	338.600		338.600	
	425-6035	PRESTR CONC GIRDER (TX28)	LF	2,697.600		2,697.600	
	432-6001	RIPRAP (CONC)(4 IN)	CY	19.000		19.000	
	432-6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	370.000		370.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	10.000		10.000	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB	320.000		320.000	
	450-6007	RAIL (TY T223)(HPC)	LF	492.000		492.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0902-48-894 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY LONG

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0902-48-894**			
		PROJECT ID		**A00037909**			
		COUNTY		**Tarrant**			
		HIGHWAY		**LONG**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	450-6033	RAIL (TY C223)(HPC)	LF	467.000		467.000	
	454-6004	ARMOR JOINT (SEALED)	LF	224.000		224.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	25.000		25.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	22.000		22.000	
	464-6006	RC PIPE (CL III)(27 IN)	LF	62.000		62.000	
	465-6011	JCTBOX(COMPL)(PJB)(6FTX6FT)	EA	3.000		3.000	
	465-6040	INLET (COMPL)(PCU)(5FT)(BOTH)	EA	2.000		2.000	
	466-6095	HEADWALL (CH - PW - 0) (DIA= 18 IN)	EA	1.000		1.000	
	467-6405	SET (TY II) (27 IN) (RCP) (6: 1) (P)	EA	1.000		1.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	2.000		2.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	15.000		15.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	225.000		225.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	225.000		225.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	609.000		609.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	609.000		609.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	122.000		122.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	122.000		122.000	
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	200.000		200.000	
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	100.000		100.000	
	512-6033	PORT CTB (MOVE)(LOW PROF)(TY 1)	LF	280.000		280.000	
	512-6034	PORT CTB (MOVE)(LOW PROF)(TY 2)	LF	60.000		60.000	
	512-6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	200.000		200.000	
	512-6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	100.000		100.000	
	529-6003	CONC CURB (TY II A)	LF	96.000		96.000	
	529-6005	CONC CURB (MONO) (TY II)	LF	1,104.000		1,104.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	14.000		14.000	
	531-6001	CONC SIDEWALKS (4")	SY	90.000		90.000	
	531-6004	CURB RAMPS (TY 1)	EA	1.000		1.000	
	531-6005	CURB RAMPS (TY 2)	EA	1.000		1.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	162.500		162.500	
	540-6007	MTL BEAM GD FEN TRANS (TL2)	EA	2.000		2.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	463.000		463.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1.000		1.000	
	545-6006	CRASH CUSH ATTEN (INSTL)(L)(N)(TL2)	EA	2.000		2.000	
	545-6009	CRASH CUSH ATTEN (INSTL)(L)(W)(TL2)	EA	2.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0902-48-894 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY LONG

			CONTROL SECTION JOB		**0902-48-894**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00037909**		
			COUNTY		**Tarrant**		
			HIGHWAY		**LONG**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	618-6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	100.000		100.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	100.000		100.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	200.000		200.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	4.000		4.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	1.000		1.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	10.000		10.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	10.000		10.000	
	658-6044	INSTL DEL ASSM (D-DY)SZ 2(WC)GND	EA	2.000		2.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	6.000		6.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF	1,850.000		1,850.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	5,905.000		5,905.000	
	662-6094	WK ZN PAV MRK REMOV (Y)4"(DOT)	LF	640.000		640.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	7,335.000		7,335.000	
	666-6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	1,035.000		1,035.000	
	666-6172	REFL PAV MRK TY II (W) 6" (DOT)	LF	68.000		68.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	758.000		758.000	
	666-6176	REFL PAV MRK TY II (W) 8" (DOT)	LF	25.000		25.000	
	666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1,050.000		1,050.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	73.000		73.000	
	666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	7.000		7.000	
	666-6192	REFL PAV MRK TY II (W) (WORD)	EA	7.000		7.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	1,224.000		1,224.000	
	666-6225	PAVEMENT SEALER 6"	LF	3,085.000		3,085.000	
	666-6226	PAVEMENT SEALER 8"	LF	1,075.000		1,075.000	
	666-6230	PAVEMENT SEALER 24"	LF	73.000		73.000	
	666-6231	PAVEMENT SEALER (ARROW)	EA	7.000		7.000	
	666-6232	PAVEMENT SEALER (WORD)	EA	7.000		7.000	
	672-6007	REFL PAV MRKR TY I-C	EA	79.000		79.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	36.000		36.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	628.000		628.000	
	677-6038	ELIM EXT PAV MRK & MRKRS(PLOWABLE RPMS)	EA	468.000		468.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	3,085.000		3,085.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	1,075.000		1,075.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	73.000		73.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	7.000		7.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	7.000		7.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0902-48-894 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY LONG

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0902-48-894**			
		PROJECT ID		**A00037909**			
		COUNTY		**Tarrant**			
		HIGHWAY		**LONG**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	678-6033	PAV SURF PREP FOR MRK (RPM)	EA	115.000		115.000	
	684-6029	TRF SIG CBL (TY A)(14 AWG)(3 CONDR)	LF	225.000		225.000	
	684-6046	TRF SIG CBL (TY A)(14 AWG)(20 CONDR)	LF	225.000		225.000	
	690-6011	INSTALL OF CABLES	LF	450.000		450.000	
	3076-6001	D-GR HMA TY-B PG64-22	TON	348.000		348.000	
	3076-6066	TACK COAT	GAL	161.000		161.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	1,960.000		1,960.000	
	6004-6031	ITS COM CBL (ETHERNET)	LF	225.000		225.000	
	6027-6008	GROUND BOX (PREPARE)	EA	4.000		4.000	
	6185-6002	TMA (STATIONARY)	DAY	393.000		393.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	5.000		5.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

TIME: 4:28:48 PM
DATE: 1/24/2023

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS																				
LOCATION	502 6001	305 6005	310 6001	3076 6066	403 6001	512 6009	512 6010	512 6033	512 6034	512 6057	512 6058	662 6060	662 6063	662 6094	662 6095	677 6001	677 6038	6001 6001	6185 6002	6185 6005	3076 6001
	BARRICADES, SIGNS AND TRAFFIC HANDLING	SALV, HAUL & STKPL RCL APH PV (6 TO 8")	PRIME COAT (MULTI OPTION)	TACK COAT	TEMPORARY SPL SHORING	PORT CTB (FUR & INST) (LOW PROF) (TY 1)	PORT CTB (FUR & INST) (LOW PROF) (TY 2)	PORT CTB (MOVE) (LOW PROF) (TY 1)	PORT CTB (MOVE) (LOW PROF) (TY 2)	PORT CTB (REMOVE) (LOW PROF) (TY 1)	PORT CTB (REMOVE) (LOW PROF) (TY 2)	WK ZN PAV MRK REMOV (W) 4" (BRK)	WK ZN PAV MRK REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (DOT)	WK ZN PAV MRK REMOV (Y) 4" (SLD)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKRS (PLOWABLE RPMS)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)	D-GR HMA TY-B PG64-22
	MO	SY	GAL	GAL	SF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	DAY	DAY	DAY	TON
E LONG AVE																					
PHASE 1			161	161								391	249	100	2006	329	394	240		1	348
PHASE 2		45			403	180	80					341	1973	250	1693	299	44	740	176	1	
PHASE 3A		79				20		180	40		40	187	2999	190	2000		30	120	4	1	
PHASE 3B		192			447		20	100	20	20			124					740	213	1	
PHASE 4		490								180	60	931	560	100	1636			120		1	
PROJECT TOTALS	15	806	161	161	850	200	100	280	60	200	100	1850	5905	640	7335	628	468	1960	393	5	348

SUMMARY OF REMOVAL ITEMS								
LOCATION	100 6002	104 6001	104 6009	104 6011	104 6017	104 6036	542 6001	544 6003
	PREPARING ROW	REMOVING CONC (PAV)	REMOVING CONC (RIPRAP)	REMOVING CONC (MEDIANS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (SIDEWALK OR RAMP)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)
	STA	SY	SY	SY	SY	SY	LF	EA
E LONG AVE	6.12	2179	2313	50	13	4	463	1
PROJECT TOTALS	6.12	2179	2313	50	13	4	463	1

SUMMARY OF ROADWAY ITEMS														
LOCATION	110 6001	132 6008	247 6236	260 6002	260 6027	360 6010	420 6066	432 6001	432 6008	432 6045	450 6007	529 6003	529 6005	530 6017
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY D)	FL BS (RDWY DEL) (TY A GR 1-2) (FNAL POS)	LIME (HYDRATED LIME (SLURRY))	LIME TRT (EXST MATL) (8")	CONC PVMT (CONT REINF - CRCP) (7.5")	CL C CONC (RAIL FOUNDATION)	RIPRAP (CONC) (4 IN)	RIPRAP (CONC) (CL B) (RR8&RR9)	RIPRAP (MOW STRIP) (4 IN)	RAIL (TY T223) (HPC)	CONC CURB (TY II A)	CONC CURB (MONO) (TY II)	DRIVEWAYS (CONC) (HES)
	CY	CY	CY	TON	SY	SY	CY	CY	CY	CY	LF	LF	LF	SY
E LONG AVE	515	186	313	3	110	1875	4	19	370	10	20	96	1104	14
PROJECT TOTALS	515	186	313	3	110	1875	4	19	370	10	20	96	1104	14

SUMMARY OF ROADWAY ITEMS								
LOCATION	531 6001	531 6004	531 6005	540 6001	540 6007	540 6016	545 6006	545 6009
	CONC SIDEWALKS (4")	CURB RAMPS (TY 1)	CURB RAMPS (TY 2)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (TL2)	DOWNSTREAM ANCHOR TERMINAL SECTION	CRASH CUSH ATTEN (INSTL) (L) (N) (TL2)	CRASH CUSH ATTEN (INSTL) (L) (W) (TL2)
	SY	EA	EA	LF	EA	EA	EA	EA
E LONG AVE	90	1	1	162.5	2	2	2	2
PROJECT TOTALS	90	1	1	162.5	2	2	2	2

SUMMARY OF DRAINAGE ITEMS								
LOCATION	420 6009	464 6003	464 6005	464 6006	465 6040	465 6011	466 6095	467 6405
	CL A CONC (COLLAR)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (27 IN)	INLET (COMPL) (PCU) (5FT) (BOTH)	JCTBOX (COMPL) (PJB) (6FTX6FT)	HEADWALL (CH - PW - O) (DIA= 18 IN)	SET (TY II) (27 IN) (RCP) (6:1) (P)
	EA	LF	LF	LF	EA	EA	EA	EA
E LONG AVE	1	25	22	62	2	3	1	1
PROJECT TOTALS	1	25	22	62	2	3	1	1

FILE: ...\WFX08702 - WA2\SU\894GQS01.sht

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

Texas Department of Transportation

E. LONG AVENUE

QUANTITY SUMMARIES

SCALE: N.T.S.

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	10
BHK				
CHECK	0902	48	894	
PKC				

TIME: 12:27:09 PM
DATE: 2/6/2023

SEE TRAFFIC SIGNAL LAYOUT SHEETS FOR SUMMARY OF TRAFFIC SIGNAL ITEMS.
SEE BRIDGE ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS SHEETS FOR SUMMARY OF BRIDGE ITEMS.

SUMMARY OF SIGNING ITEMS

LOCATION	644 6001	644 6068	644 6076	658 6013	658 6061	658 6026	658 6044
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	RELOCATE SM RD SN SUP&AM TY 10BWG	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	INSTL DEL ASSM (D-DY)SZ 2(WC)GND
	EA	EA	EA	EA	EA	EA	EA
E LONG AVE	4	1	1	10	6	10	2
PROJECT TOTALS	4	1	1	10	6	10	2

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6171	666 6172	666 6174	666 6176	666 6178	666 6182	666 6184	666 6192	666 6210	666 6225	666 6226	666 6230	666 6231	666 6232
	REFL PAV MRK TY II (W) 6" (BRK)	REFL PAV MRK TY II (W) 6" (DOT)	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (W) 8" (DOT)	REFL PAV MRK TY II (W) 8" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (W) (ARROW)	REFL PAV MRK TY II (W) (WORD)	REFL PAV MRK TY II (Y) 6" (SLD)	PAVEMENT SEALER 6"	PAVEMENT SEALER 8"	PAVEMENT SEALER 24"	PAVEMENT SEALER (ARROW)	PAVEMENT SEALER (WORD)
	LF	LF	LF	LF	LF	LF	EA	EA	LF	LF	LF	LF	EA	EA
E LONG AVE	1035	68	758	25	1050	73	7	7	1224	3085	1075	73	7	7
PROJECT TOTALS	1035	68	758	25	1050	73	7	7	1224	3085	1075	73	7	7

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	672 6007	672 6010	678 6002	678 6004	678 6008	678 6009	678 6016	678 6033
	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-C-R	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (RPM)
	EA	EA	LF	LF	LF	EA	EA	EA
E LONG AVE	79	36	3085	1075	73	7	7	115
PROJECT TOTALS	79	36	3085	1075	73	7	7	115

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	161 6017	164 6001	164 6029	164 6031	168 6001	506 6020	506 6024	506 6040	506 6043	506 6038	506 6039
	COMPOST MANUF TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	CELL FBR MLCH SEED(TEMP)(WARM)	CELL FBR MLCH SEED(TEMP)(COOL)	VEGETATIVE WATERING	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (8")	BIODEG EROSN CONT LOGS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	SY	MG	SY	SY	LF	LF	LF	LF
E LONG AVE	1190	1190	595	595	42	225	225	122	122	609	609
PROJECT TOTALS	1190	1190	595	595	42	225	225	122	122	609	609

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

Texas Department of Transportation

E. LONG AVENUE

QUANTITY SUMMARIES

SCALE: N.T.S.

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	11
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\WFXQ8702 - WA2\SU\894GQS02.sht

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STATION	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE/RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1		58	E LONG AVE EB (MEDIAN)	16+49.50	TL-2	UNI	REINF CONCRETE	6" - 8"	STAND-ALONE	96"		50'+	1					1				
2		58	E LONG AVE EB (RT)	17+03.50	TL-2	UNI	REINF CONCRETE	6"	C223	12"	32"	16.00'	1				1					
3		58	E LONG AVE WB (LT)	18+41.50	TL-2	UNI	REINF CONCRETE	6"	C223	12"	32"	29.00'	1				1					
4		58	E LONG AVE WB (MEDIAN)	18+95.50	TL-2	UNI	REINF CONCRETE	6" - 8"	STAND-ALONE	96"		20.00'	1					1				
												TOTALS	4				2	2				

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/7/2023

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY	
	FTW	TARRANT	
	FEDERAL AID PROJECT		SHEET NO.
	(See Title Sheet)		12

TIME: 8:56:23 AM
DATE: 1/20/2023

GENERAL TCP NOTES

NOTES:

1. THE FOLLOWING SEQUENCE IS THE METHOD OF PROSECUTION OF THE CONSTRUCTION. THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGE TO THE OVERALL PROJECT SCHEDULE AND COST, ETC. IF THE PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH A CHANGE ORDER. THE CONTRACTOR SHALL NOT PROCEED WITH ANY CONSTRUCTION OPERATIONS UNTIL THIS REQUIREMENT IS MET.

2. THE CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE OF WORK TO THE PROJECT ENGINEER FOR APPROVAL PRIOR TO THE BEGINNING OF CONSTRUCTION AND WILL SUBMIT REQUESTS TO ALTER THE SEQUENCE OF OPERATION OF TCP PLANS TO THE ENGINEER FOR WRITTEN APPROVAL.

3. ALL BARRICADES, WARNING SIGNS, AND CHANNELIZING DEVICES FOR THE GUIDANCE AND PROTECTION OF TRAFFIC AND PEDESTRIANS MUST CONFORM TO THE INSTALLATION SHOWN IN THE 2011 TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AS CURRENTLY AMENDED AND STANDARD HIGHWAY SIGN DESIGNS (2014).

4. THE TRAFFIC CONTROL PLAN IDENTIFIES THE PHASE/STAGE/STEP IN WHICH ITEMS OF WORK MUST BE STARTED OR BY "LATE START". THE CONTRACTOR MAY BEGIN CONSTRUCTION AT AN EARLIER TIME, WITH APPROVAL BY THE ENGINEER, UNLESS OTHERWISE NOTED IN THE PLANS AND SPECIFICATIONS.

5. TRAFFIC CONTROL & LANE CLOSURES WILL BE IN ACCORDANCE WITH THE PLANS, BC, TCP, AND WZ STANDARDS AND AS DIRECTED BY THE ENGINEER. ALL CHANNELIZING DEVICES SHOULD BE SUPPLEMENTED BY TY C WARNING LIGHTS AS SPECIFIED IN BC (7)-21.

6. ALL TRAFFIC CONTROL SIGNS WILL FOLLOW THE MINIMUM SIGN SPACING ACCORDING TO THE TRAFFIC CONTROL STANDARDS. CONTRACTORS SHALL MAINTAIN TEMPORARY SIGNS WITHIN THE PROJECT LIMITS AND WHEN NOT APPLICABLE OR IN USE, WILL NEED TO BE COVERED OR REMOVED TO AID THE TRAVELING PUBLIC.

7. SIGNS, BARRICADES, AND OTHER WARNING DEVICES SHOWN SHALL BE CONSIDERED MINIMUM AND ADDITIONAL SIGNS, BARRICADES AND OTHER WARNING DEVICES DEEMED NECESSARY BY THE ENGINEER OR DICTATED BY FIELD CONDITIONS SHALL BE PROVIDED ACCORDINGLY TO ALL APPLICABLE STANDARDS AND THEY WILL BE SUBSIDIARY TO THE BID ITEM BARRICADES, SIGNS, AND TRAFFIC HANDLING.

8. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL ONLY BE PLACED IN AREAS WHERE SOIL DISTURBANCE IS EXPECTED TO OCCUR WITHIN TWO WEEKS. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL BE REMOVED IN EACH AREA WITHIN TWO WEEKS OF VEGETATION ESTABLISHMENT OR AS APPROVED BY THE ENGINEER.

9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE ALL LANE AND STREET CLOSURES, AND ACCOMMODATE PLANNED EVENTS WITH THE CITY OF FORT WORTH, TXDOT AND EMS PERSONNEL.

10. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EXISTING DRAINAGE FACILITIES IN GOOD ORDER UNTIL THOSE FACILITIES ARE REPLACED BY PERMANENT CONSTRUCTION OR THEIR FLOWS ARE REROUTED. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN INTERIM DRAINAGE IN AREAS THAT MAY BE AFFECTED BY DETOUR OR OTHER CONSTRUCTION THAT WERE NOT SPECIFICALLY ANTICIPATED HEREIN. POSITIVE DRAINAGE SHALL BE PROVIDED AND MAINTAINED FOR ALL DETOURS AND AFFECTED AREAS BY THE USE OF CROSS-SLOPE, DITCHES, TEMPORARY LINES, OR OTHER METHODS WETHER SPECIFICALLY SHOWN HEREIN OR NOT.

11. REFER TO THE STORM WATER POLLUTION PREVENTION PLAN FOR SW3P & EROSION CONTROL TREATMENTS AND DEVICES TO BE INSTALLED PRIOR TO EACH PHASE/STAGE/STEP OF CONSTRUCTION.

12. THE CONTRACTOR SHALL COORDINATE WITH THE CITY OF FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE CONSTRUCTION. PAYMENT SUBSIDIARY TO VARIOUS TRAFFIC SIGNAL ITEMS.

13. THE CONTRACTOR IS RESPONSIBLE FOR COMMUNICATING LANE CLOSURES, TRAFFIC SHIFTS AND OTHER CONSTRUCTION ACTIVITIES THAT WILL IMPACT TRAFFIC TO THE TRAVELING PUBLIC, ADJACENT PROPERTIES, AND EMS. THIS COMMUNICATION SHALL INCLUDE, BUT NOT BE LIMITED TO, THE PROJECT PCMS AND ISSUING NOTICES TO THE PRESS.

14. ACCESS TO ALL STREETS AND ADJOINING PROPERTIES SHALL BE MAINTAINED AT ALL TIMES. CHANNELIZING DEVICES AND SIGNS SHALL BE PLACED TO AVOID INTERFERENCE WITH DRIVEWAY, RAILROAD, AND CROSS STREET OPERATIONS.

15. BEFORE COMPLETION OF THE WORK, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARD MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE PROJECT IN A SMOOTH, CLEAN, NEAT AND SIGHTLY CONDITION.

NOTES:

16. UTILITIES NOT SHOWN ON TRAFFIC CONTROL PHASE LAYOUTS FOR CLARITY. REFER TO EXISTING UTILITY LAYOUTS, ROADWAY PLAN AND PROFILE, DRAINAGE PLAN, DRAINAGE PROFILE, BRIDGE LAYOUTS, AND TRAFFIC SIGNAL LAYOUT FOR UTILITY LOCATIONS. CONTRACTOR TO FIELD-VERIFY LOCATION OF ALL UTILITIES.

17. SEE TREATMENT FOR VARIOUS EDGE CONDITIONS SHEET FOR TREATMENT AT PAVEMENT DROP-OFFS.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL NARRATIVE

SCALE: N.T.S.

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	13
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894TCN01.sht

TIME: 1:09:23 PM
DATE: 1/18/2023

TCP NARRATIVE
SEQUENCE OF CONSTRUCTION

PRE-PHASE 1 - SITE PREPARATION

1. INSTALL ADVANCED WARNING SIGNS AND PROJECT SIGNS IN ACCORDANCE WITH TEXAS MUTCD, BC STANDARDS, OR AS DIRECTED.
2. IMPLEMENT STORM WATER POLLUTION PREVENTION PLAN (SW3P) AND EROSION CONTROL MEASURES THROUGHOUT PROJECT LIMITS.
3. PREPARE RIGHT-OF-WAY.

PHASE 1 - DEMOLISH EXISTING MEDIAN

1. INSTALL PORTABLE MESSAGE SIGNS (PCMS), LPCB, BARRICADES, CHANNELIZING DEVICES AND TEMP PAVEMENT MARKINGS IN PHASE 1 CONFIGURATION.
2. INSTALL PHASE 1 TEMPORARY SW3P MEASURES.
3. CLOSE INSIDE TRAVEL AND TURN LANES ON WB AND EB LONG AVE. TRAFFIC MAINTAINED ON OUTSIDE TWO LANES.
4. DEMOLISH EXISTING MEDIAN AS SHOWN IN PLANS. CONTRACTOR TO PROVIDE TEMP ASPHALT PAVEMENT TO ENSURE SMOOTH TEMP DRIVING SURFACE IN AREAS OF SAWCUT AND MEDIAN REMOVAL. SEE REMOVAL PLANS FOR LIMITS OF SAWCUT.
5. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE.
6. MAINTAIN EXISTING TRINITY METRO BUS ROUTES ALONG N BEACH ST.
7. INSTALL TEMPORARY TRAFFIC SIGNALIZATION.

PHASE 2 - CONSTRUCT WESTBOUND PORTION OF PROPOSED ROADWAY AND BRIDGE

1. INSTALL PCMS, LPCB, BARRICADES, CHANNELIZING DEVICES AND TEMP PAV MRKS IN PHASE 2 CONFIGURATION.
2. INSTALL PHASE 2 TEMPORARY SW3P MEASURES.
3. SHIFT ALL LONG AVE TRAFFIC TO THE EASTBOUND LONG AVE BRIDGE.
   CLOSE FREE RIGHT TURN BAY ALONG SB N. BEACH ST TO WB LONG AVE.
4. DEMOLISH EXISTING WB LONG AVE BRIDGE, ADA RAMPS, INLET, AND ASSOCIATED RIPRAP AS SHOWN IN PLANS.
5. CONSTRUCT WB LONG AVE BRIDGE, PAVEMENT, RAIL, RIPRAP, MBGF (OUTSIDE), DRAINAGE, AND ANCILLARY FEATURES AS SHOWN IN PLANS. LPCB TO REMAIN IN MEDIAN TO PROTECT EB TRAFFIC FROM NEW BRIDGE END.
6. USE STANDARD LANE CLOSURE DETAILS TO CONSTRUCT WB LONG AVE PERMANENT TRAFFIC SIGNALS AND PEDESTRIAN CROSSINGS, AND INSTALL SMALL SIGNS. CONTRACTOR RESPONSIBLE IS FOR COVERING PERMANENT SIGNS WHICH CONFLICT WITH TRAFFIC CONTROL SIGNAGE.

PHASE 3 STAGE 1 - CONSTRUCT EASTBOUND PAVEMENT AND DRIVEWAY

1. INSTALL PCMS, LPCB, BARRICADES, CHANNELIZING DEVICES AND TEMP PAV MRKS IN PHASE 3 STAGE 1 CONFIGURATION.
2. INSTALL TEMPORARY PHASE 3 STAGE 1 SW3P MEASURES.
3. SHIFT ALL TRAFFIC TO WESTBOUND BRIDGE AND PAVEMENT CONSTRUCTED IN PHASE 2.
4. CLOSE RIGHT TURN LANE TO BROADWAY AVE AND DETOUR TRAFFIC TO N BEACH ST INTERSECTION.
5. DRIVEWAY CLOSURE TO BE COORDINATED BY CONTRACTOR WITH ENGINEER AND PROPERTY OWNER.
   DEMOLISH EXISTING DRIVEWAY AND EB LONG AVE PAVEMENT ADJACENT TO DRIVEWAY AS SHOWN IN PLANS.

PHASE 3 STAGE 2- CONSTRUCT EASTBOUND PORTION OF PROPOSED ROADWAY AND BRIDGE

1. INSTALL PCMS, LPCB, BARRICADES, CHANNELIZING DEVICES AND TEMP PAV MRKS IN PHASE 3 STAGE 2 CONFIGURATION.
2. INSTALL TEMPORARY PHASE 3 STAGE 2 SW3P MEASURES.
3. TRAFFIC TO REMAIN IN PHASE 3 STAGE 1 CONFIGURATION.
4. CLOSE RIGHT TURN LANE TO BROADWAY AVE AND DETOUR TRAFFIC TO N BEACH ST INTERSECTION.
5. DEMOLISH EXISTING EB LONG AVE BRIDGE AND ASSOCIATED RIPRAP.
6. MAINTAIN ACCESS TO DRIVEWAYS.
7. CONSTRUCT EB LONG AVE BRIDGE, PAVEMENT, RAIL, RIPRAP, MBGF (OUTSIDE), DRAINAGE, AND ANCILLARY FEATURES AS SHOWN IN PLANS. LPCB TO REMAIN IN MEDIAN TO PROTECT WB TRAFFIC FROM NEW BRIDGE END.
8. USE STANDARD LANE CLOSURE DETAILS TO CONSTRUCT EB LONG AVE PERMANENT TRAFFIC SIGNALS AND INSTALL SMALL SIGNS. CONTRACTOR IS RESPONSIBLE FOR COVERING PERMANENT SIGNS WHICH CONFLICT WITH TRAFFIC CONTROL SIGNAGE.

PHASE 4 - CONSTRUCT MEDIAN, CURB & GUTTER, PERMANENT SIGNING & PAVEMENT MARKINGS

1. INSTALL PCMS, LPCB, BARRICADES, CHANNELIZING DEVICES AND TEMP PAVEMENT MARKINGS IN PHASE 4 CONFIGURATION.
2. CLOSE INSIDE TRAVEL AND TURN LANES ON WB AND EB LONG AVE. TRAFFIC MAINTAINED ON OUTSIDE TWO LANES.
3. CONSTRUCT LONG AVE MEDIAN, MBGF (INSIDE), CURB AND GUTTER, PED FACILITIES, AND ANCILLARY FEATURES SHOWN IN THE PLANS.
4. REMOVE LANE CLOSURES.
5. USE STANDARD LANE CLOSURE DETAILS TO CONSTRUCT PERMANENT TRAFFIC SIGNALS AND PEDESTRIAN CROSSINGS, INSTALL SMALL SIGNS AND PERMANENT PAVEMENT MARKINGS.
6. REMOVE SW3P DEVICES, TEMOPRARY SIGNALIZATION, PREFORM FINAL CLEAN UP, AND DEMOBILIZE.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL NARRATIVE

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	14
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TCNO2.sht

TIME: 1:09:42 PM
DATE: 1/18/2023

① OBEY WARNING SIGNS STATE LAW — R20-3T 48"X42"

② STAY ALERT / TALK OR TEXT LATER — G20-10T 60"X48"

③ BEGIN WORK ZONE — G20-9TP 24"X24"
TRAFFIC FINES DOUBLE — R20-5T 24"X30"
WHEN WORKERS ARE PRESENT — R20-5aTP 24"X12"

④ SPEED LIMIT 30 — R2-1 48"X60"

⑤ ROAD WORK AHEAD — CW20-1D 48"X48"

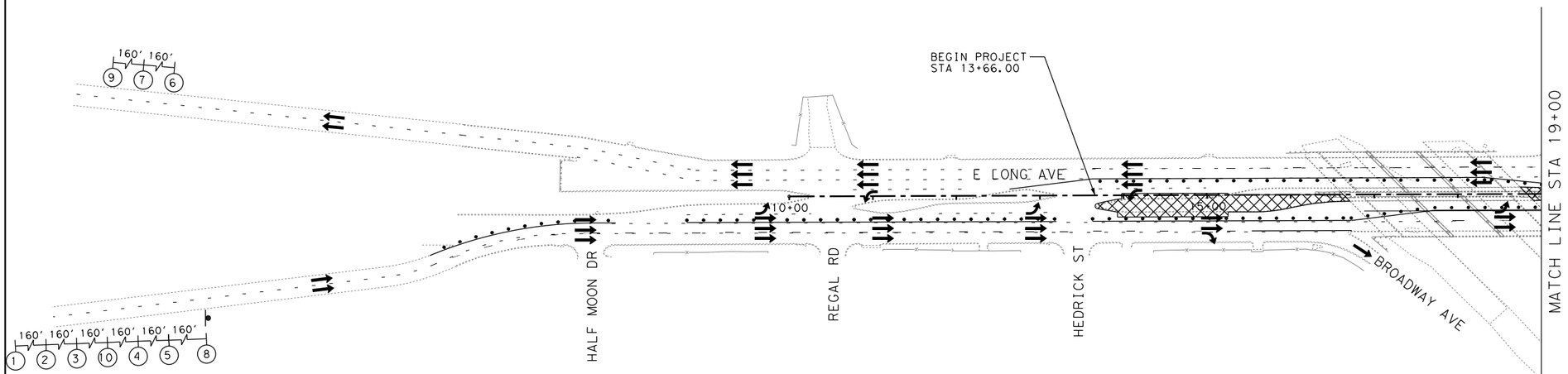
⑥ END ROAD WORK — G20-2 36"X18"

⑦ SPEED LIMIT 35 — R2-1 48"X60" (EXIST POSTED)

⑧ BEGIN ROAD WORK NEXT XX MILES — G20-5T 48"X24"
NAME ADDRESS CITY STATE CONTRACTOR — G20-6T 48"X30"

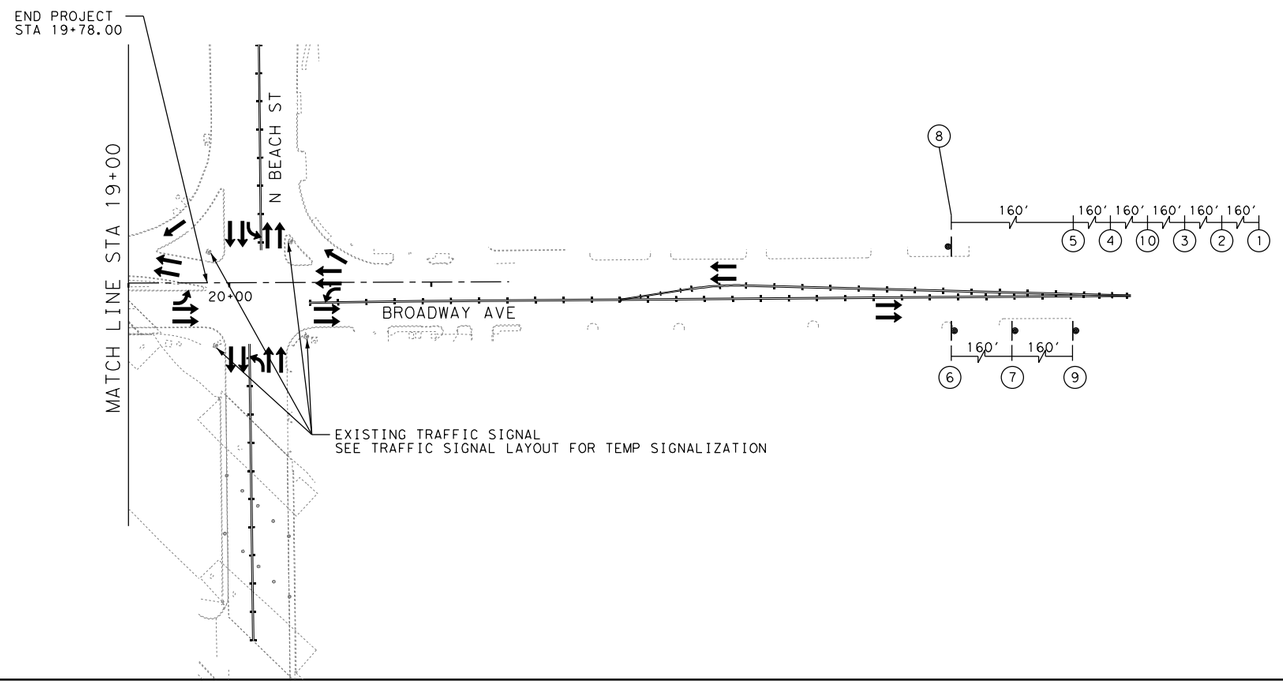
⑨ END WORK ZONE — G20-2bT 36"X18"

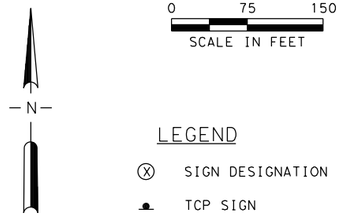
⑩ SPEED LIMIT 30 — CW3-5 36"X36"



RAILROAD NOTES:

1. RAILROAD LOCATED TO THE WEST OF PROJECT LIMITS. ADJUST ADVANCE WARNING SIGN SPACING AS NECESSARY TO AVOID SIGNING WITHIN RAILROAD RIGHT-OF-WAY.





LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC FLOW ARROW

NOTES:

1. PLACE PROJECT LIMITS SIGNS AT LOCATION TO REMAIN FOR THE DURATION OF THE PROJECT.
2. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
3. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
5. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
6. SEE BC(1)-21 STANDARD FOR STAY ALERT SIGN INFORMATION.
7. REFERENCE TCP PHASE LAYOUTS FOR THE LOCATIONS OF THE LIMITS TO PLACE ADVANCE WARNING SIGNS FOR SPECIFIC PHASES.
8. ALL SIGNING SHALL BE PLACE 25' MINIMUM FROM RAILROAD ON EITHER SIDE.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

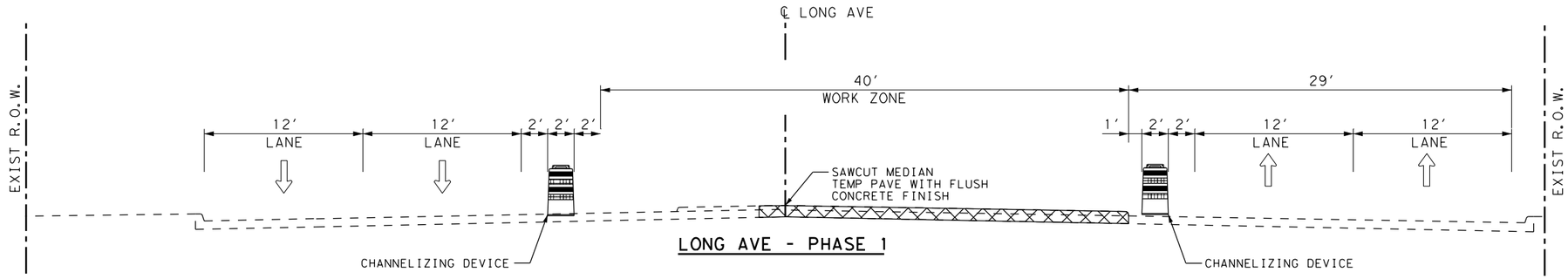
TRAFFIC CONTROL ADVANCE WARNING SIGNS

SCALE: 1"=150' (H) SHEET 1 OF 1

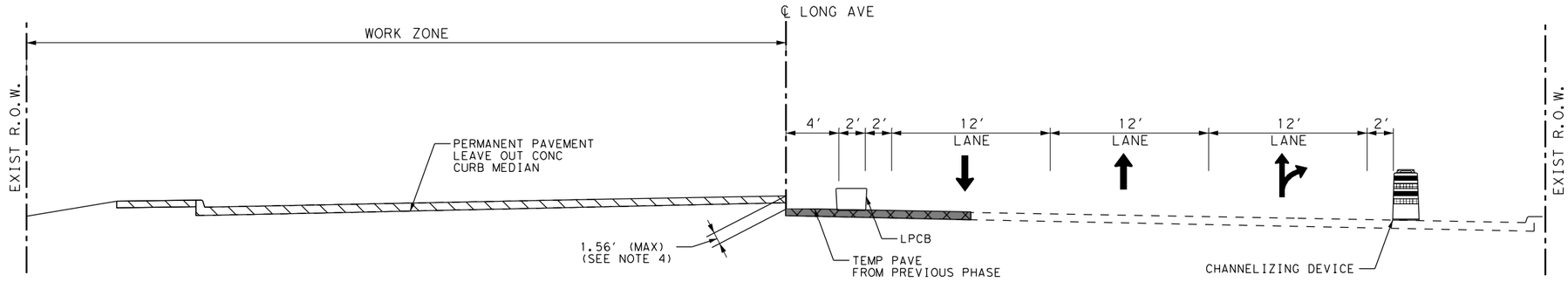
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	15
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894AWS01.sht

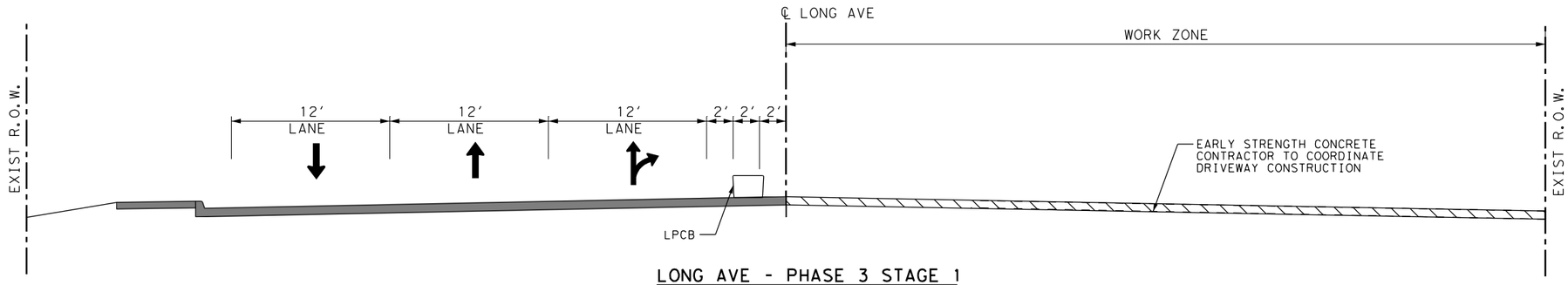
TIME: 12:17:12 PM
DATE: 1/19/2023



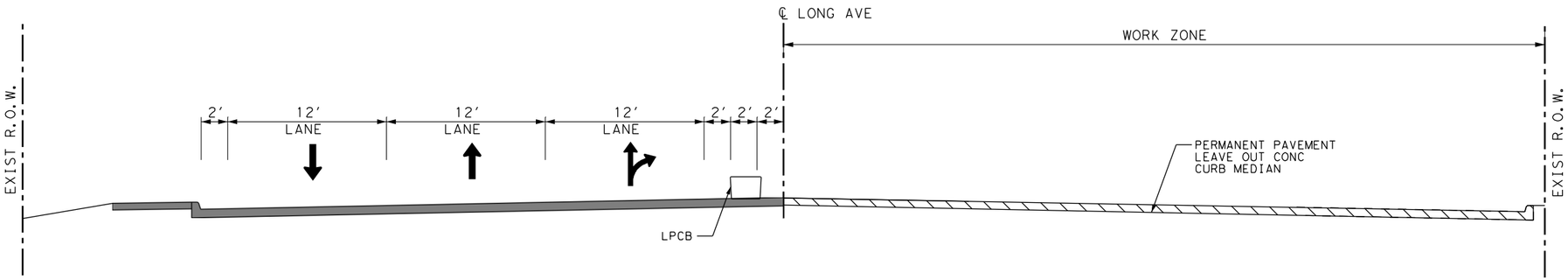
LONG AVE - PHASE 1



LONG AVE - PHASE 2



LONG AVE - PHASE 3 STAGE 1



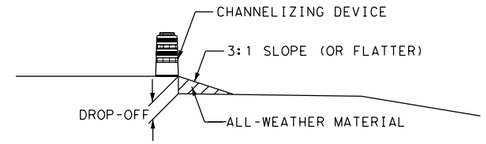
LONG AVE - PHASE 3 STAGE 2

LEGEND

- PERM CONST THIS PHASE/STAGE
- TEMP PVMT THIS PHASE/STAGE
- COMPLETED PERMANENT CONST
- COMPLETED TEMP PVMT
- CHANNELIZING DEVICE

NOTES:

1. PROTECT ALL DROP OFFS AT END OF WORK DAY AND OUTSIDE LIMITS OF CONSTRUCTION WITH 3:1 OR FLATTER NON ERODABLE MATERIAL, EXCEPT WHERE NOTED IN THE PLANS. REFER TO DETAIL "A".
2. CONTRACTOR WILL UTILIZE 3:1 (TYP) AND 1:1 (MAX) TEMPORARY FILL SLOPES.
3. FOR INFORMATION REGARDING BARRIER LIMITS, REFERENCE TCP PHASE LAYOUT SHEETS.
4. TRAFFIC CROSSOVERS TO UTILIZE LEVEL-UP PAVEMENT IN LOCATIONS OF GRADE DIFFERENCES. CROSSOVERS TO OCCUR OUTSIDE LOCATIONS OF MAX GRADE DIFFERENCE. SEE TCP PHASE LAYOUTS.



DETAIL A

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

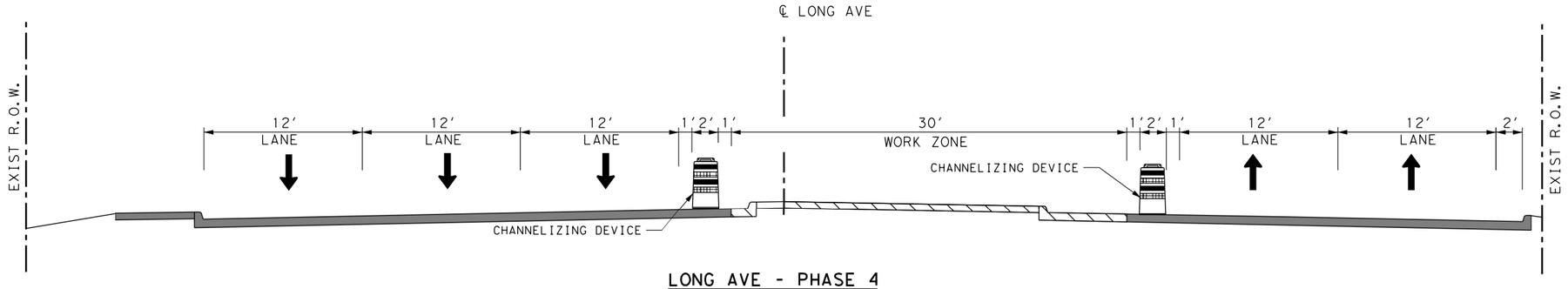
TRAFFIC CONTROL TYPICAL SECTIONS

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

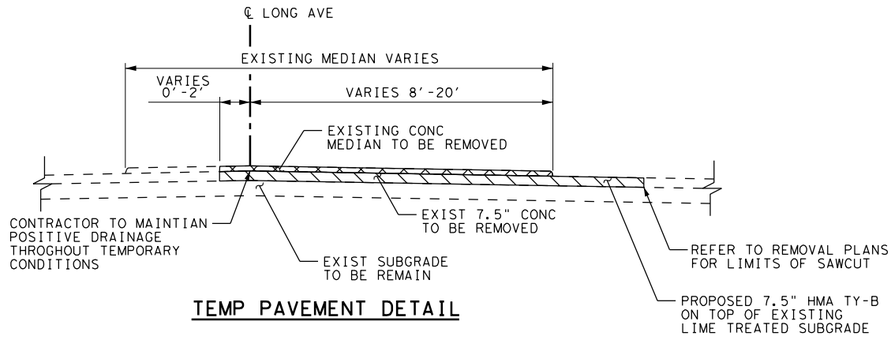
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK REL	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT	16
CHECK PKC	CONTROL 0902	SECTION 48	JOB 894	

FILE: ...\TCP\894TTSO1.sht

TIME: 12:17:21 PM
DATE: 1/19/2023



LONG AVE - PHASE 4



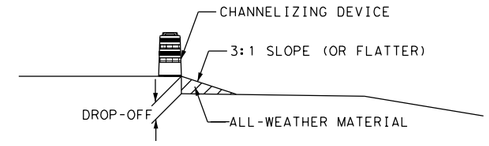
TEMP PAVEMENT DETAIL

LEGEND

- PERM CONST THIS PHASE/STAGE
- TEMP PVMT THIS PHASE/STAGE
- COMPLETED PERMANENT CONST
- COMPLETED TEMP PVMT
- CHANNELIZING DEVICE

NOTES:

1. PROTECT ALL DROP OFFS AT END OF WORK DAY AND OUTSIDE LIMITS OF CONSTRUCTION WITH 3:1 OR FLATTER NON ERODABLE MATERIAL, EXCEPT WHERE NOTED IN THE PLANS. REFER TO DETAIL "A".
2. CONTRACTOR WILL UTILIZE 3:1 (TYP) AND 1:1 (MAX) TEMPORARY FILL SLOPES.
3. FOR INFORMATION REGARDING BARRIER LIMITS, REFERENCE TCP PHASE LAYOUT SHEETS.
4. TRAFFIC CROSSOVERS TO UTILIZE LEVEL-UP PAVEMENT IN LOCATIONS OF GRADE DIFFERENCES. CROSSOVERS TO OCCUR OUTSIDE LOCATIONS OF MAX GRADE DIFFERENCE. SEE TCP PHASE LAYOUTS.



DETAIL A

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

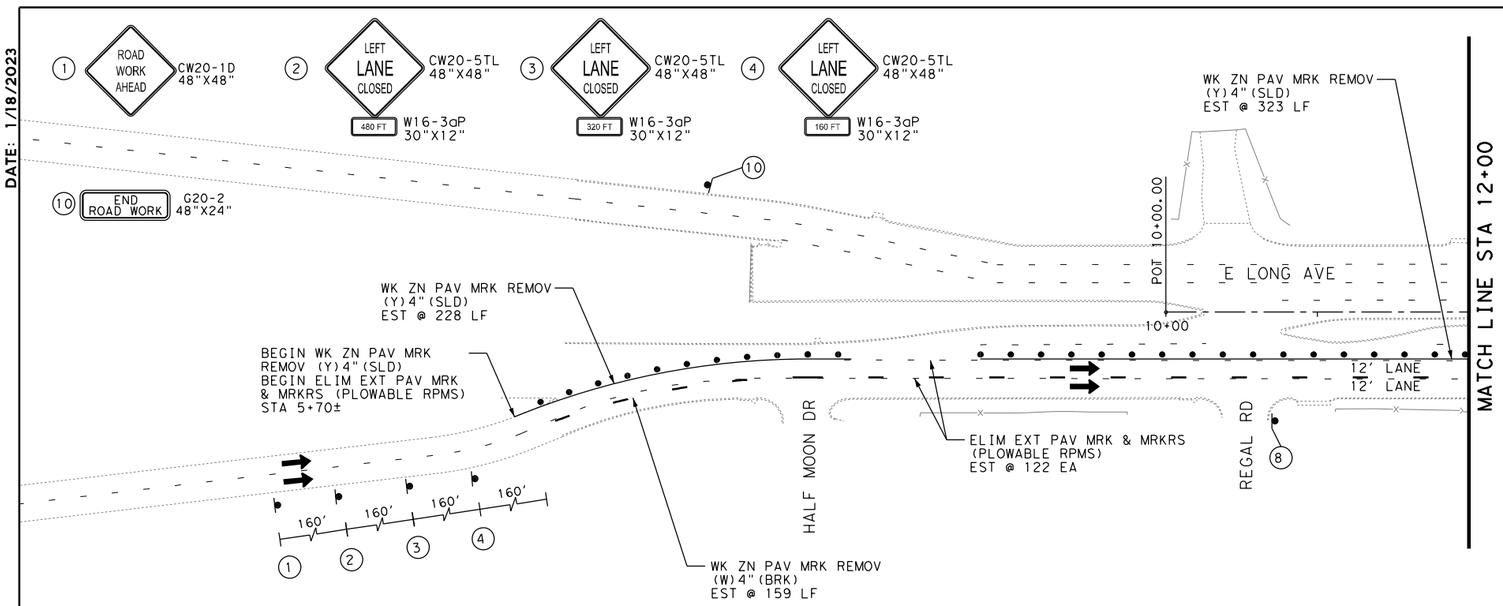
TRAFFIC CONTROL TYPICAL SECTIONS

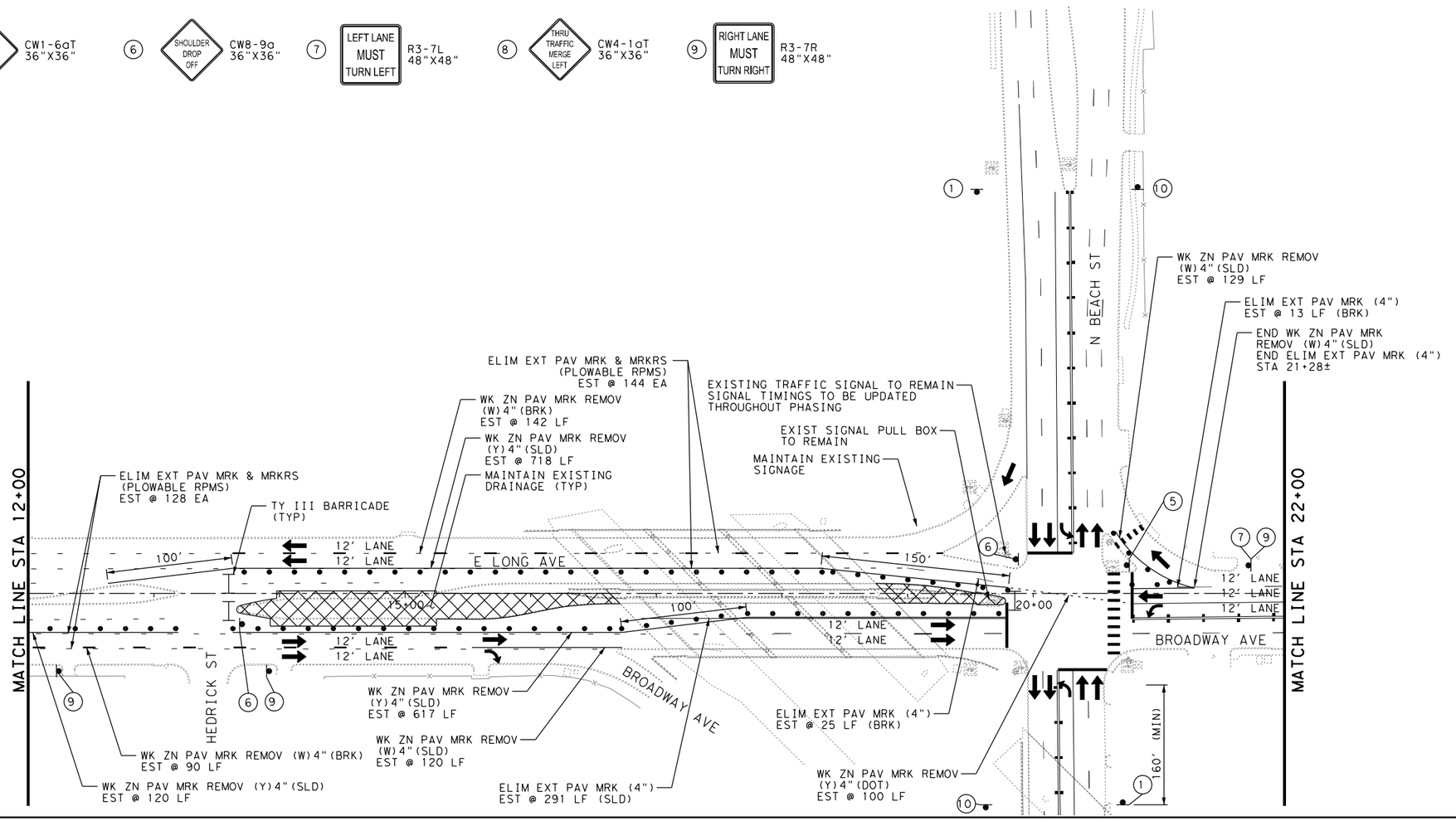
SCALE: N.T.S. SHEET 2OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK REL	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT	17
CHECK PKC	CONTROL 0902	SECTION 48	JOB 894	

FILE: ...\TCP\894TTS02.sht

TIME: 1:10:32 PM
DATE: 1/18/2023





0 50 100
SCALE IN FEET

N

LEGEND

- X — SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL PHASE 1

SCALE: 1"=100' (H) SHEET 1 OF 10

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	18
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPSOIA.sht

TIME: 1:10:49 PM
DATE: 1/18/2023

① ROAD WORK AHEAD CW20-1D 48"X48"

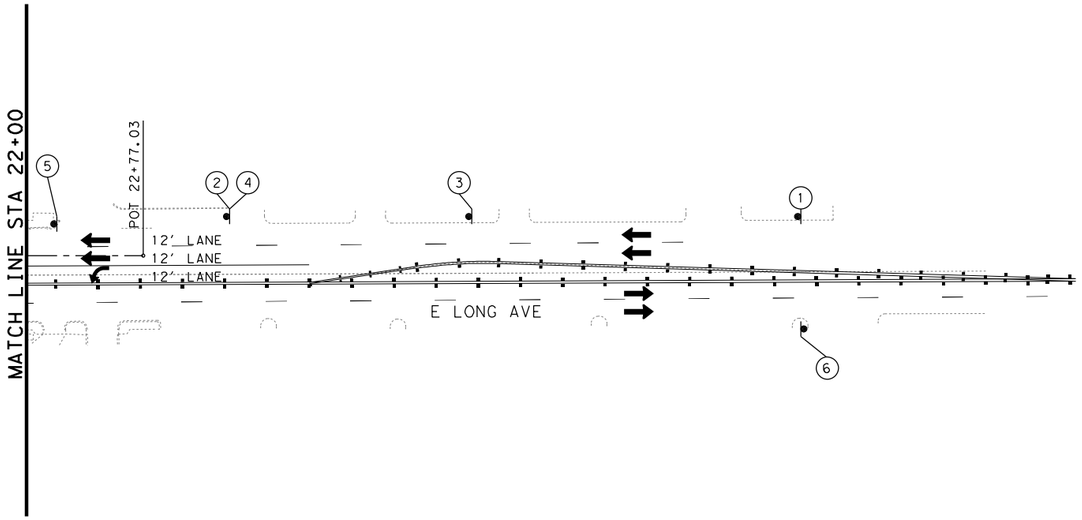
② LEFT LANE MUST TURN LEFT R3-7L 48"X48"

③ THRU TRAFFIC MERGE LEFT CW4-1aT 36"X36"

④ RIGHT LANE MUST TURN RIGHT R3-7R 48"X48"

⑤ CW1-4R 48"X48"
20 MPH CW13-1P 24"X24"

⑥ END ROAD WORK G20-2 48"X24"



0 50 100
SCALE IN FEET

— N —

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

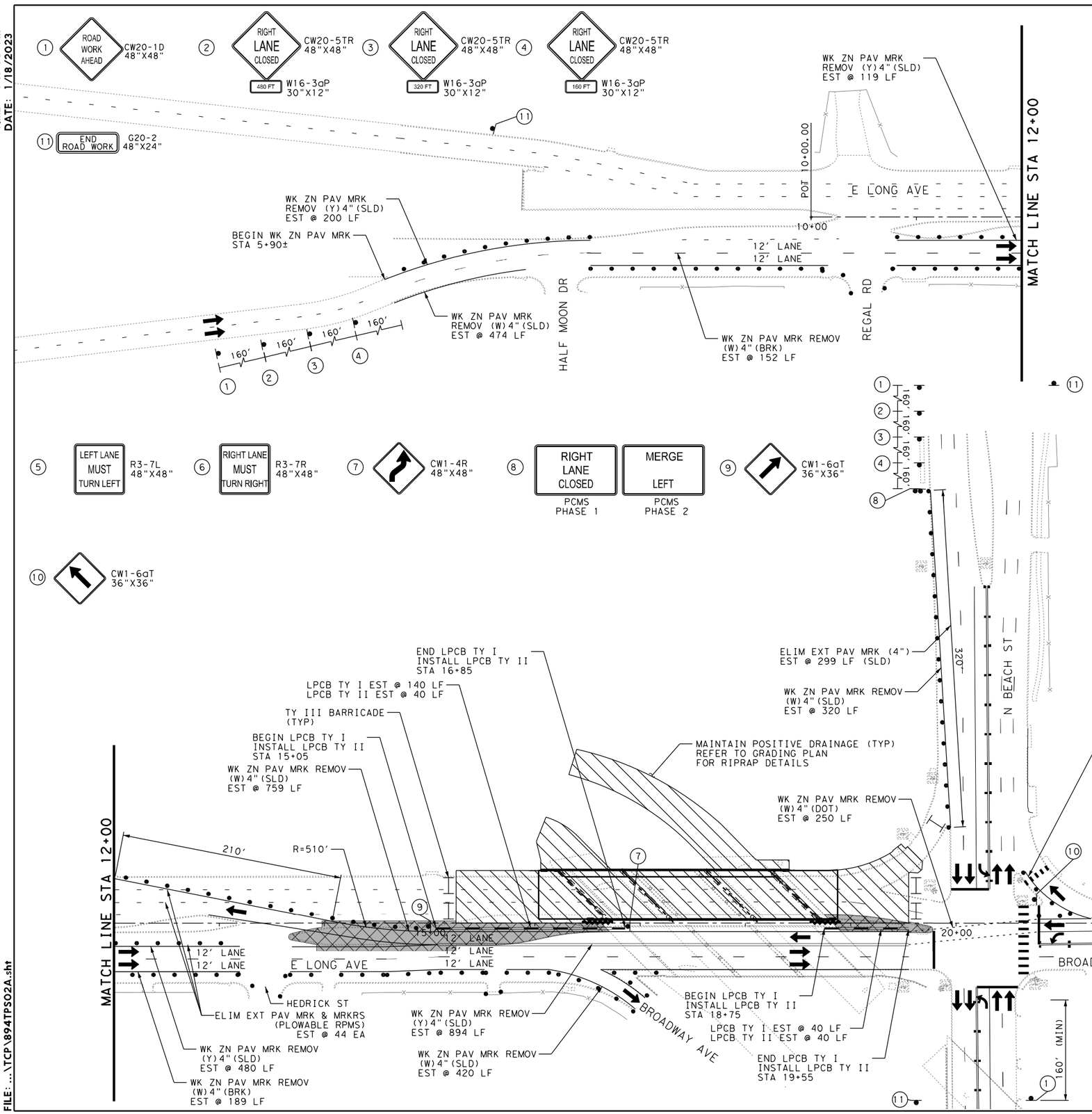
TRAFFIC CONTROL
PHASE 1

SCALE: 1"=100' (H) SHEET 2 OF 10

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	19
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPSOIB.sht

TIME: 1:11:06 PM
DATE: 1/18/2023



0 50 100
SCALE IN FEET

— N —

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL PHASE 2

SCALE: 1"=100' (H) SHEET 3 OF 10

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	20
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894TPS02A.sht

TIME: 1:11:28 PM
DATE: 1/18/2023

① ROAD WORK AHEAD CW20-1D 48"X48"

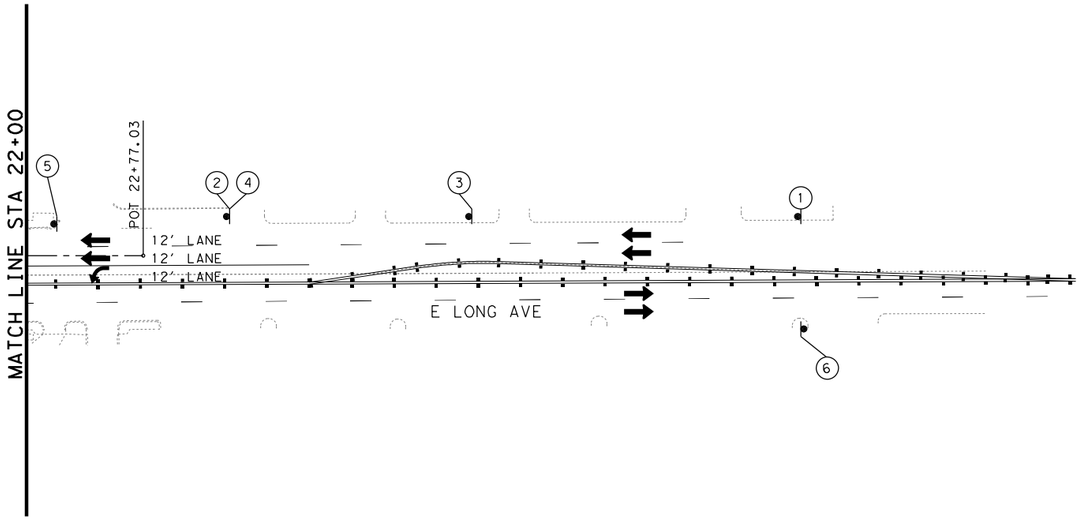
② LEFT LANE MUST TURN LEFT R3-7L 48"X48"

③ THRU TRAFFIC MERGE LEFT CW4-1aT 36"X36"

④ RIGHT LANE MUST TURN RIGHT R3-7R 48"X48"

⑤ CW1-4L 48"X48"
25 MPH CW13-1P 24"X24"

⑥ END ROAD WORK G20-2 48"X24"



N

0 50 100
SCALE IN FEET

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

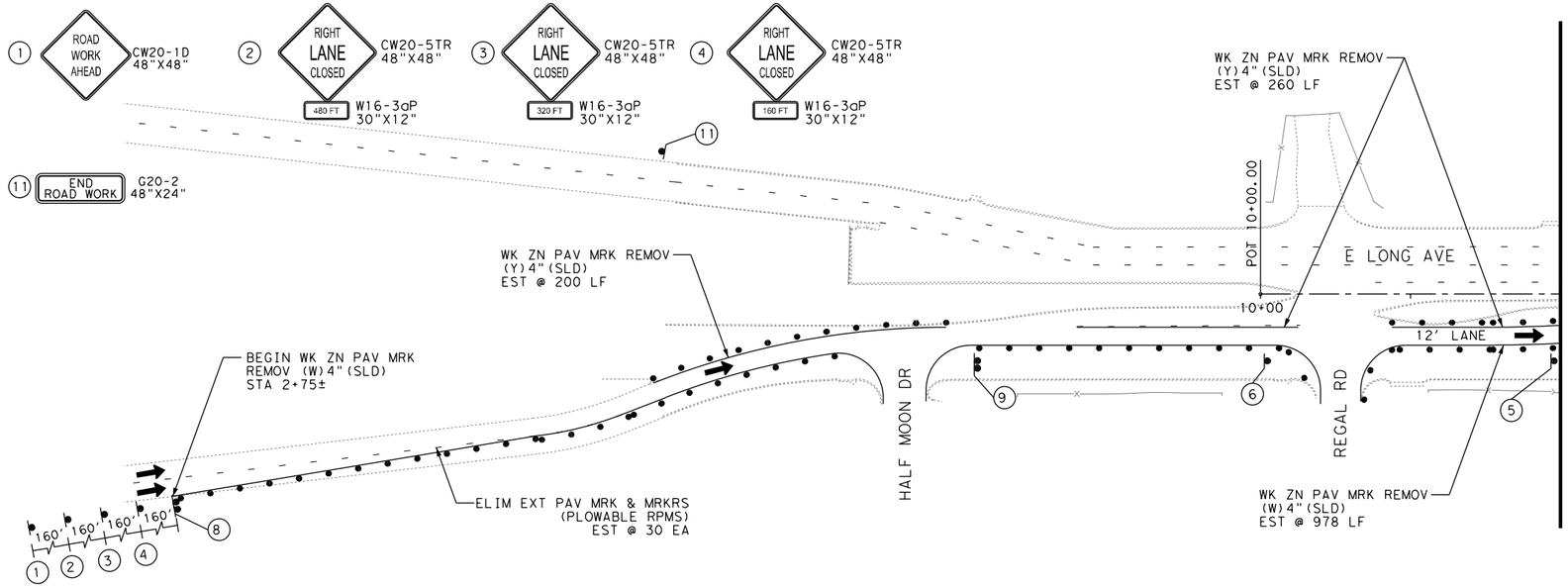
TRAFFIC CONTROL
PHASE 2

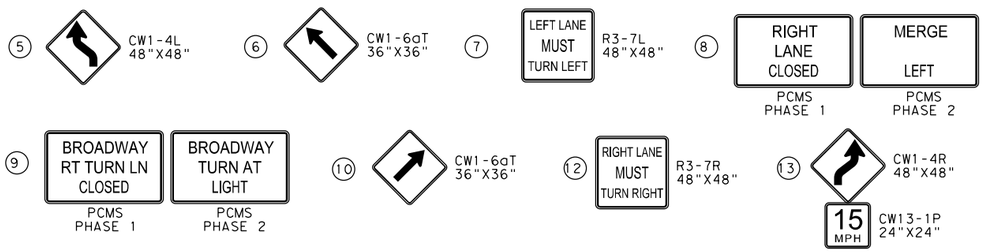
SCALE: 1"=100' (H) SHEET 4 OF 10

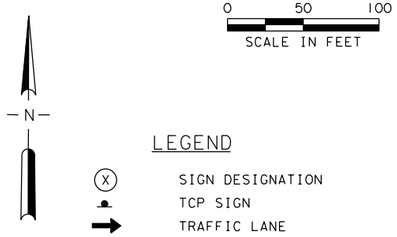
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	21
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPSO2B.sht

TIME: 1:11:46 PM
DATE: 1/18/2023







NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL
PHASE 3 STAGE 1

SCALE: 1"=100' (H) SHEET 5 OF 10

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	22
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894TPS03IA.sht

TIME: 1:12:01 PM
DATE: 1/18/2023

① ROAD WORK AHEAD CW20-1D 48"X48"

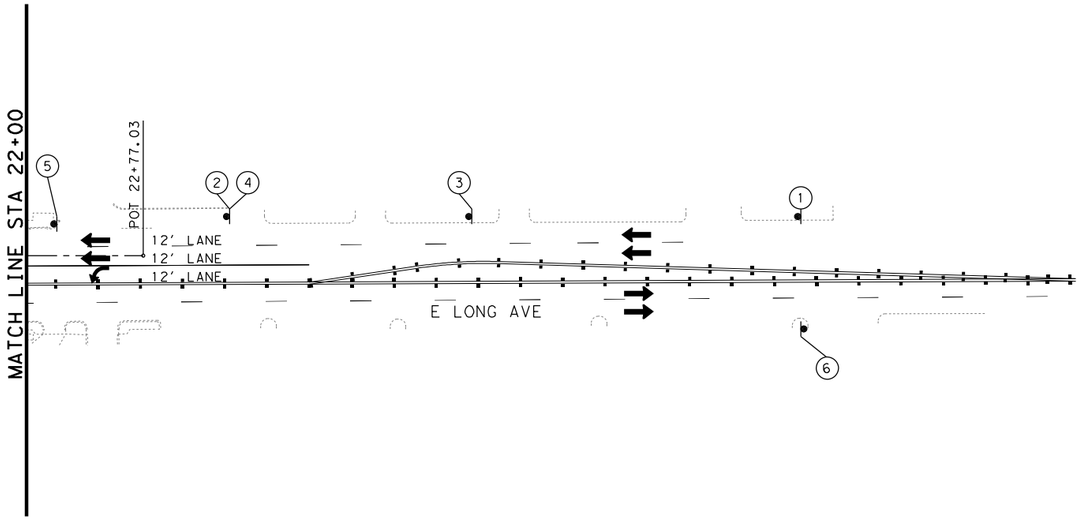
② LEFT LANE MUST TURN LEFT R3-7L 48"X48"

③ THRU TRAFFIC MERGE LEFT CW4-1aT 36"X36"

④ RIGHT LANE MUST TURN RIGHT R3-7R 48"X48"

⑤ CW1-4R 48"X48"
20 MPH CW13-1P 24"X24"

⑥ END ROAD WORK G20-2 48"X24"



0 50 100
SCALE IN FEET

— N —

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

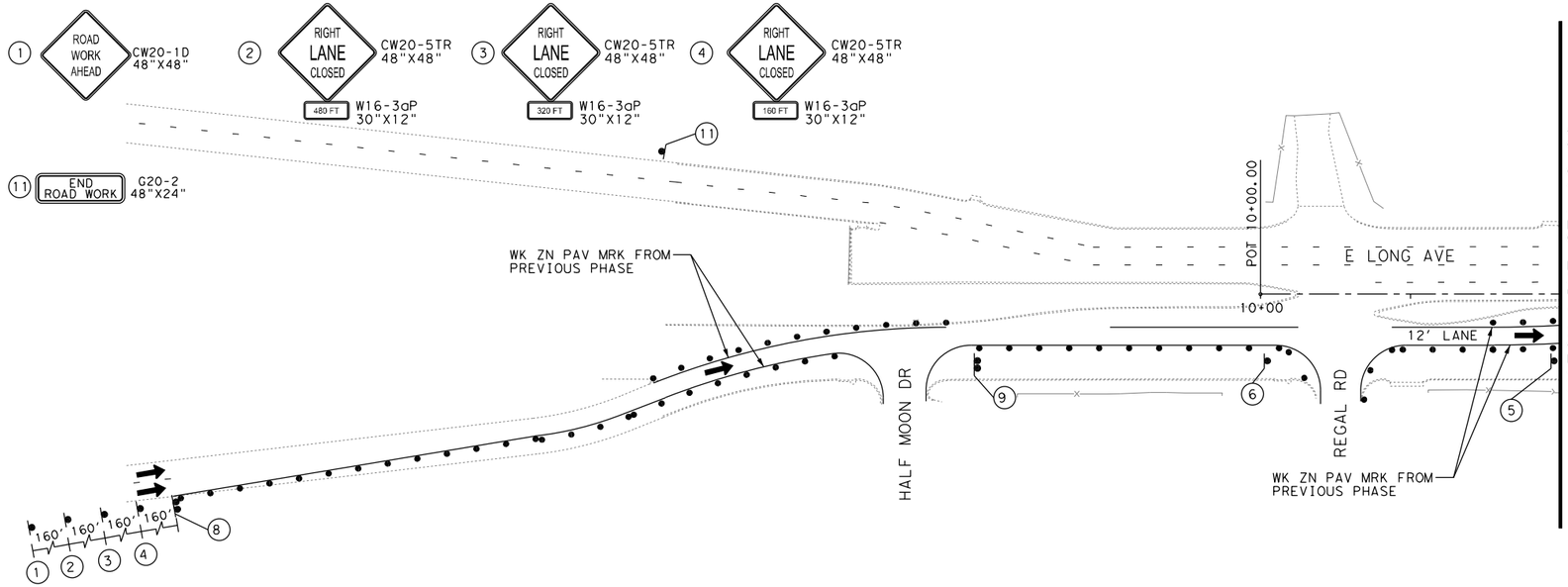
TRAFFIC CONTROL
PHASE 3 STAGE 1

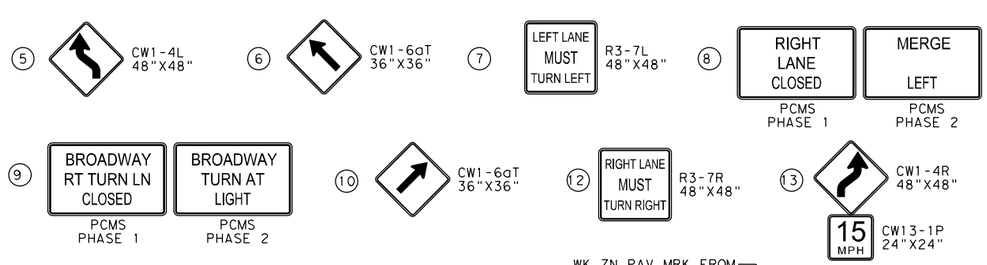
SCALE: 1"=100' (H) SHEET 6 OF 10

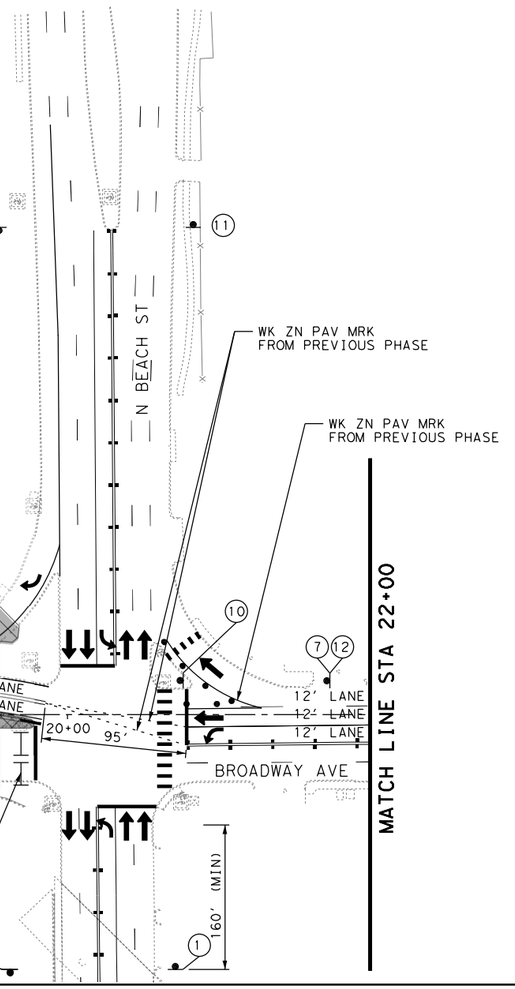
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	23
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPS03IB.sht

TIME: 1:12:17 PM
DATE: 1/18/2023







0 50 100
SCALE IN FEET

N

LEGEND

- X — SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

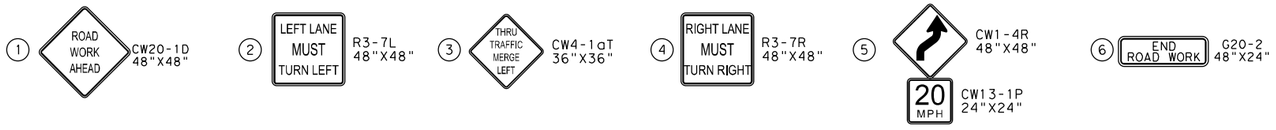
TRAFFIC CONTROL
PHASE 3 STAGE 2

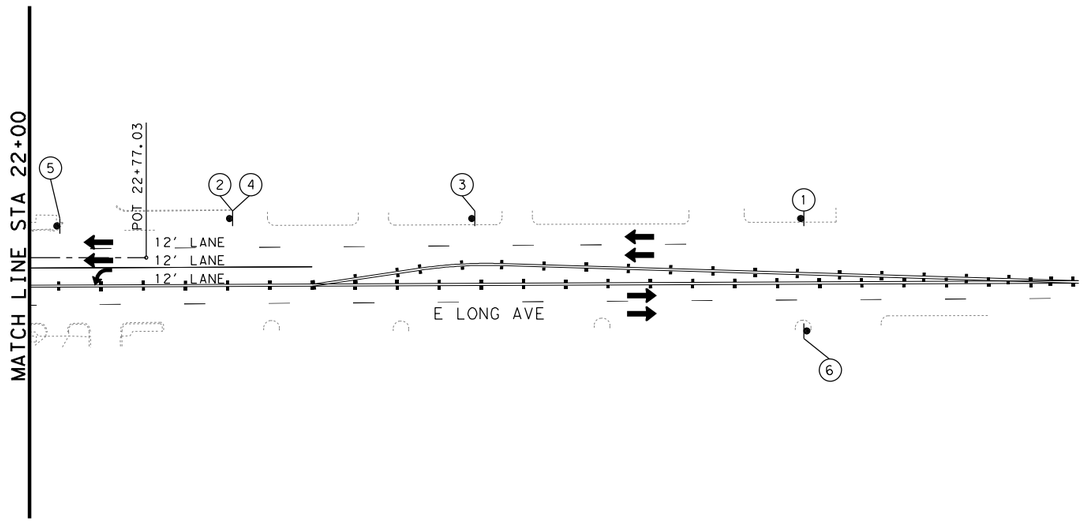
SCALE: 1"=100' (H) SHEET 7 OF 10

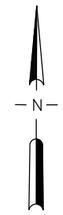
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	24
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894TPS032A.sht

TIME: 1:12:35 PM
DATE: 1/18/2023







0 50 100
SCALE IN FEET

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

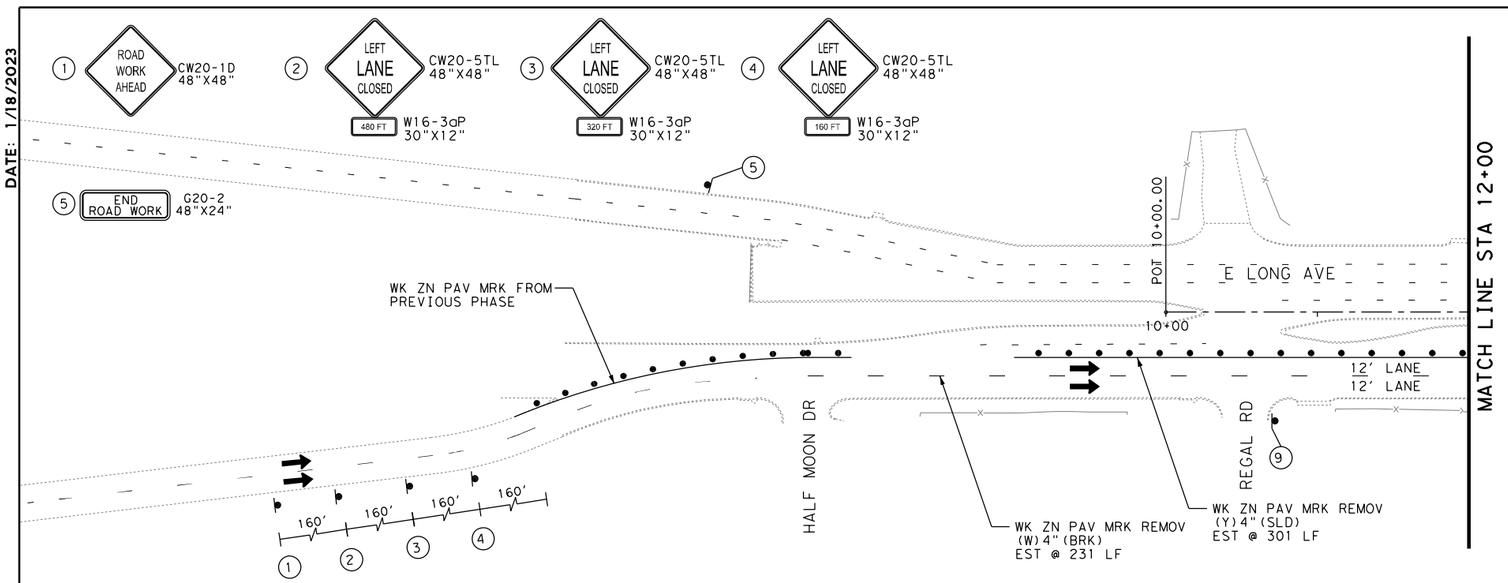
TRAFFIC CONTROL
PHASE 3 STAGE 2

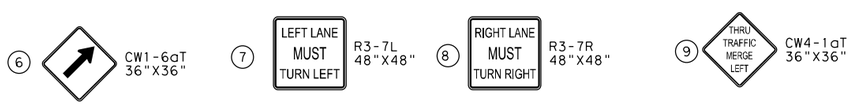
SCALE: 1"=100' (H) SHEET 8 OF 10

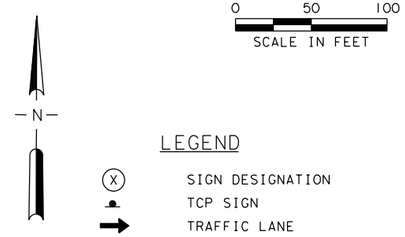
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	25
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPSO32B.sht

TIME: 1:13:01 PM
DATE: 1/18/2023



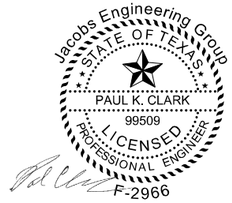




NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023



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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL PHASE 4

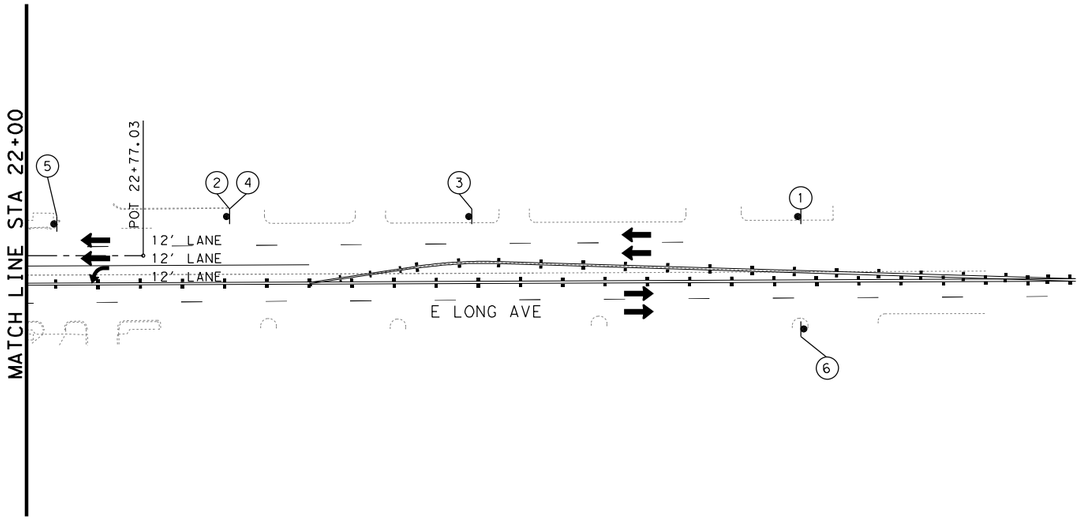
SCALE: 1"=100' (H) SHEET 9 OF 10

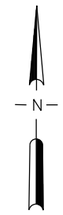
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	26
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPS04A.sht

TIME: 1:13:27 PM
DATE: 1/18/2023

1. ROAD WORK AHEAD — CW20-1D 48"X48"
2. LEFT LANE MUST TURN LEFT — R3-7L 48"X48"
3. THRU TRAFFIC MERGE LEFT — CW4-1aT 36"X36"
4. RIGHT LANE MUST TURN RIGHT — R3-7R 48"X48"
5. CW1-4R 48"X48"; 15 MPH — CW13-1P 24"X24"
6. END ROAD WORK — G20-2 48"X24"





0 50 100
SCALE IN FEET

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.
5. TRAFFIC CONTROL SIGNAGE TO NOT BE PLACED WITHIN UNION PACIFIC RAILROAD RIGHT-OF-WAY.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

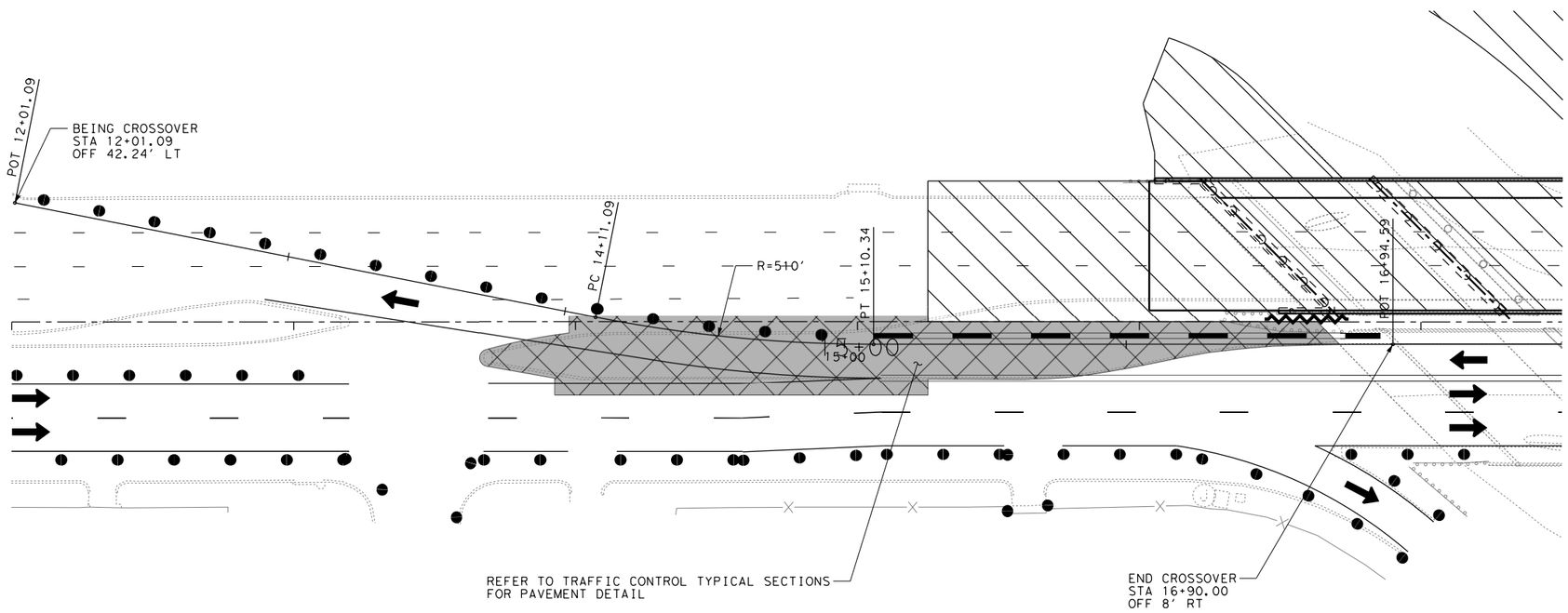
TRAFFIC CONTROL
PHASE 4

SCALE: 1"=100' (H) SHEET 10 OF 10

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	27
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TPSO4B.sht

TIME: 1:13:47 PM
DATE: 1/18/2023



0 25 50 (H)
0 5 10 (V)

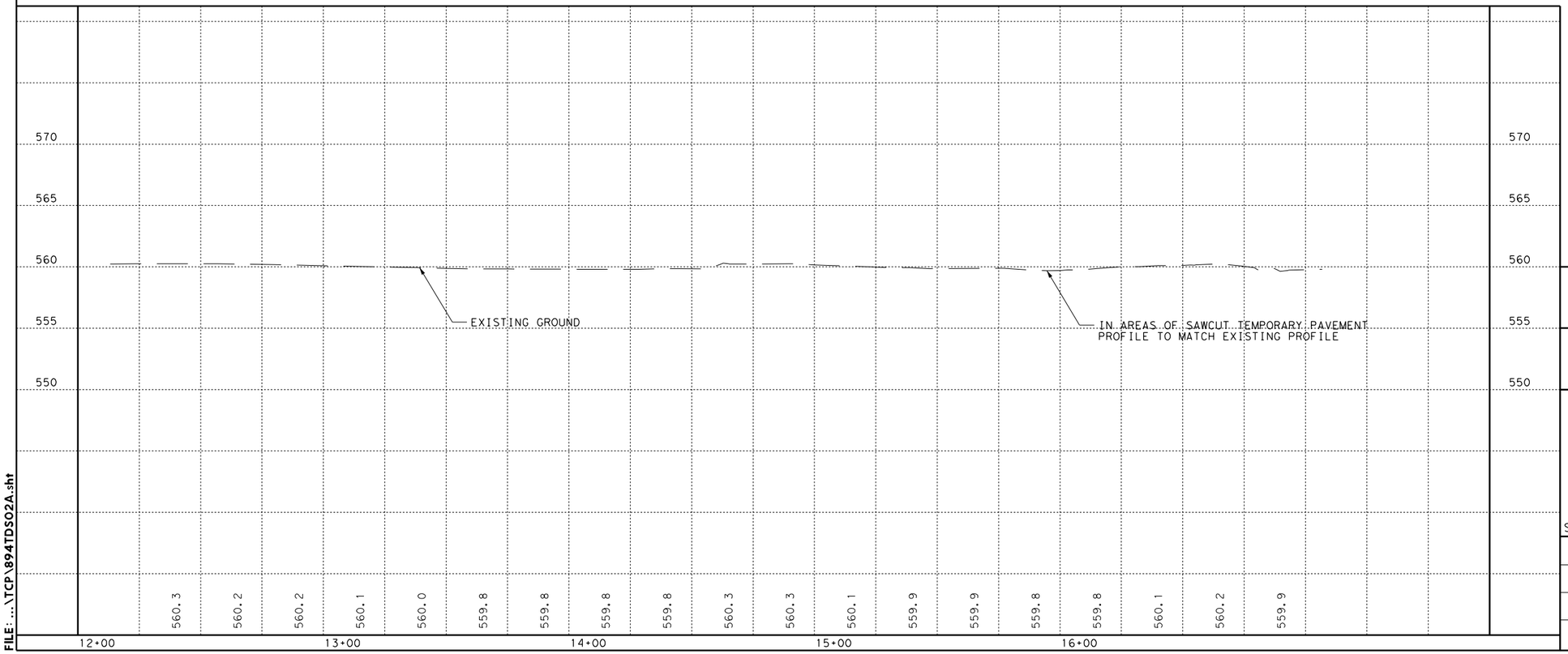
N

LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.



2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

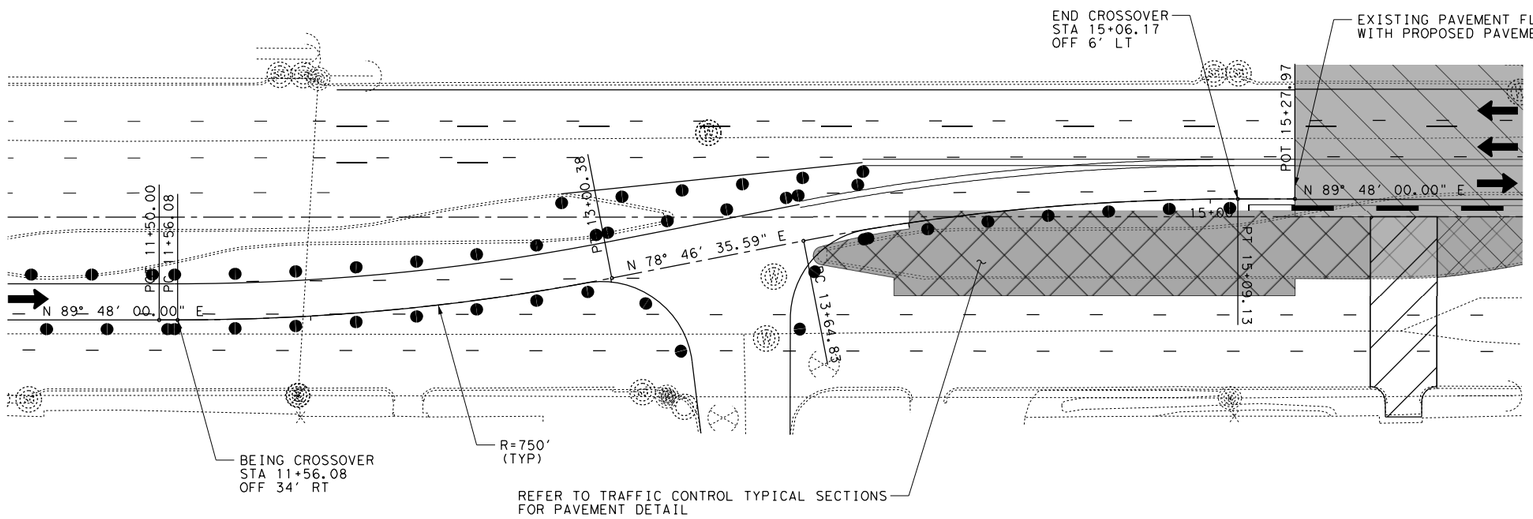
TRAFFIC CONTROL
PHASE 2 CROSS OVER

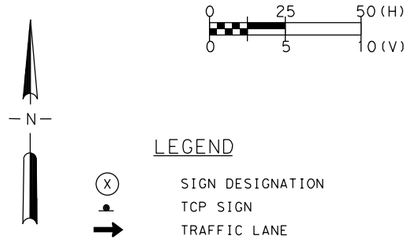
SCALE: 1"=50' (H) 1"=10' (V) SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	28
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894TDS02A.sht

TIME: 1:14:06 PM
DATE: 1/18/2023



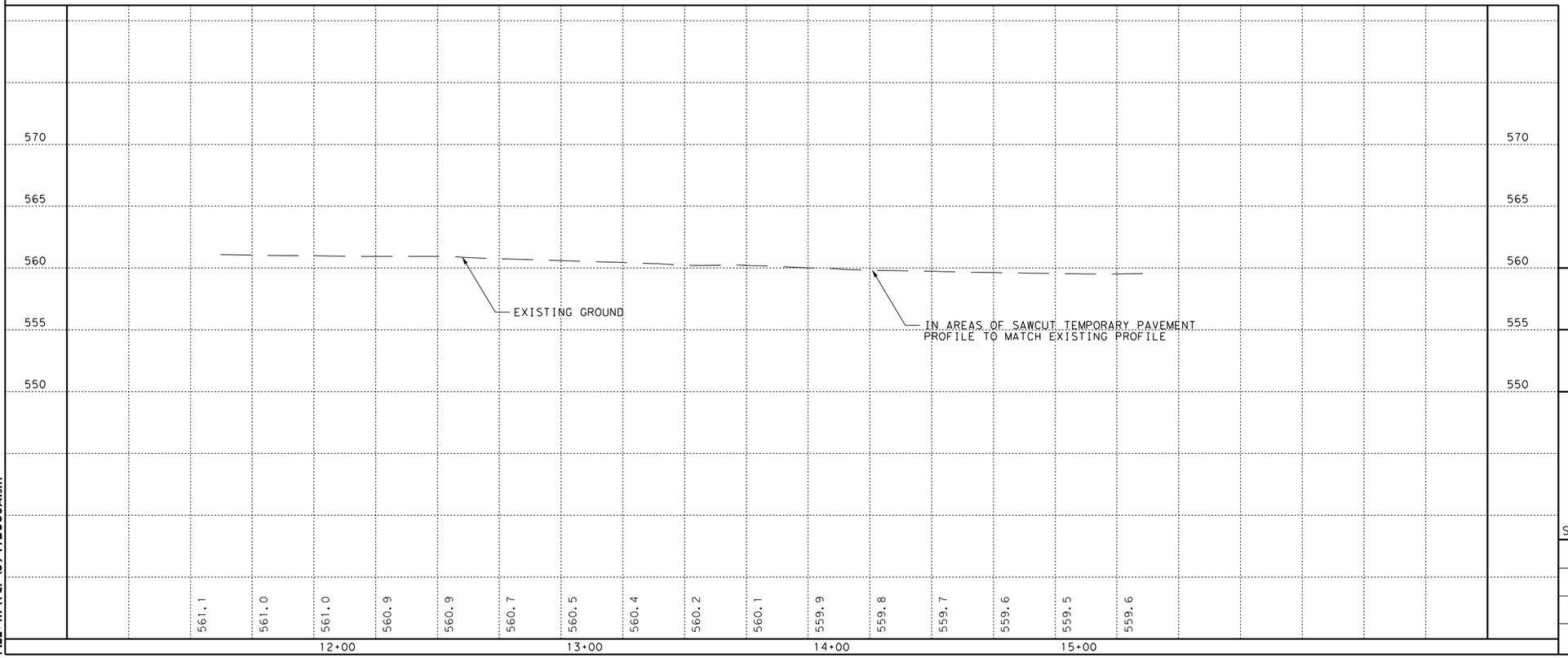


LEGEND

- (X) SIGN DESIGNATION
- TCP SIGN
- TRAFFIC LANE
- TY III BARRICADE
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES
- CONCRETE BARRIER

NOTES:

1. REFER TO BC(2)-21 STANDARD FOR CONSTRUCTION WARNING SIGN SPACING REQUIREMENTS.
2. PROVIDE AND MAINTAIN ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS, AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH TXDOT BC AND TCP STANDARDS, AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3. DETERMINE AND PLACE ALL APPROPRIATE DISTANCES FOR SIGNS SHOWING X MILES.
4. COVER OR REMOVE EXISTING SIGNS THAT ARE IN CONFLICT WITH CONSTRUCTION SIGNS.



2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

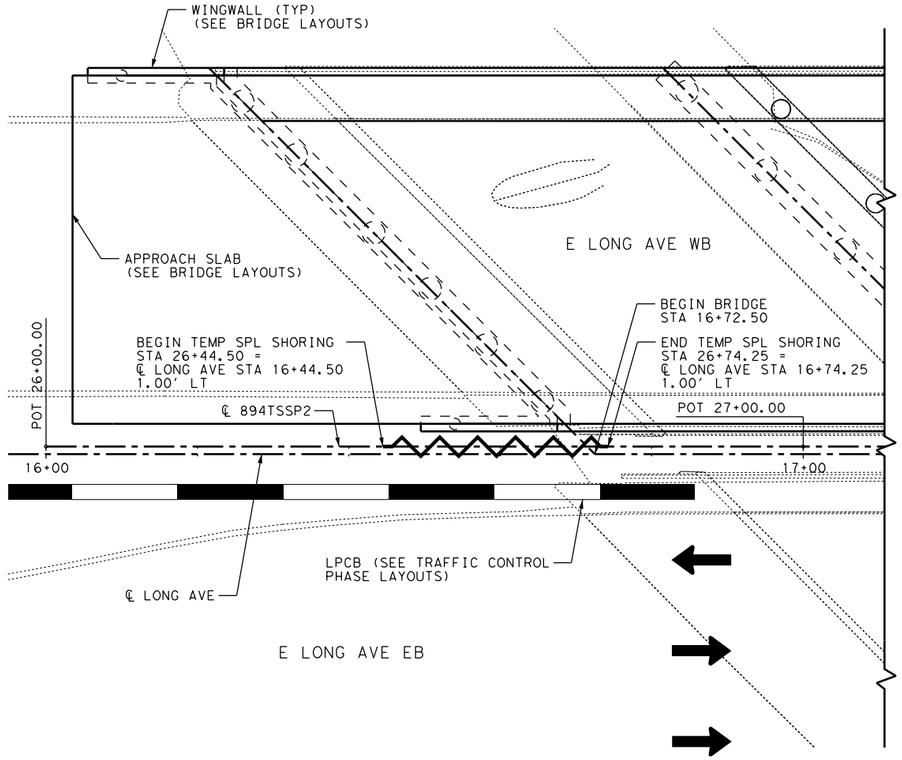
TRAFFIC CONTROL
PHASE 3 CROSS OVER

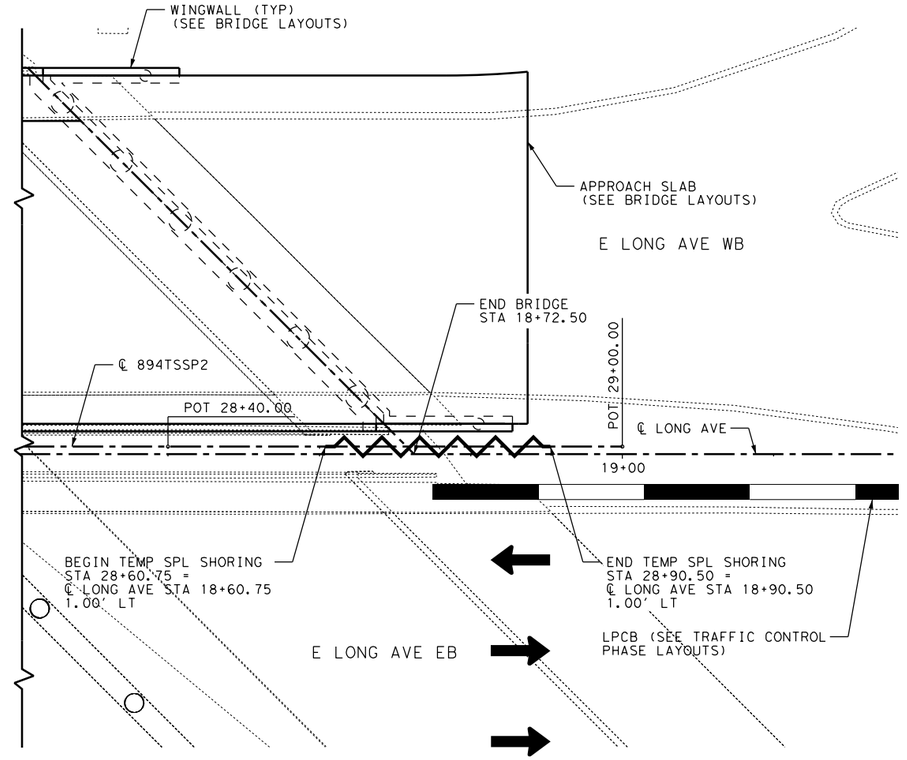
SCALE: 1"=50' (H) 1"=10' (V) SHEET 1 OF 1

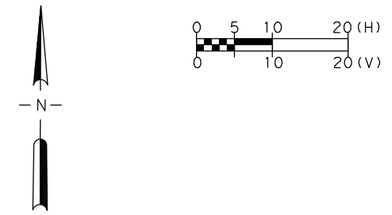
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	29
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\TCP\894TDS03A.sht

TIME: 1:14:25 PM
DATE: 1/18/2023





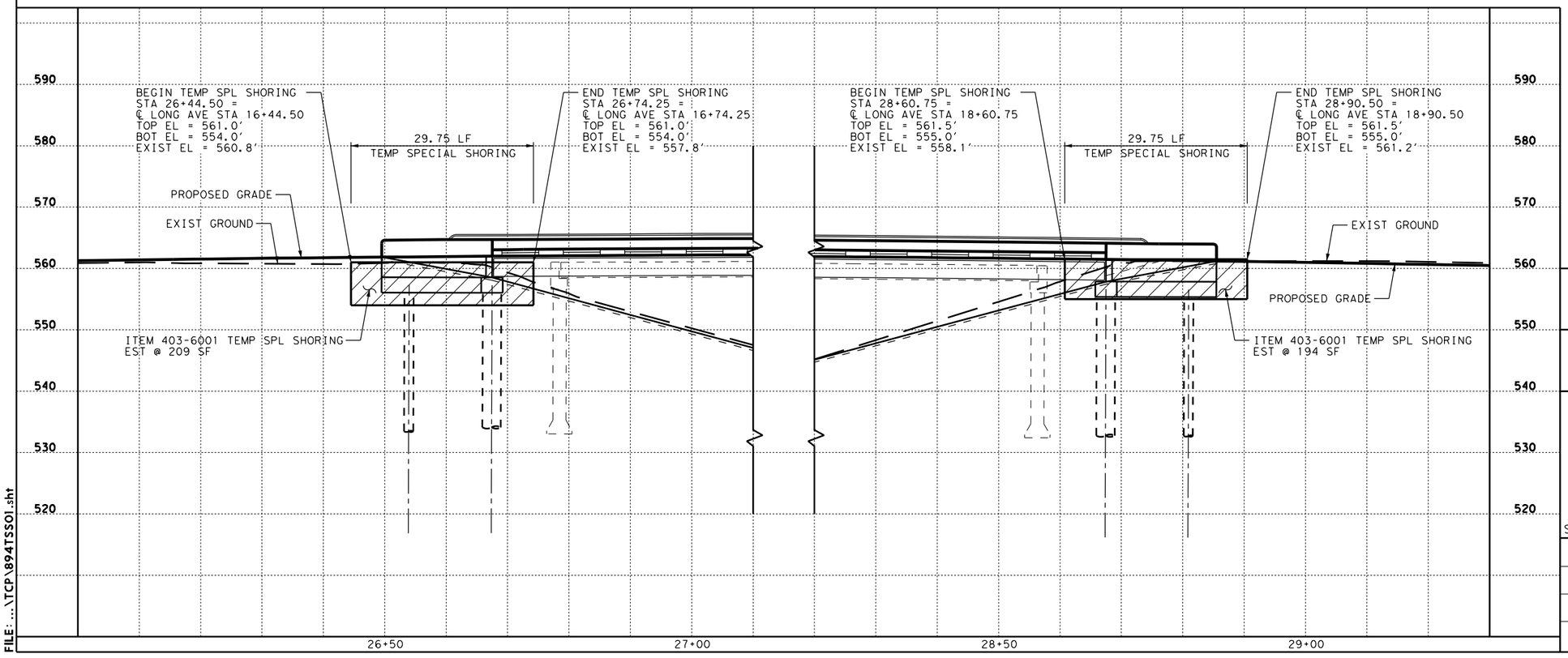


LEGEND

- CONCRETE BARRIER
- TRAFFIC LANE
- TEMPORARY SPECIAL SHORING (PLAN)
- TEMPORARY SPECIAL SHORING (PROFILE)

NOTES:

1. SEE TRAFFIC CONTROL PLANS AND STANDARDS FOR ADDITIONAL INFORMATION.
2. SEE BRIDGE PLANS FOR DETAILED BRIDGE CONSTRUCTION PHASING.
3. UTILITIES NOT SHOWN FOR CLARITY. SEE EXISTING UTILITY LAYOUTS FOR UTILITY INFORMATION.
4. TEMPORARY SPECIAL SHORING MEASUREMENT IS PROVIDED FOR THE CONTRACTOR'S INFORMATION ONLY. CONTRACTOR SHALL PROVIDE TEMPORARY SPECIAL SHORING DESIGN INCLUDING BOTTOM-OF-WALL ELEVATIONS, AS APPROVED BY THE ENGINEER.



2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

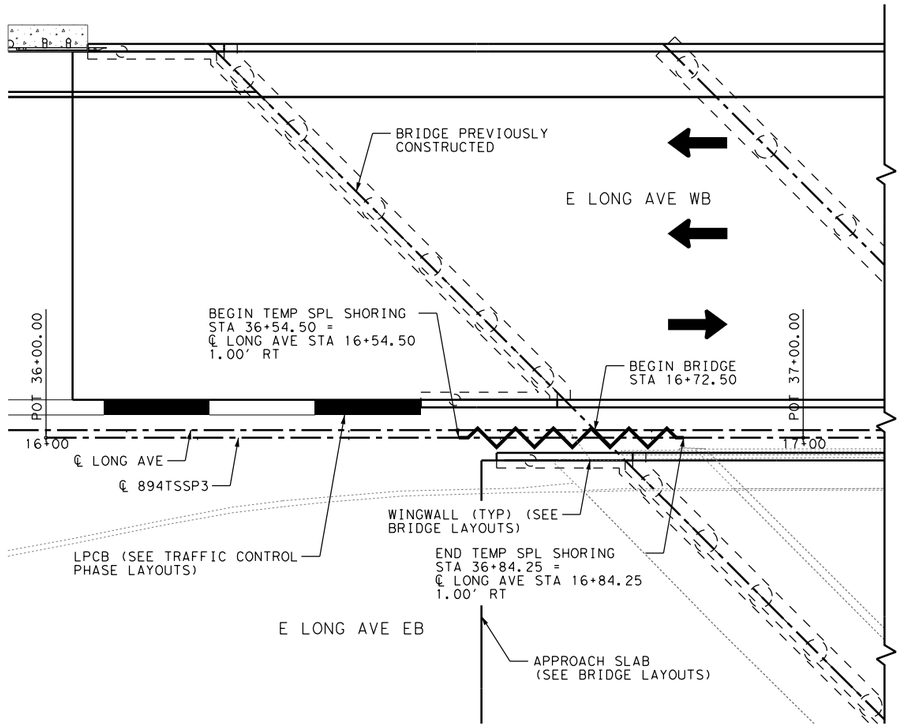
TRAFFIC CONTROL
TEMP SPECIAL SHORING LAYOUT

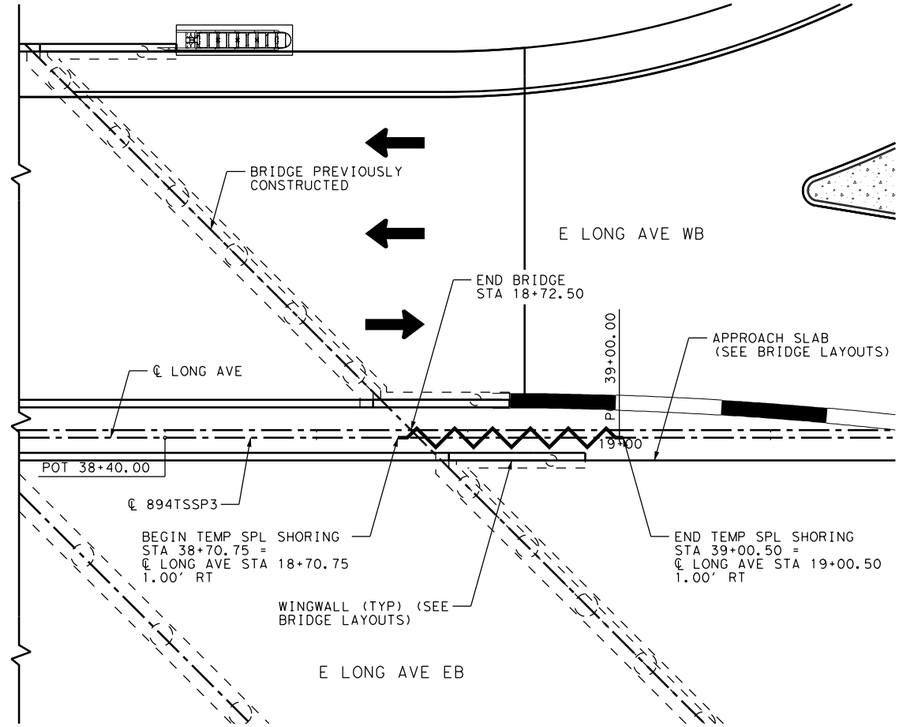
SCALE: 1"=20' (H) 1"=20' (V) SHEET 1 OF 2

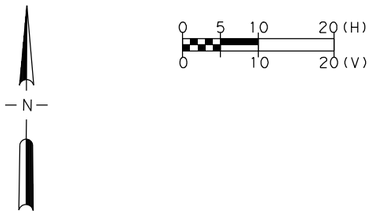
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK REL	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT	30
CHECK PKC	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\TCP\894TSSOI.sht

TIME: 1:14:41 PM
DATE: 1/18/2023





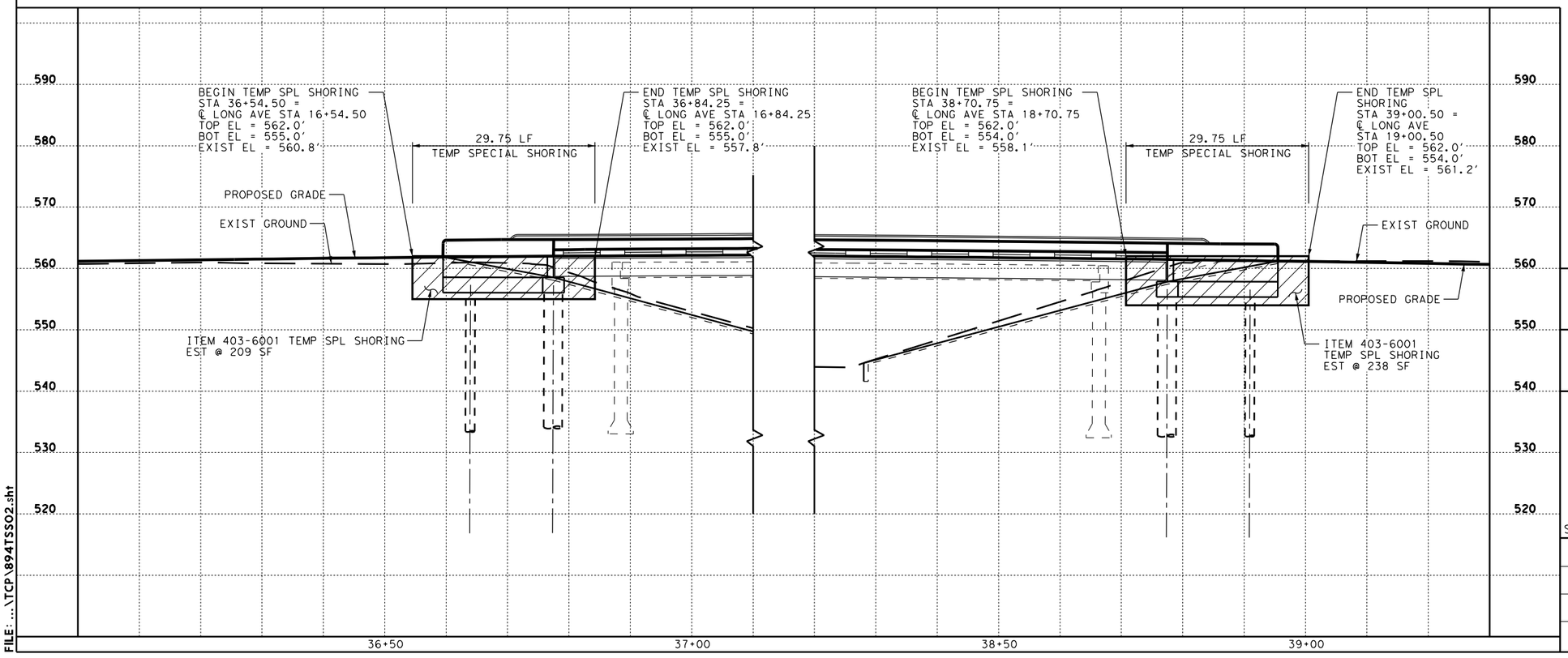


LEGEND

- CONCRETE BARRIER
- TRAFFIC LANE
- TEMPORARY SPECIAL SHORING (PLAN)
- TEMPORARY SPECIAL SHORING (PROFILE)

NOTES:

1. SEE TRAFFIC CONTROL PLANS AND STANDARDS FOR ADDITIONAL INFORMATION.
2. SEE BRIDGE PLANS FOR DETAILED BRIDGE CONSTRUCTION PHASING.
3. UTILITIES NOT SHOWN FOR CLARITY. SEE EXISTING UTILITY LAYOUTS FOR UTILITY INFORMATION.
4. TEMPORARY SPECIAL SHORING MEASUREMENT IS PROVIDED FOR THE CONTRACTOR'S INFORMATION ONLY. CONTRACTOR SHALL PROVIDE TEMPORARY SPECIAL SHORING DESIGN INCLUDING BOTTOM-OF-WALL ELEVATIONS, AS APPROVED BY THE ENGINEER.



2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC CONTROL
TEMP SPECIAL SHORING LAYOUT

SCALE: 1"=20' (H) 1"=20' (V) SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	31
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\TCP\894TSS02.sht

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

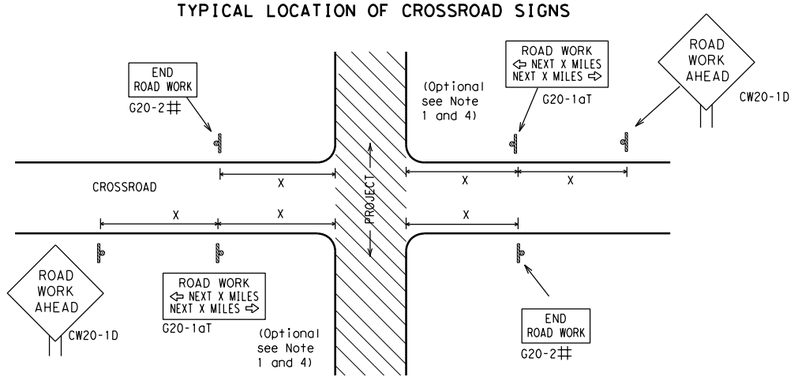
Traffic Safety Division Standard

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	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	FTW	TARRANT		32

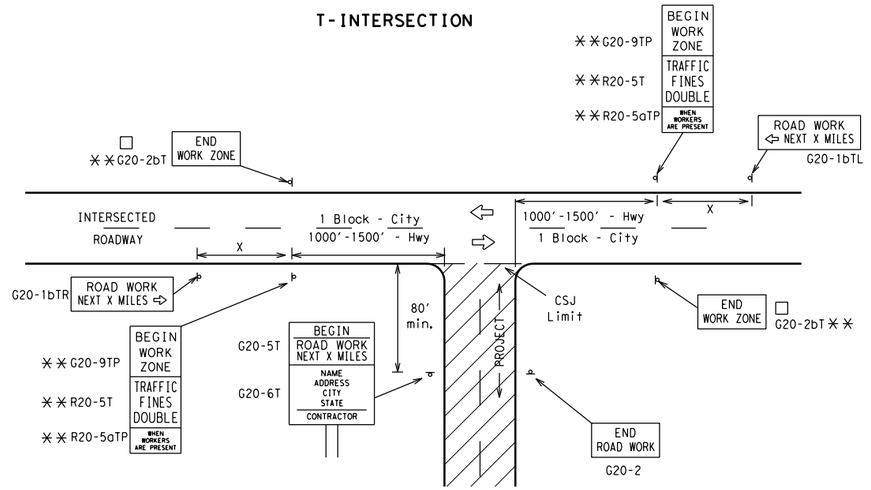
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

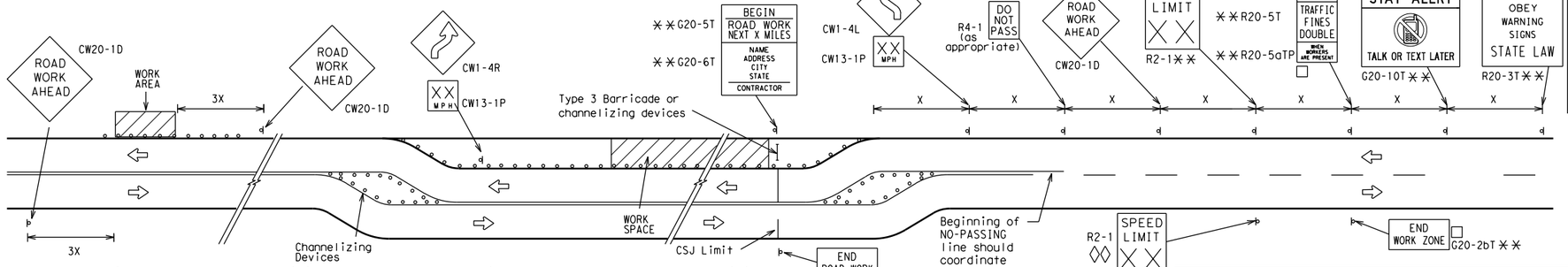
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

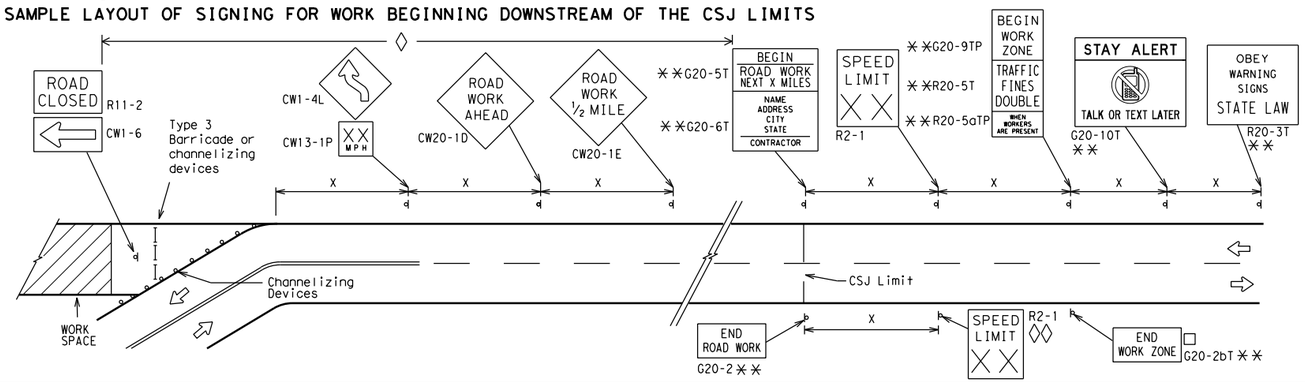
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		33

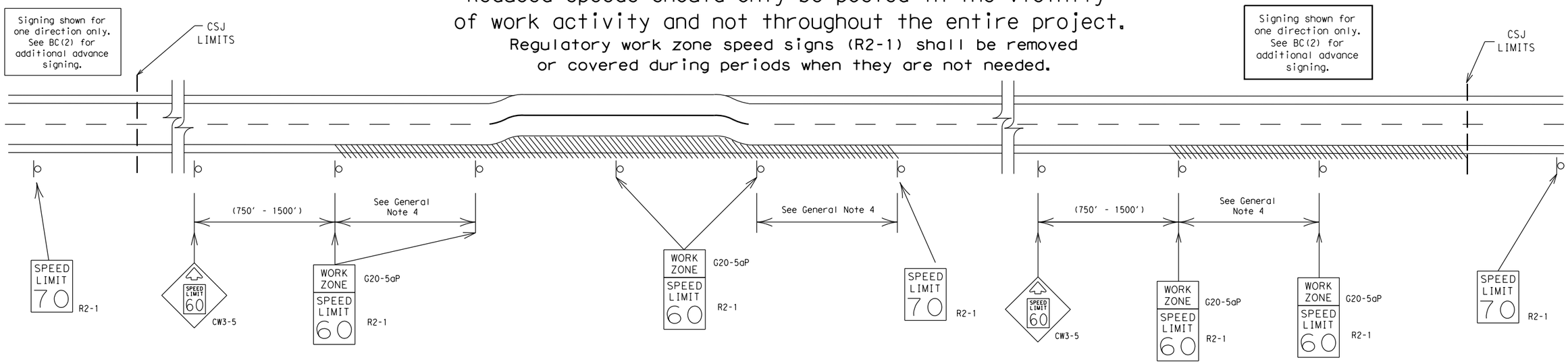
DATE: 1/18/2023 1:15:09 PM
FILE: ...\STATCP\Long Ave\894bc-21.dgn

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

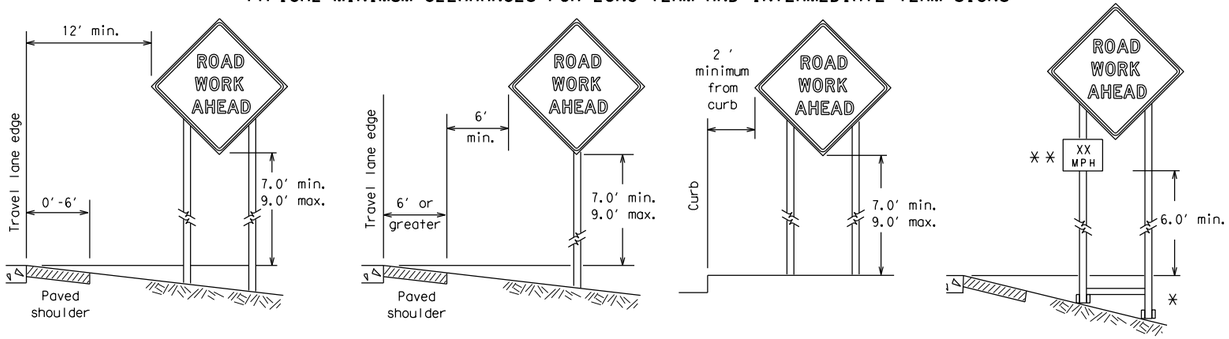
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		34

DATE: 1/18/2023 1:15:10 PM
FILE: ...\STATCP\Long Ave\894bc-21.dgn

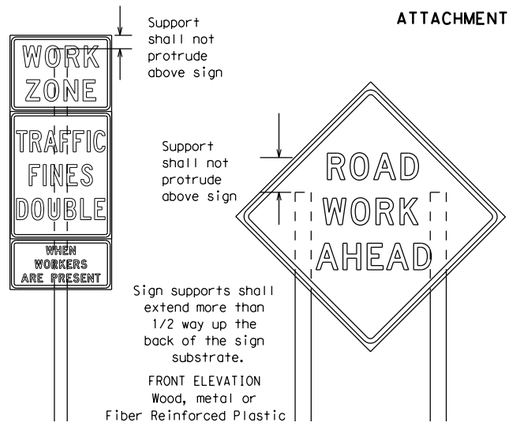
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

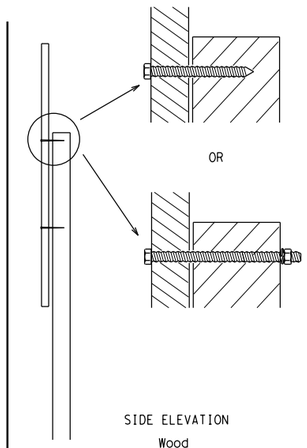


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





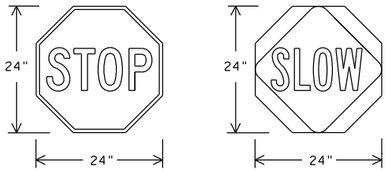
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

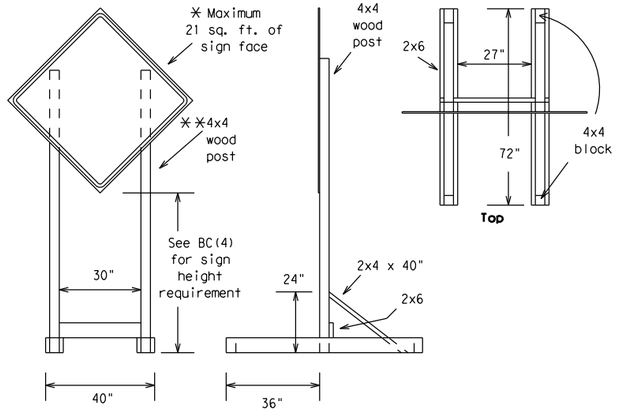
Traffic Safety Division Standard

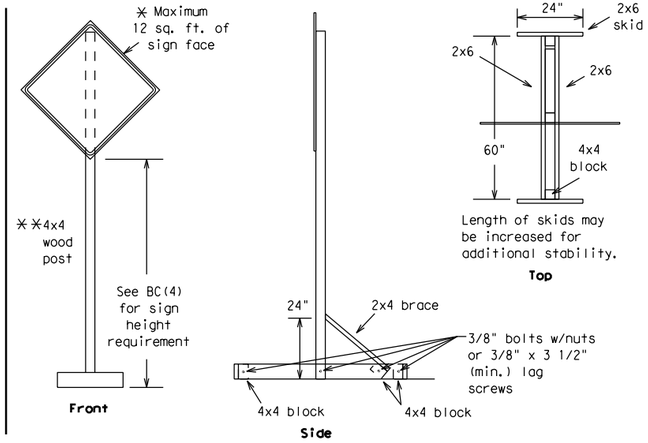
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		35

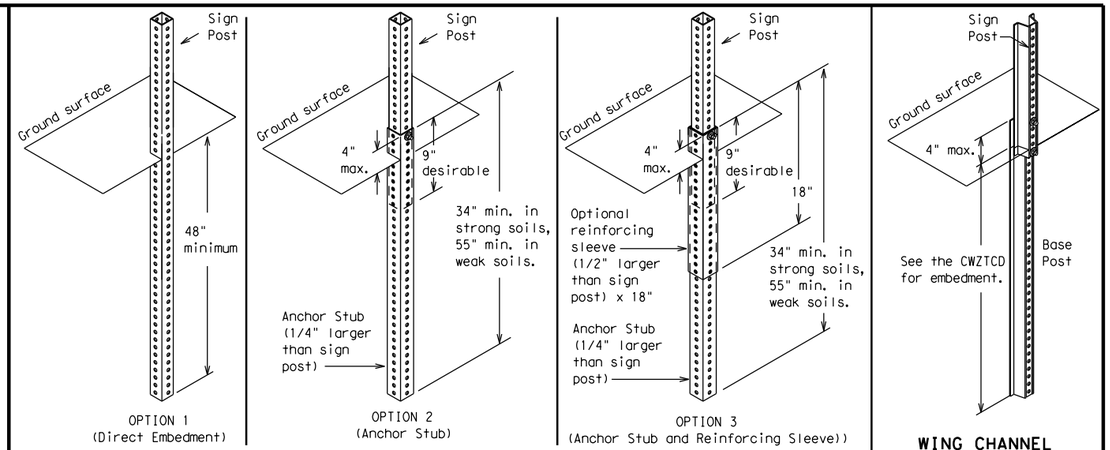
DATE: 1/18/2023 1:15:11 PM
FILE: ...\STVTCP\Long Ave\894bc-21.dgn





SKID MOUNTED WOOD SIGN SUPPORTS

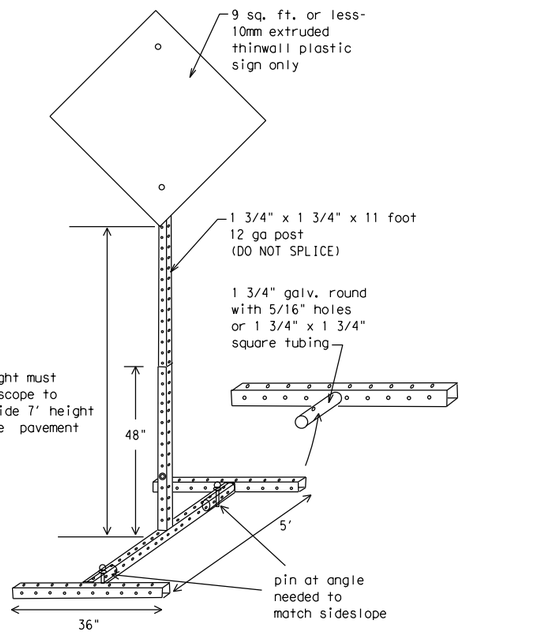
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

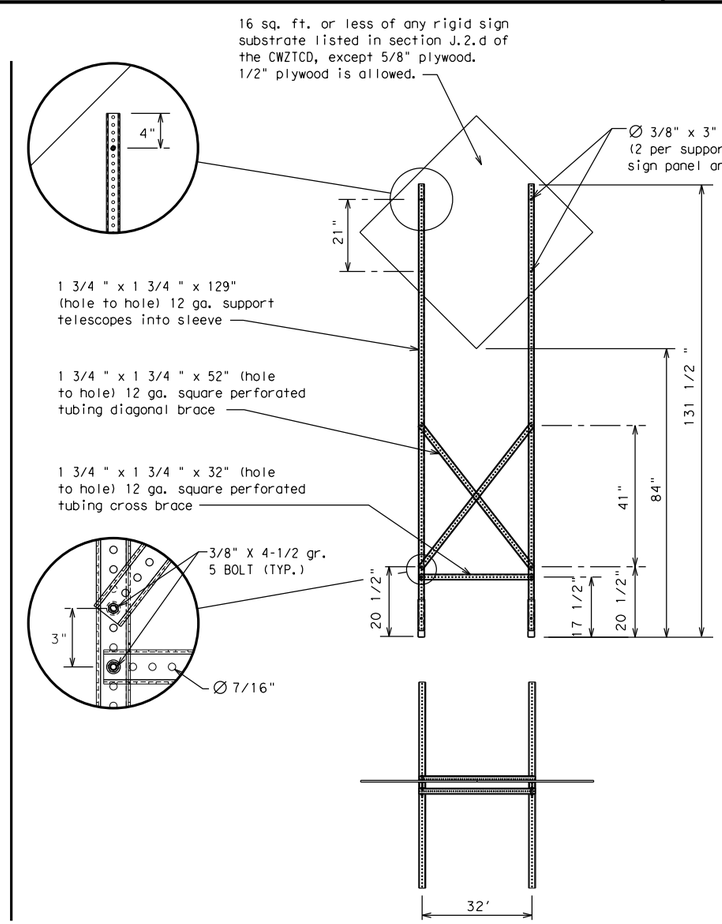


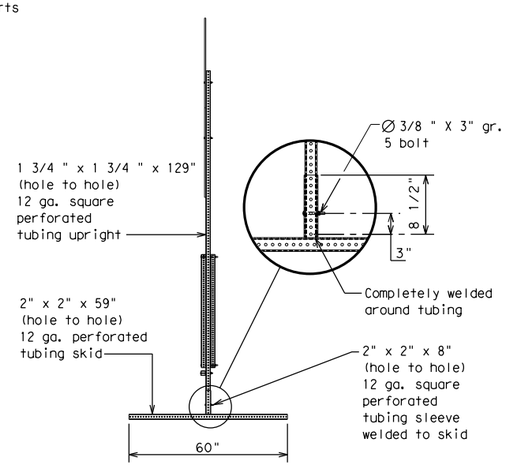
PERFORATED SQUARE METAL TUBING

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		36

DATE: 1/18/2023 1:15:12 PM
FILE: ...\STI\TCP\Long Ave\894bc-21.dgn

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

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)

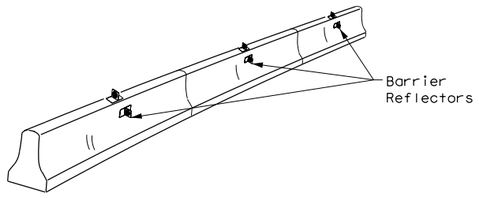
BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	48	894	CS
9-07	8-14	DIST	COUNTY		SHEET NO.
7-13	5-21	FTW	TARRANT		37

100

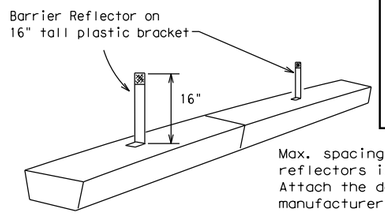
DATE: 1/18/2023 1:15:12 PM
FILE: ...\ST\TCP\Long Ave\894bc-21.dgn

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.



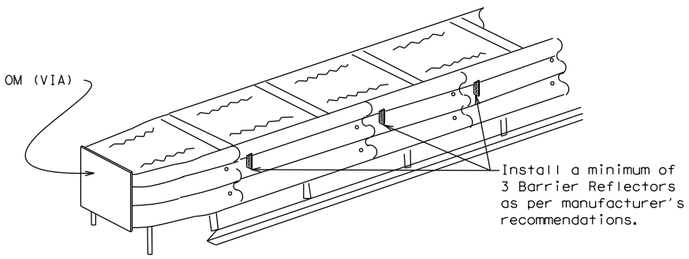
CONCRETE TRAFFIC BARRIER (CTB)

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

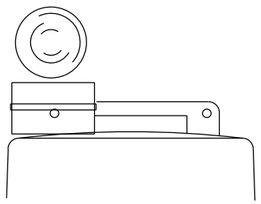
LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

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

WARNING LIGHTS

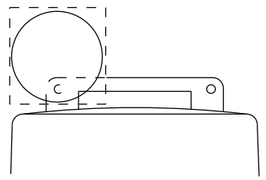


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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.



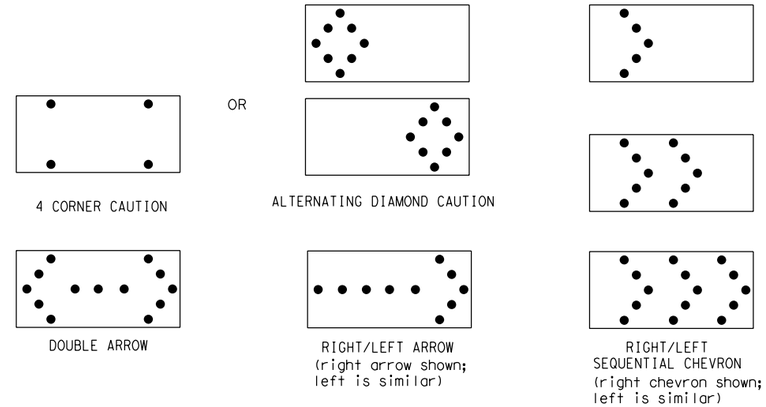
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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.

SHEET 7 OF 12

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	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		38

101

DATE: 1/18/2023 1:15:13 PM
FILE: ...\STTCP\Long Ave\894bc-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

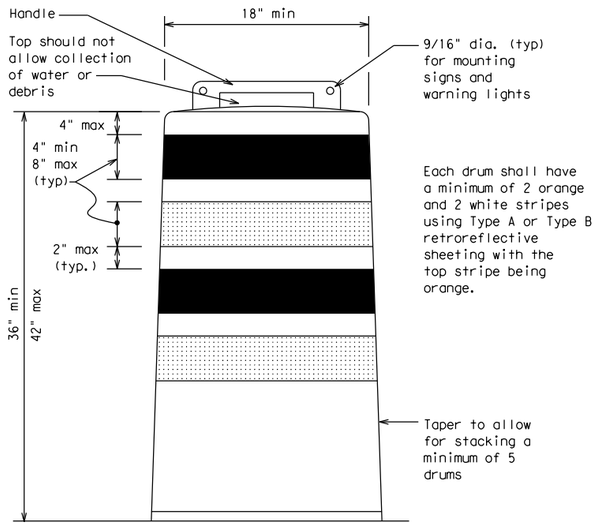
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

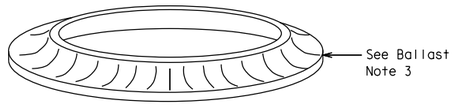
RETROREFLECTIVE SHEETING

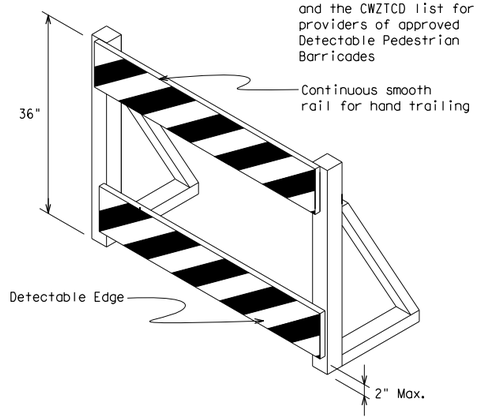
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

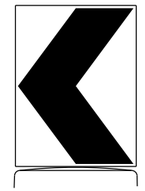




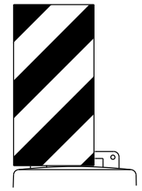


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

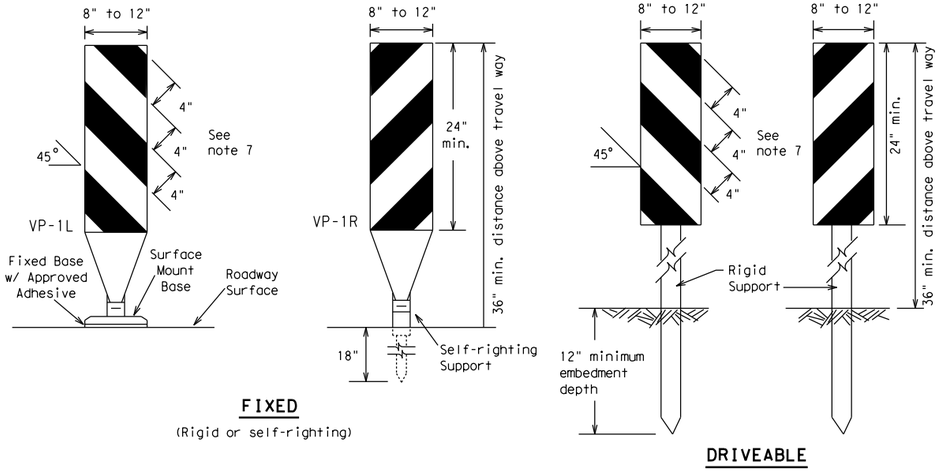
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	FTW	TARRANT		39
7-13				

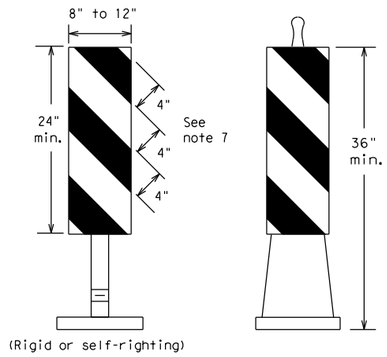
102

DATE: 1/18/2023 1:15:14 PM
FILE: ...\STXTCP\Long Ave\894bc-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

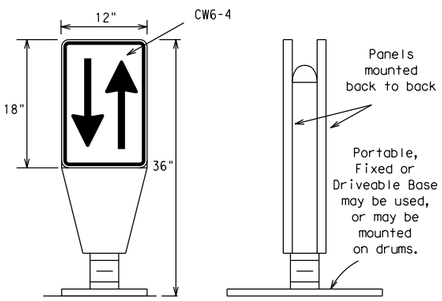


(Rigid or self-righting)

PORTABLE

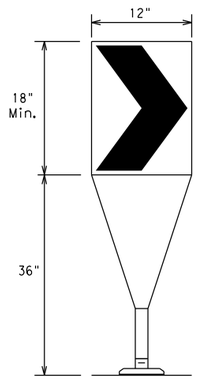
VERTICAL PANELS (VPs)

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



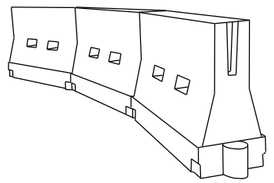
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

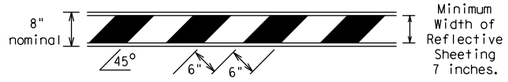
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		40

DATE: 1/18/2023 1:15:15 PM
FILE: ...\ST\TCP\Long Ave\894bc-21.dgn

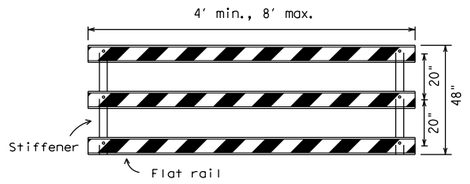
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



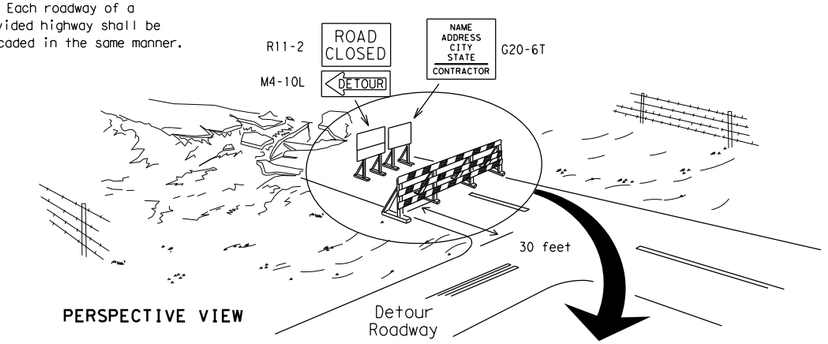
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

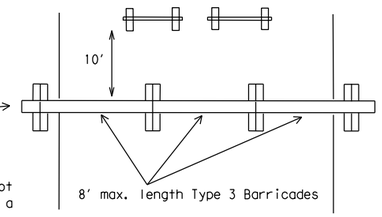
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

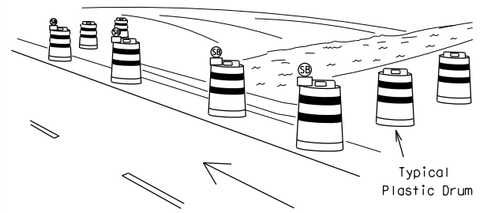
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

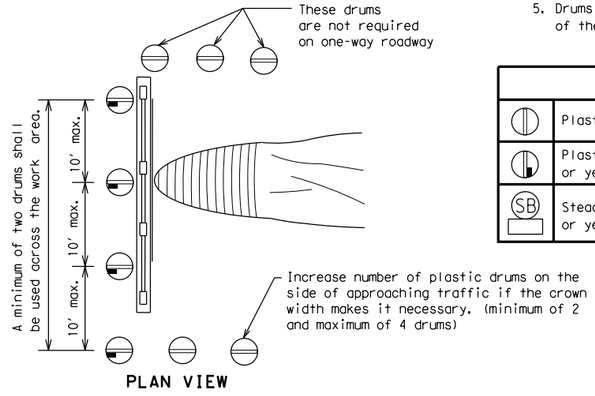
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

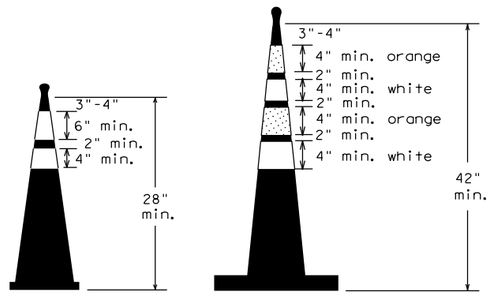
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

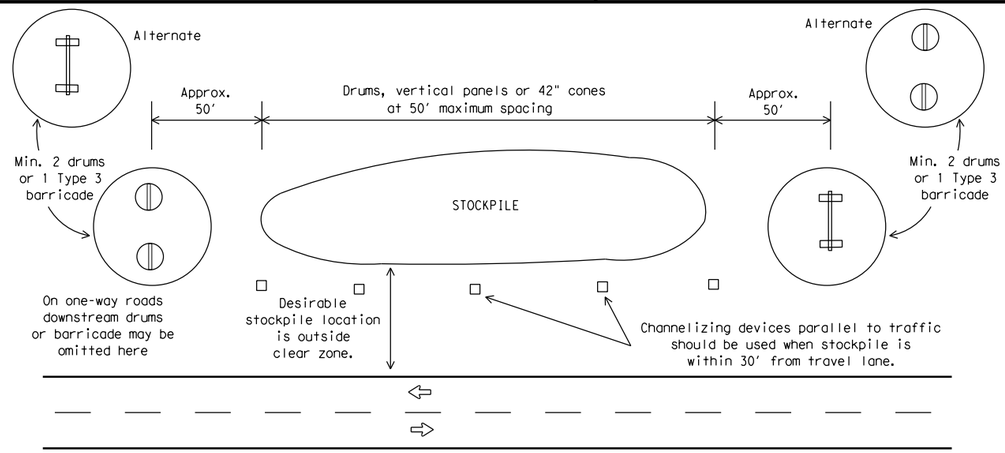
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		41

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.

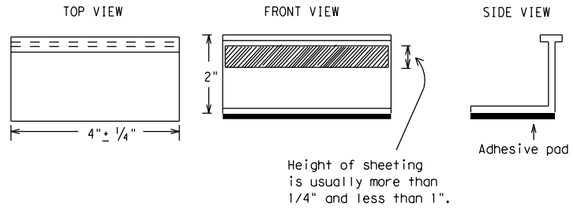
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

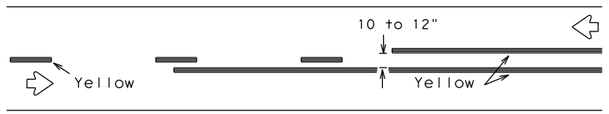
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	FTW	TARRANT		42
11-02 8-14				

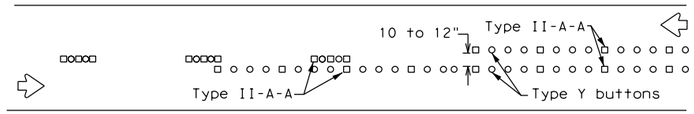
105

DATE: 1/18/2023 1:15:16 PM
FILE: ...\STTCP\Long Ave\894bc-21.dgn

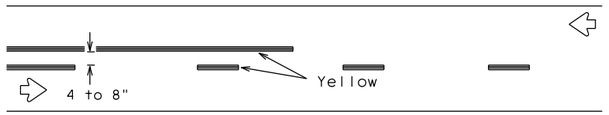
PAVEMENT MARKING PATTERNS



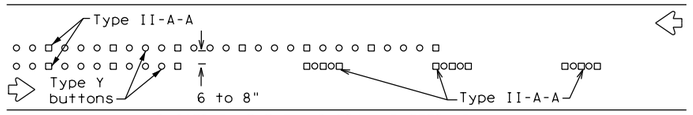
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



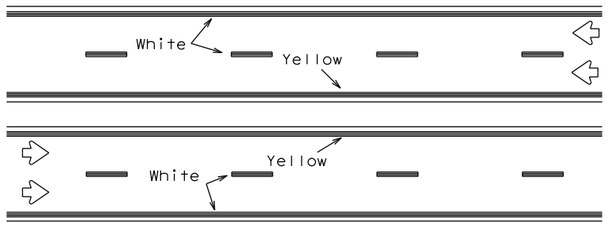
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



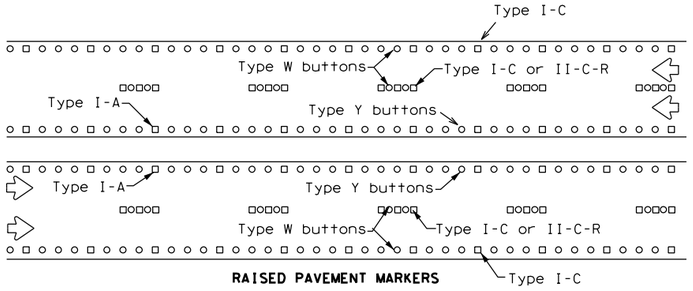
RAISED PAVEMENT MARKERS - PATTERN B

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



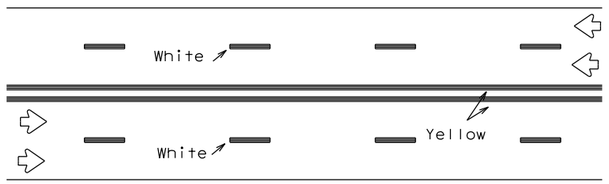
REFLECTORIZED PAVEMENT MARKINGS



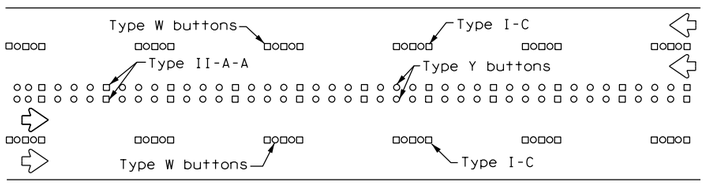
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



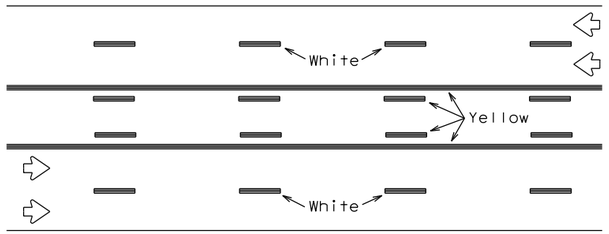
REFLECTORIZED PAVEMENT MARKINGS



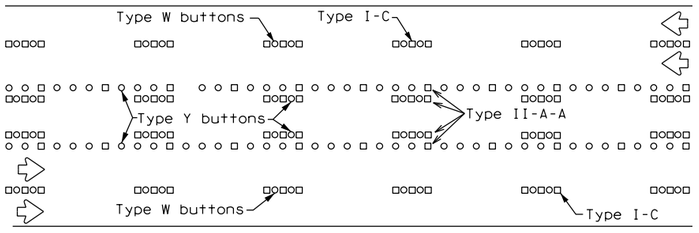
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

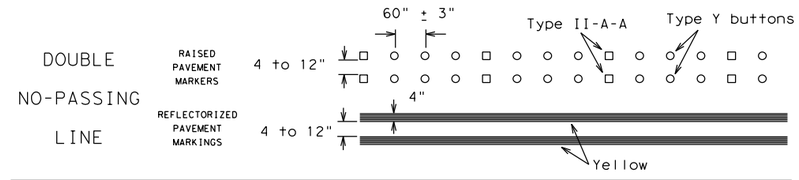
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

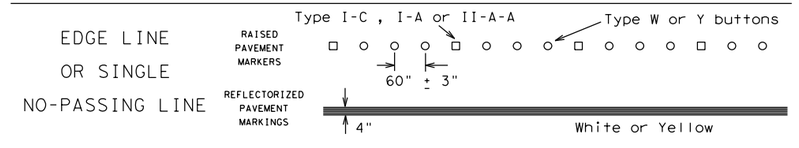
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

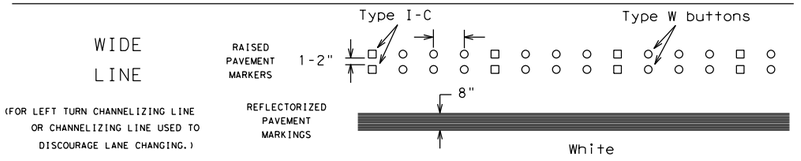


EDGE LINE OR SINGLE NO-PASSING LINE



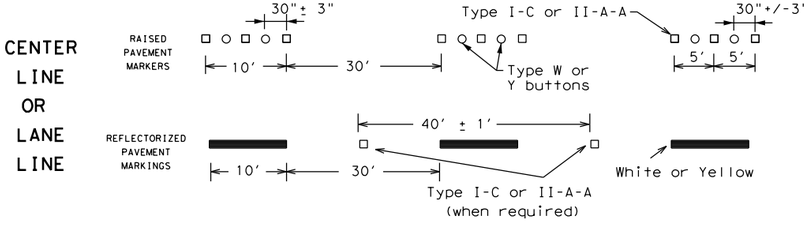
WIDE LINE

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

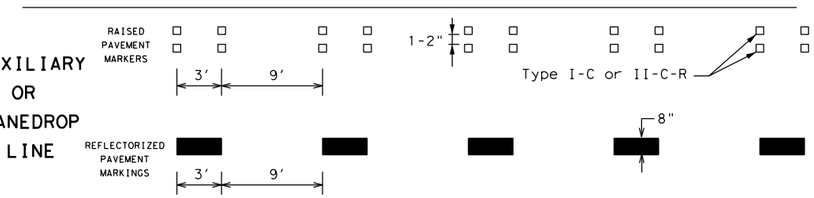


BROKEN LINES

CENTER LINE OR LANE LINE

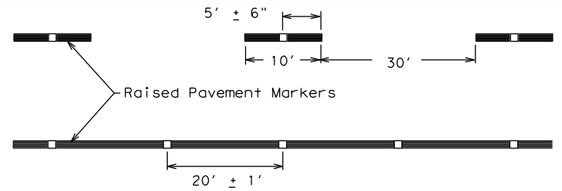


AUXILIARY OR LANEDROP LINE



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

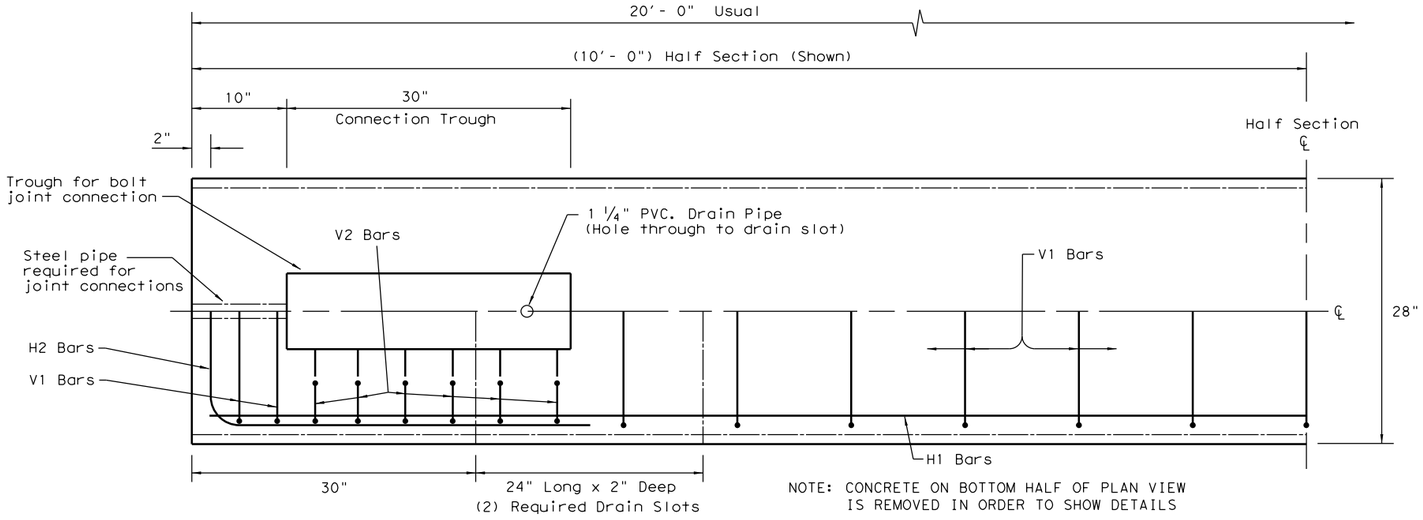
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

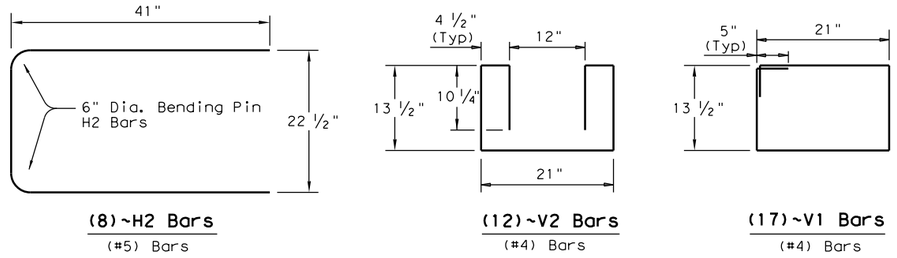
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		43

106



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

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



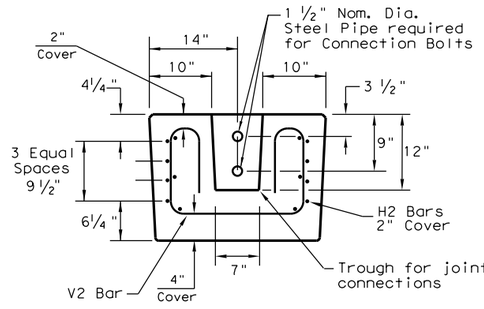
(8)~H2 Bars (#5) Bars

(12)~V2 Bars (#4) Bars

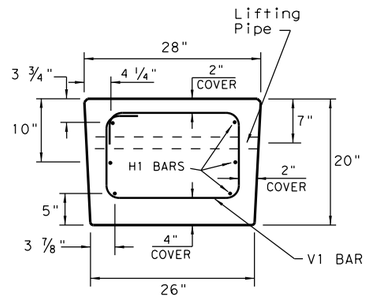
(17)~V1 Bars (#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

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



SECTION A-A



SECTION B-B

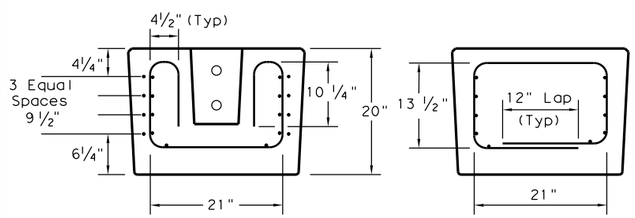
ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

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

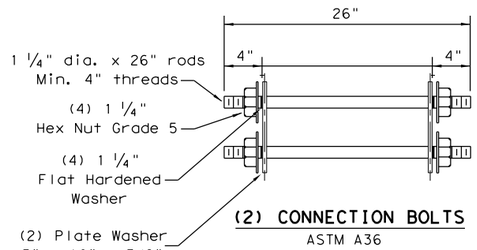
(WWR) GENERAL NOTES

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

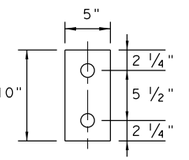


PLATE WASHER 5" x 10" x ⅜"

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

SHEET 1 OF 2

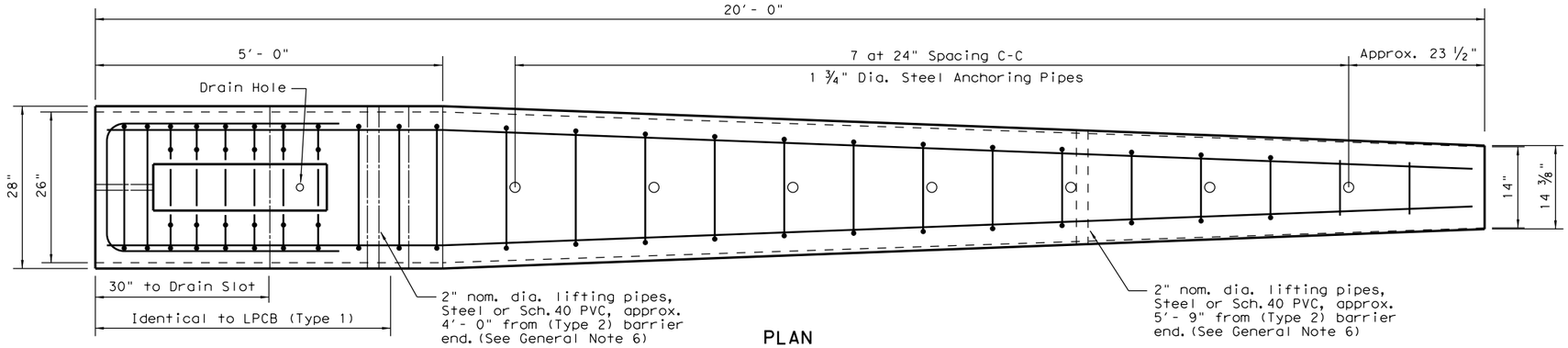
Texas Department of Transportation — Design Division Standard

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

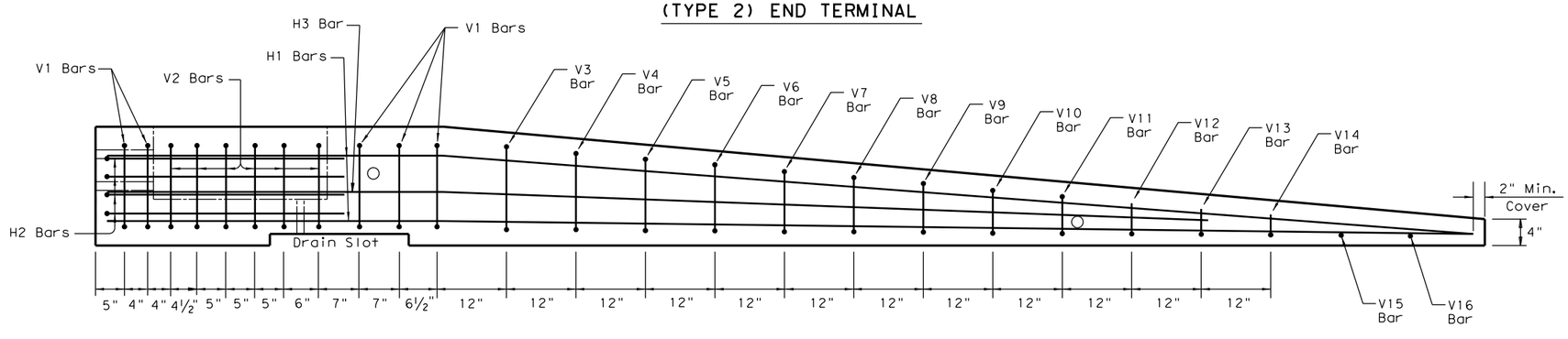
FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		44

DATE: 1/18/2023
FILE: ...\ST\TCP\Long Ave\894lpcb13.dgn

DATE: 1/18/2023
FILE: ...\ST\TCP\Long Ave\894lpcb13.dgn

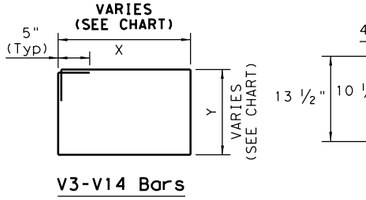


PLAN
(TYPE 2) END TERMINAL

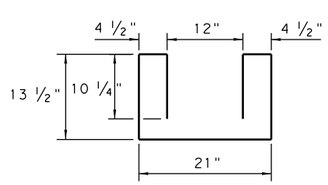


ELEVATION
(TYPE 2) END TERMINAL

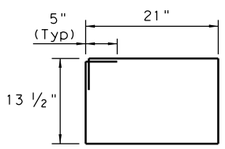
Note:
Anchoring pipes not shown in Elevation View



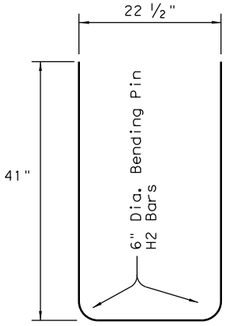
V3-V14 Bars



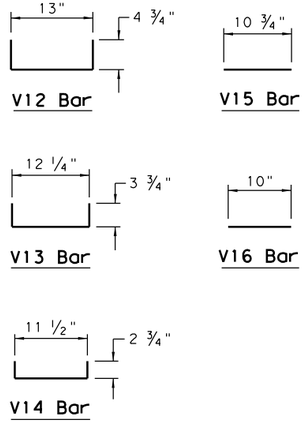
(6)~V2 Bars



(5)~V1 Bars



(4)~H2 Bars
(#5) Bars

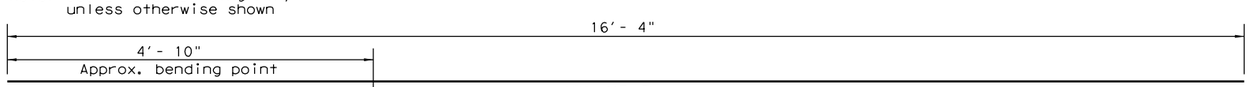


Note: All V Bars are (#4)

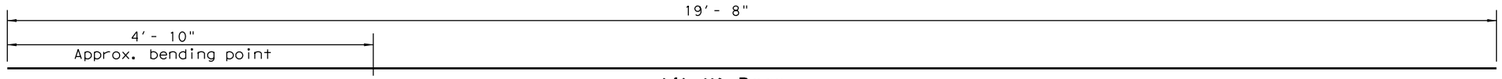
BAR (#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL

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

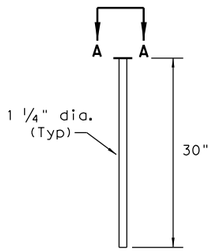


(2)~H3 Bars
(#5) Bar

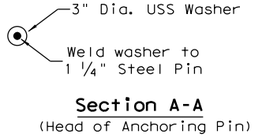


Note: Bends on H1 and H3 bars are slight and do not require formal bends.

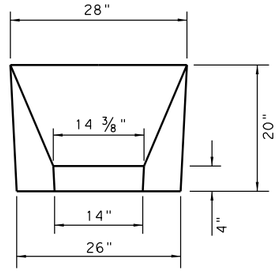
(4)~H1 Bars
(#5) Bar



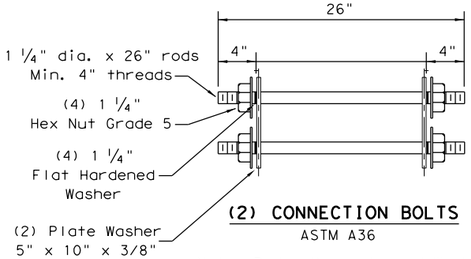
(7) Anchor Pins
ASTM A36 Steel
(See Note 3)



Section A-A
(Head of Anchoring Pin)



APPROACH VIEW



(2) CONNECTION BOLTS
ASTM A36

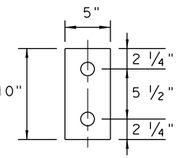


PLATE WASHER
5" x 10" x ⅜"

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

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.

FOR CONTRACTORS INFORMATION ONLY

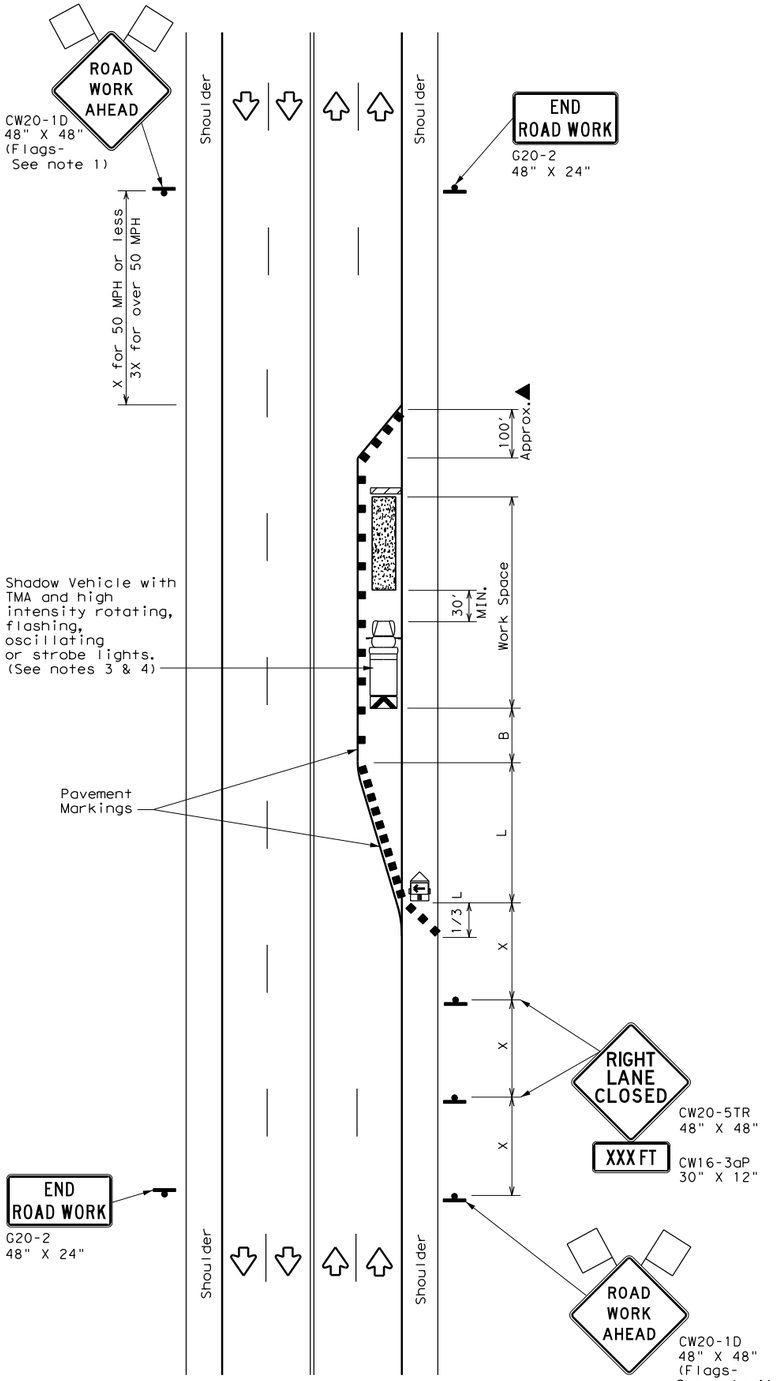
(TYPE 2) APPROX. QUANTITIES	20 FT. SECTION	
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

Texas Department of Transportation

Design Division Standard

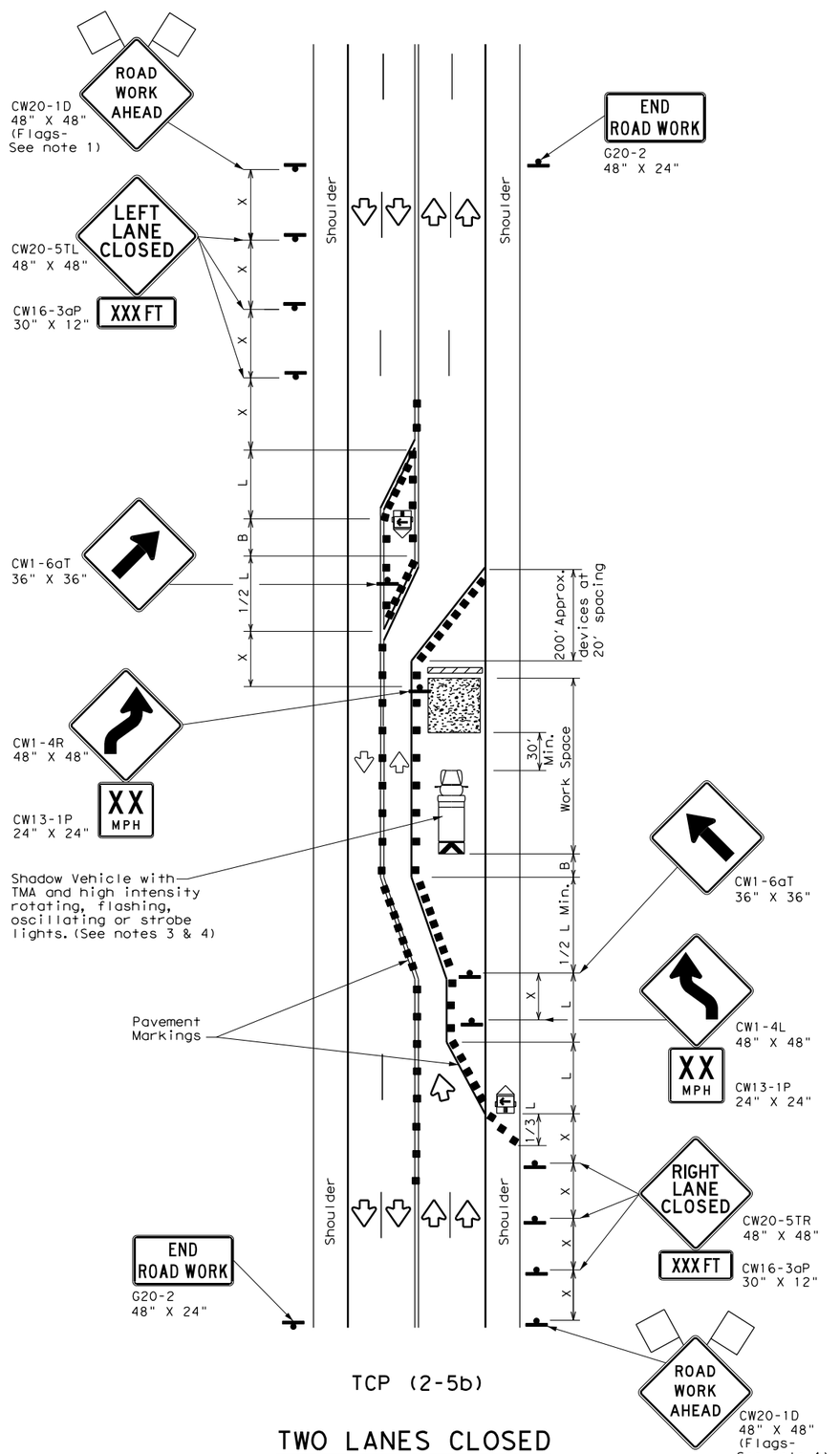
LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		45



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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. 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 substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

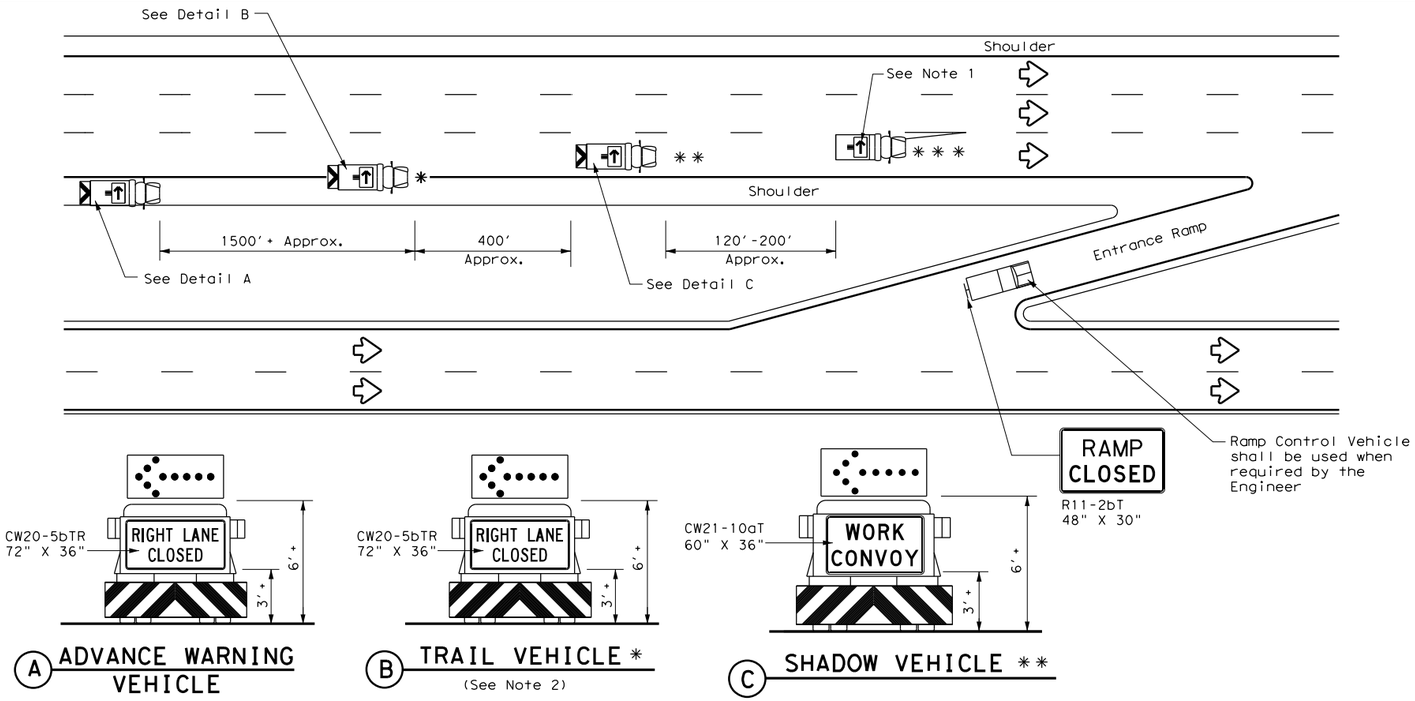
TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

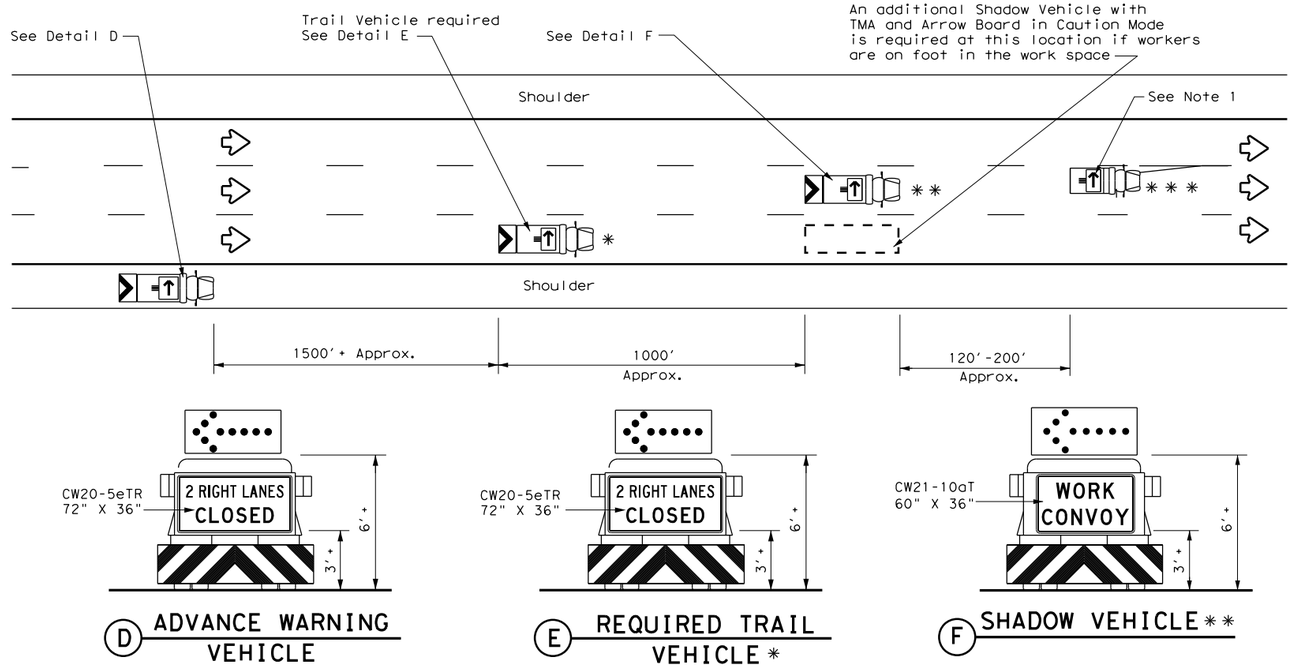
FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0902	48	894	CS
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	FTW	TARRANT		46

165

DATE: 1/18/2023 1:15:56 PM
FILE: ...\TCP\Long Ave\894tcp2-5-18.dgn



RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



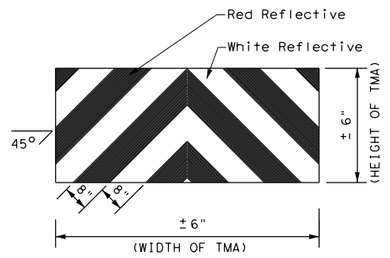
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

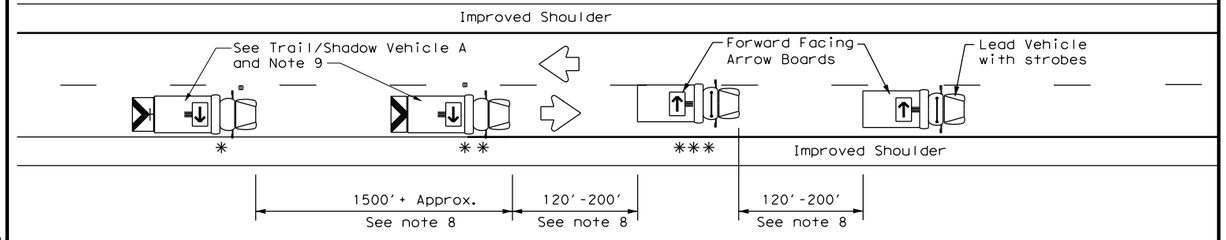
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		47

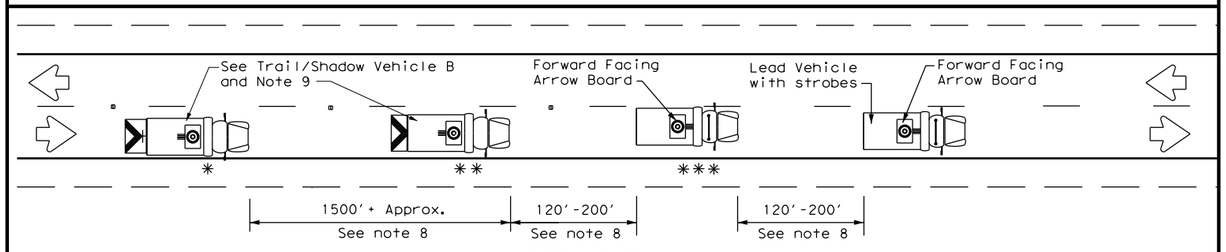
176

DATE: 1/18/2023 1:16:20 PM
FILE: ...\ST\TCP\Long Ave\894tcp3-2.dgn



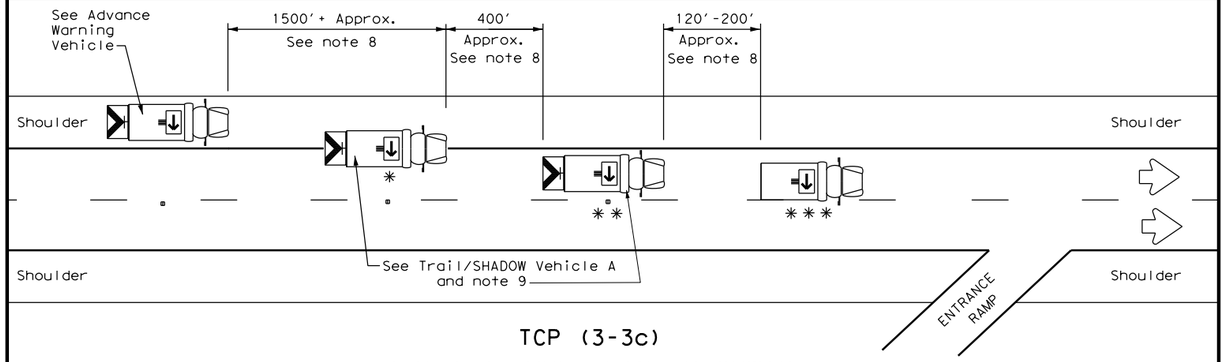
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)



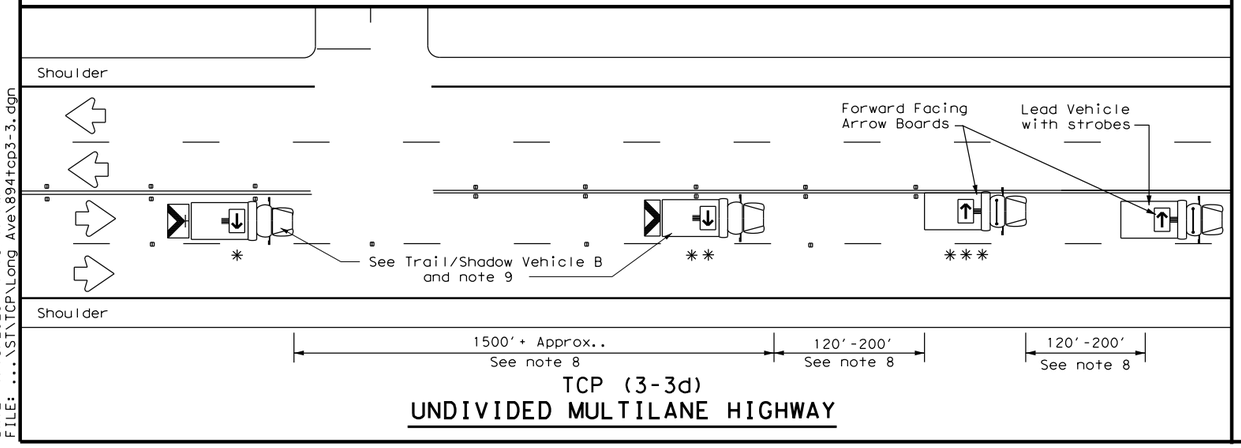
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)



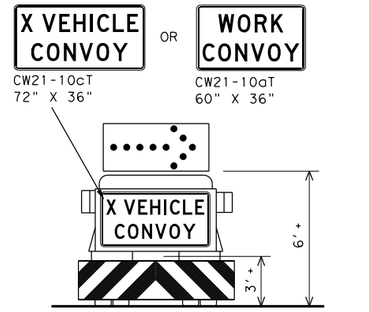
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



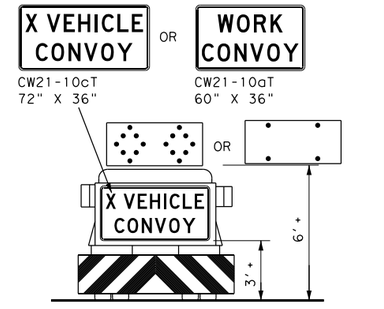
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



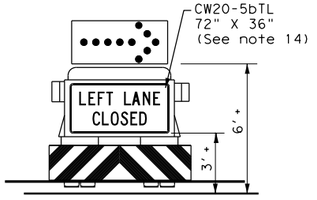
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

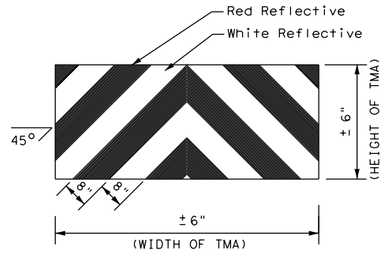


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
* *	Shadow Vehicle		
* * *	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

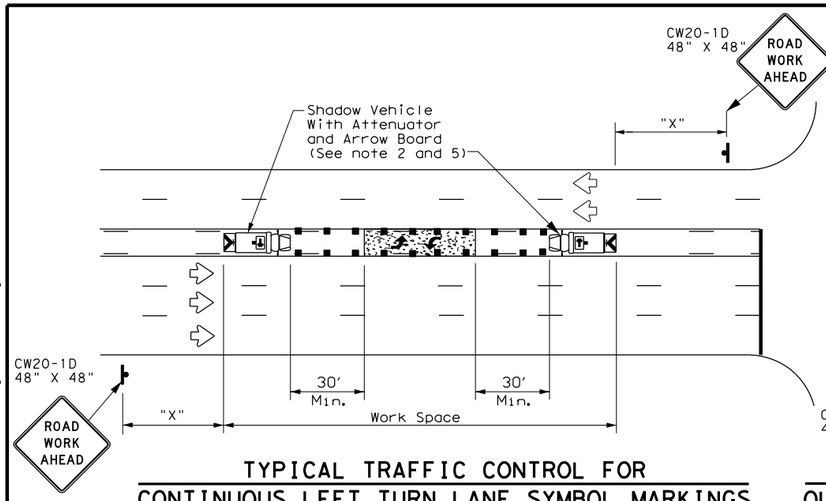
Texas Department of Transportation

Traffic Operations Division Standard

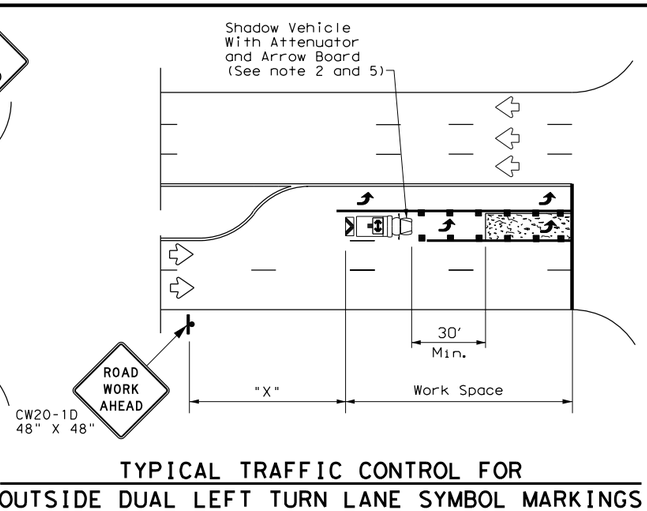
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	FTW	TARRANT		48
1-97 7-14				

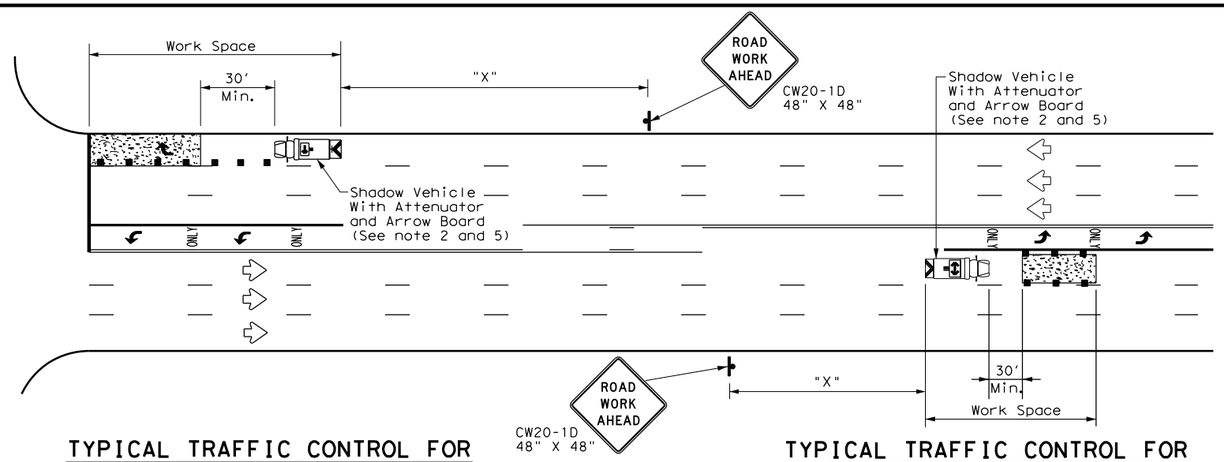
DATE: 1/18/2023 1:16:41 PM
FILE: ...\STITCP\Long Ave\894tcp3-3.dgn



TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

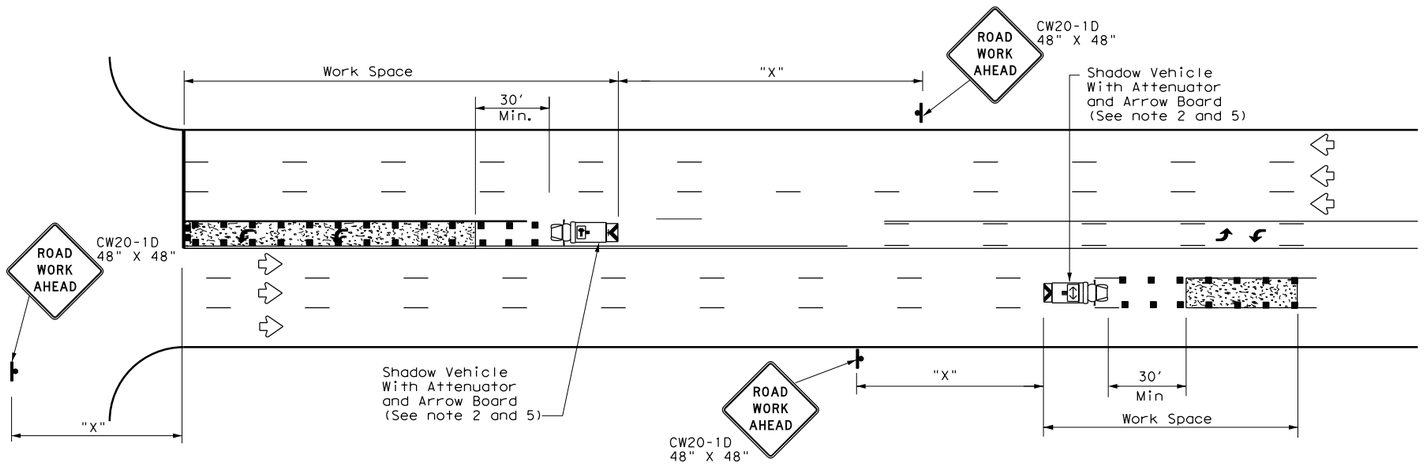


TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR
OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
CENTER LANE MARKINGS

LEGEND			
✳	Trail Vehicle	ARROW BOARD DISPLAY	
✳✳	Shadow Vehicle		
✳✳✳	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow	■ ■ ■	Channelizing Devices

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"
30	$L=\frac{WS^2}{60}$	150′	165′	180′	30′	60′	120′	90′
35		205′	225′	245′	35′	70′	160′	120′
40		265′	295′	320′	40′	80′	240′	155′
45	L=WS	450′	495′	540′	45′	90′	320′	195′
50		500′	550′	600′	50′	100′	400′	240′
55		550′	605′	660′	55′	110′	500′	295′
60		600′	660′	720′	60′	120′	600′	350′
65		650′	715′	780′	65′	130′	700′	410′
70		700′	770′	840′	70′	140′	800′	475′
75		750′	825′	900′	75′	150′	900′	540′

✳ 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

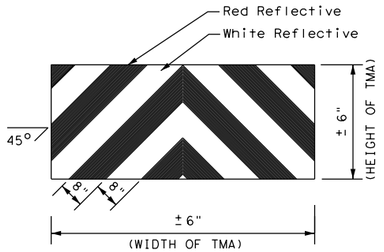
1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.

2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.

3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.

4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

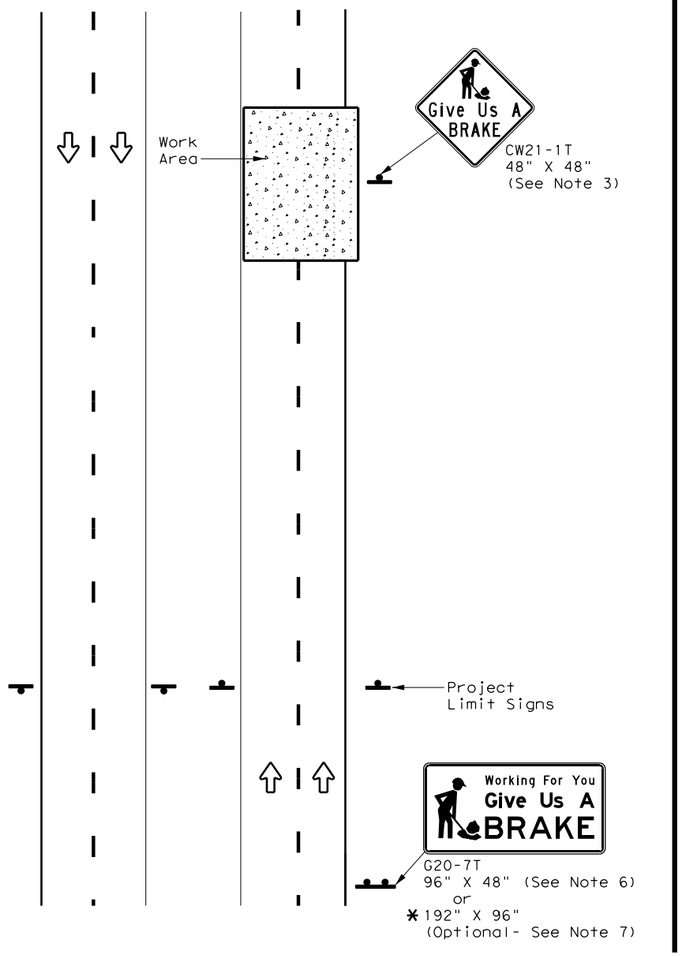
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

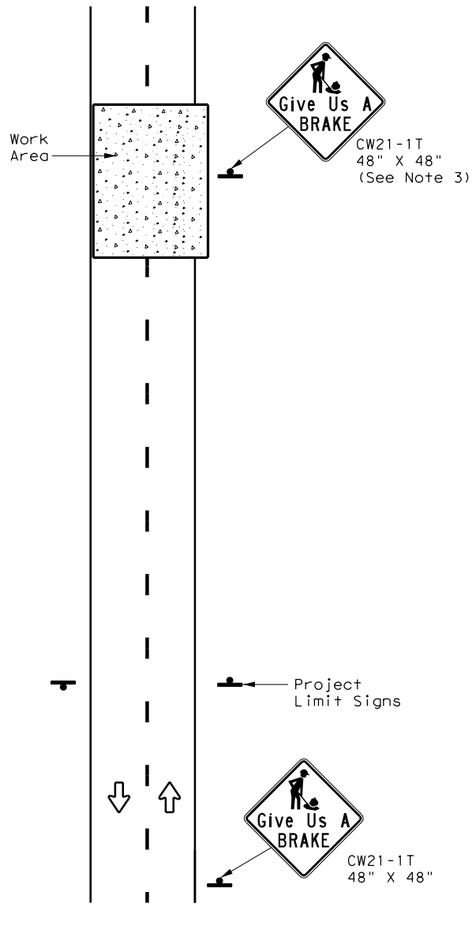
TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		49

DATE: 1/18/2023 1:17:02 PM
FILE: ...\ST\TCP\Long Ave\894tcp3-4.dgn



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

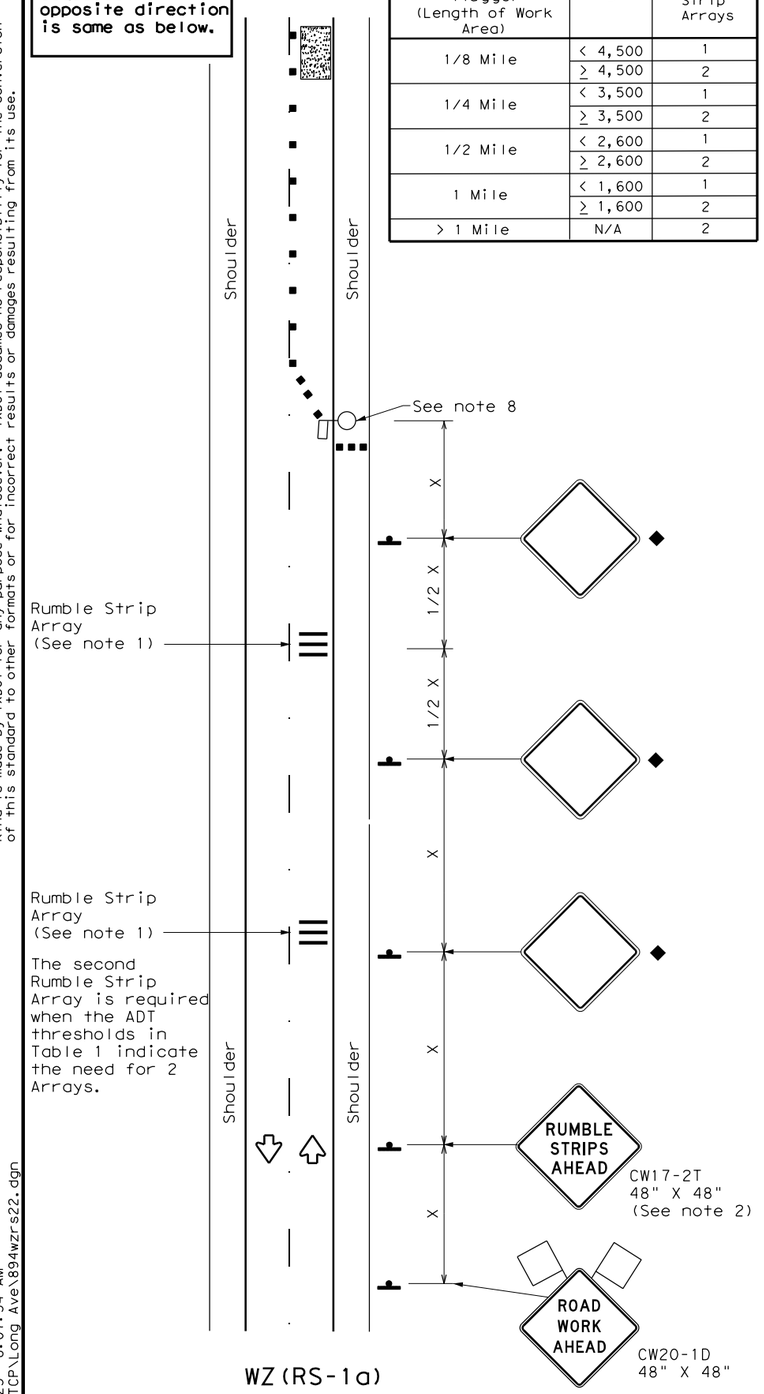
FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	FTW	TARRANT		50

116

DATE: 1/18/2023 1:17:25 PM
FILE: ...\TCP\Long Ave\894wzbrk-13.dgn

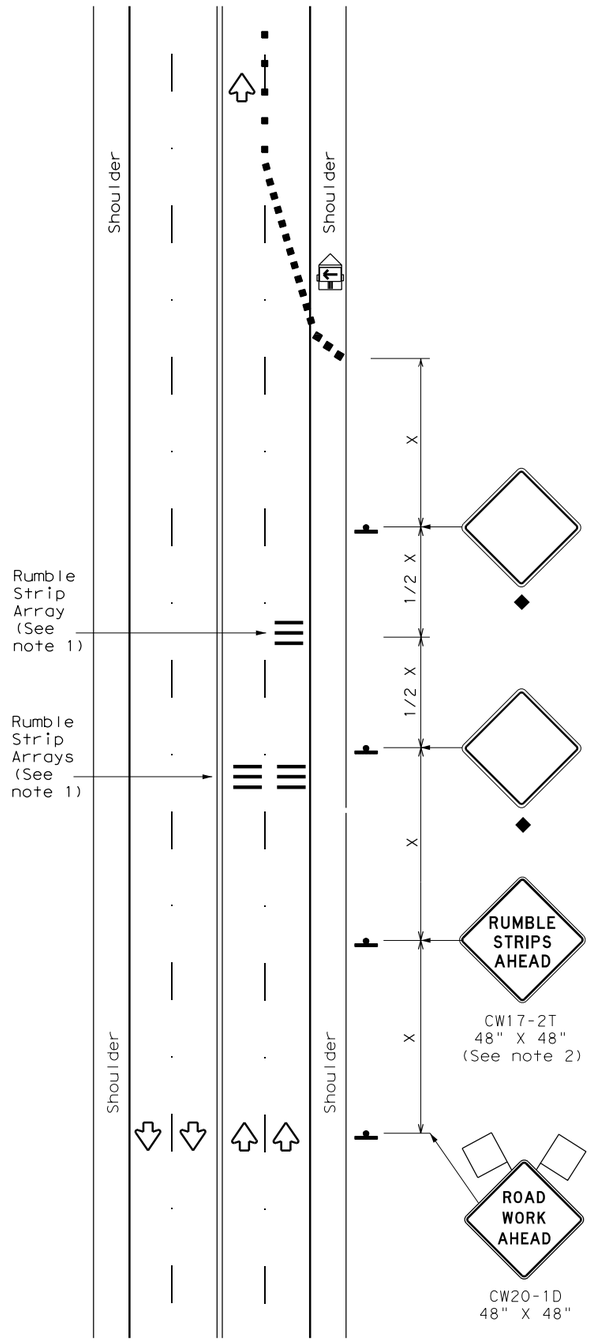
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1		
Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel	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"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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
	✓	✓		

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		50A

117

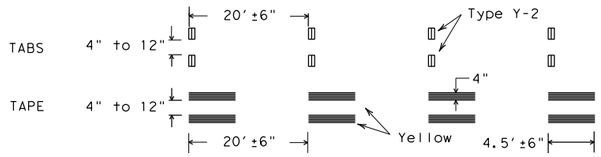
DATE: 1/20/2023 8:07:34 AM
FILE: ...\STTCP\Long Ave\894wzrs22.dgn

DATE: 1/18/2023 1:17:52 PM
FILE: ...\TCP\Long Ave\894wzstpm-13.dgn

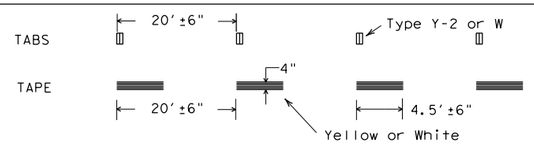
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

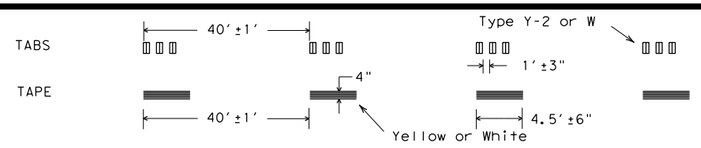


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



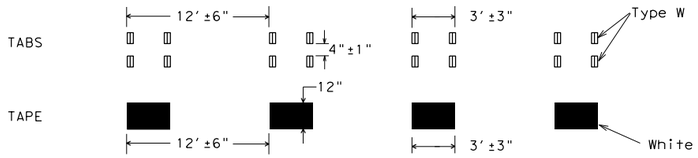
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

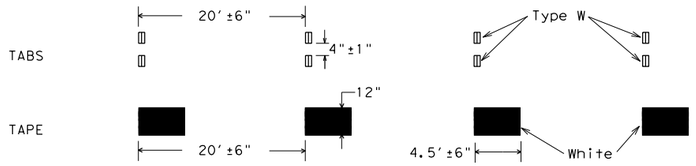


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



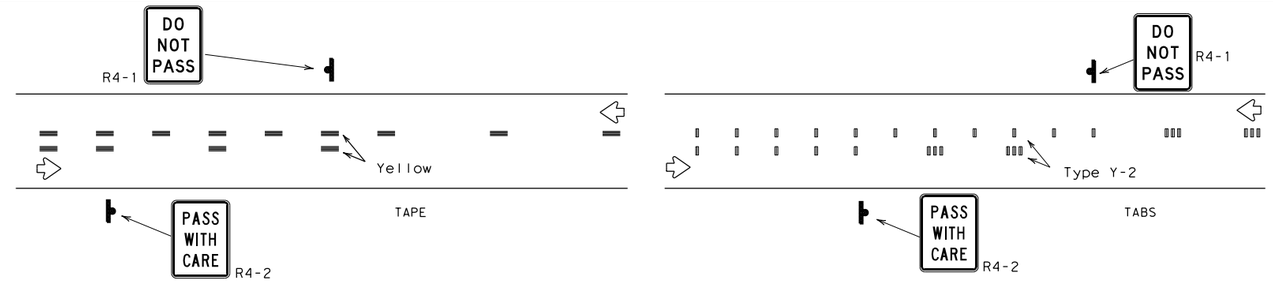
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

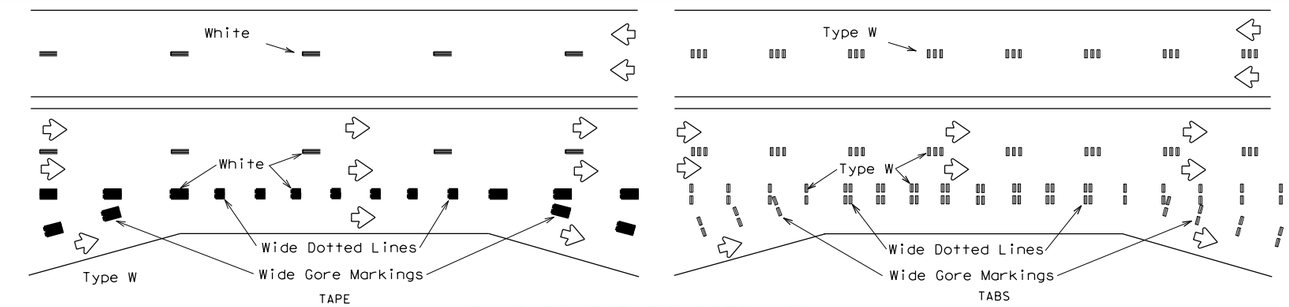
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

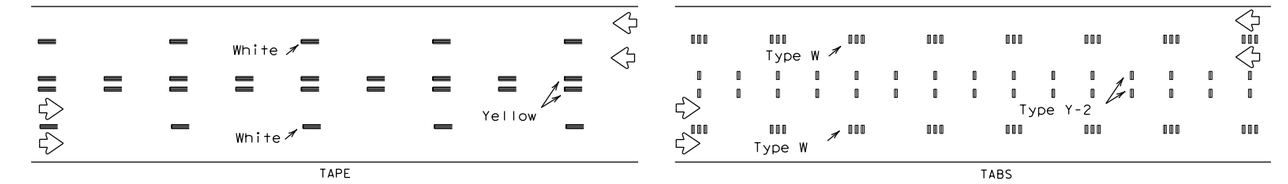
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



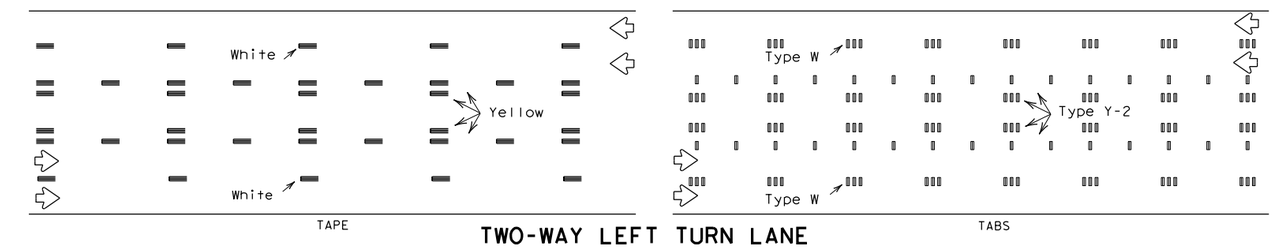
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



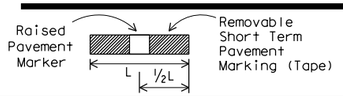
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

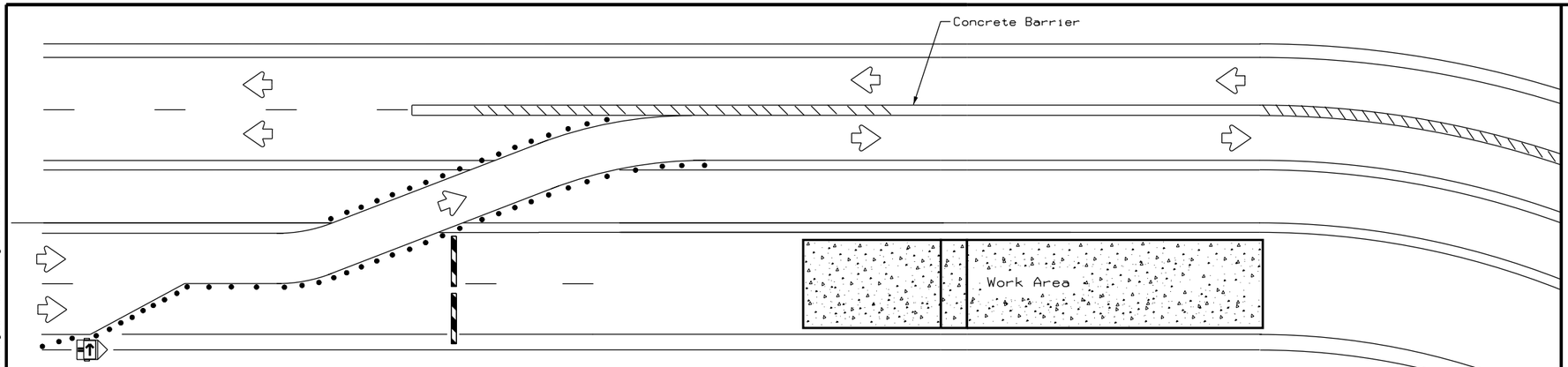
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	48	894	CS
1-97		DIST	COUNTY		SHEET NO.
3-03		FTW	TARRANT		51
7-13					

111



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

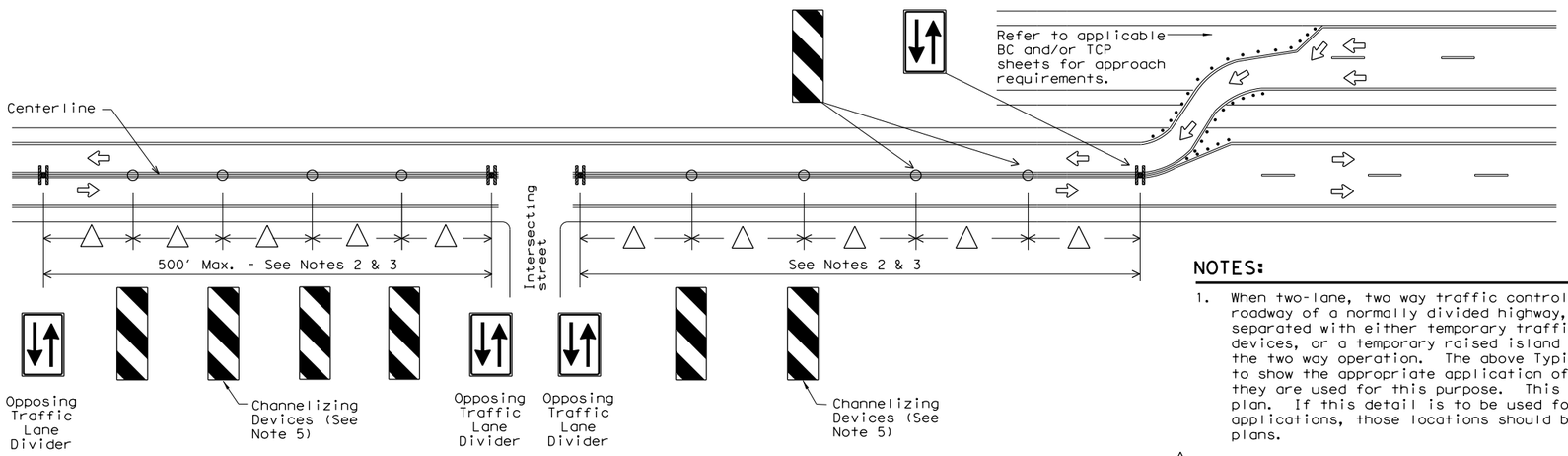
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100′.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

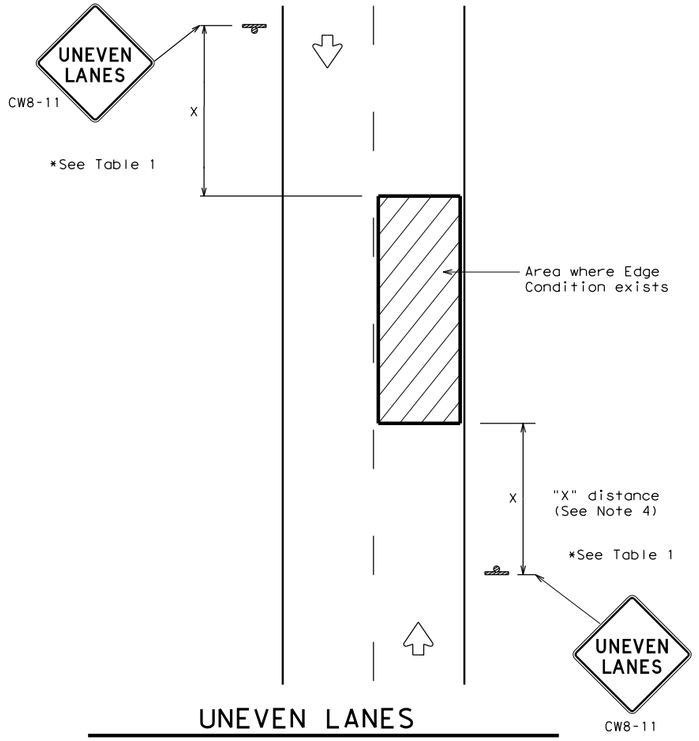
TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

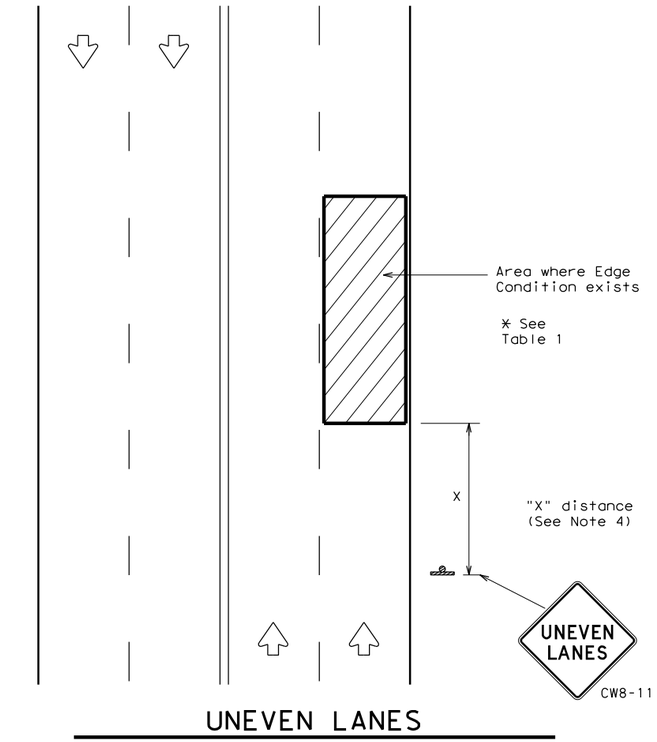
FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		52

110

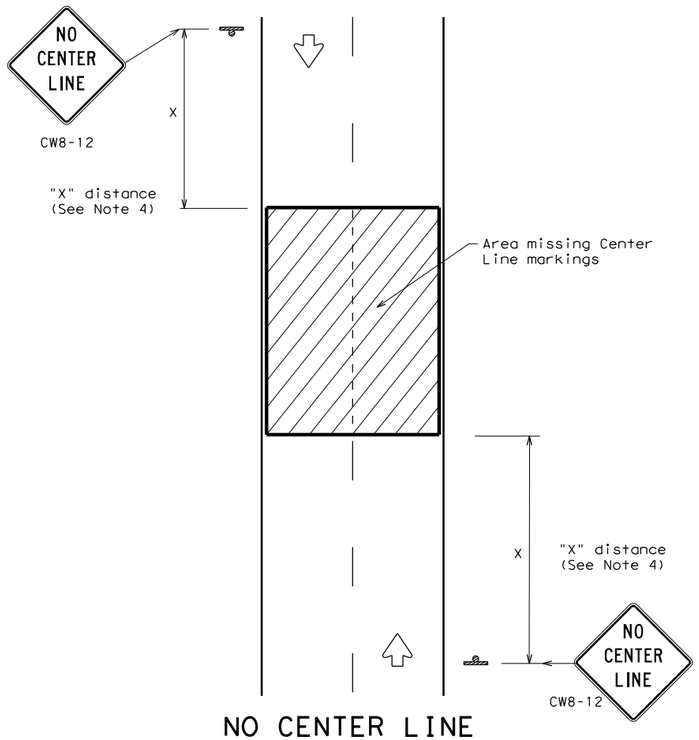
DATE: 1/18/2023 1:18:15 PM
FILE: ...\STATCP\Long Ave\894wztd-17.dgn



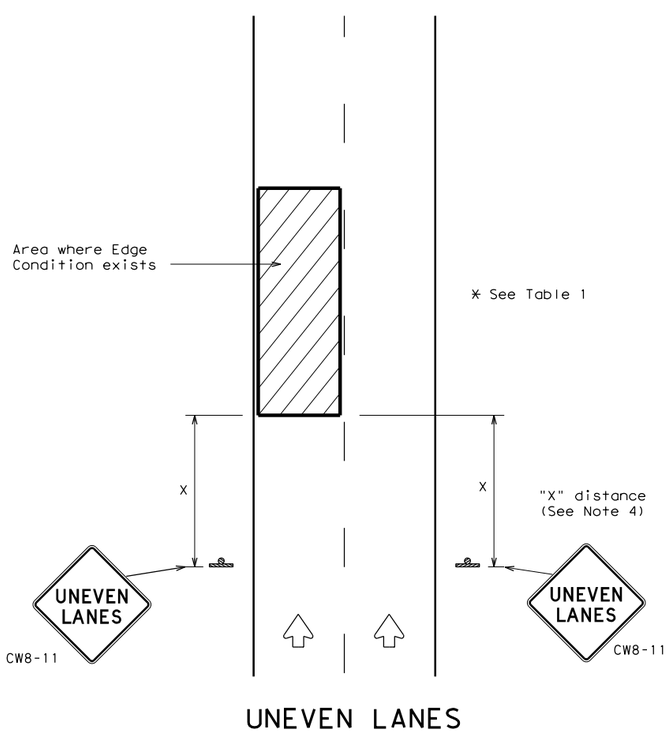
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

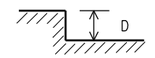
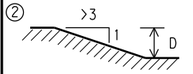
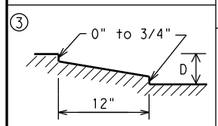
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

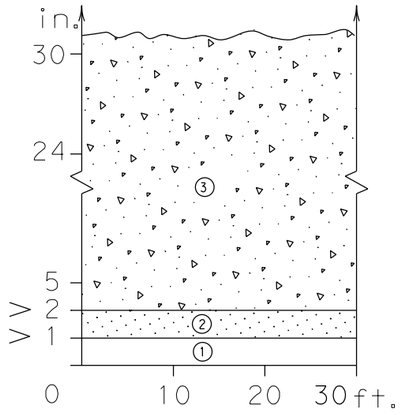
FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	FTW	TARRANT		53

112

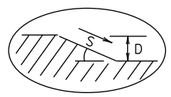
DATE: 1/18/2023 1:18:33 PM
FILE: ...\STNTCP\Long Ave\894wzul-13.dgn

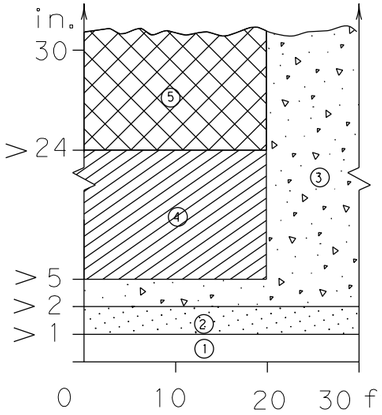
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

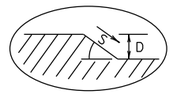


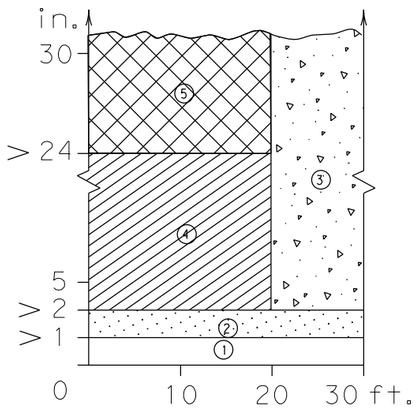
Edge Condition I
S = (3:1) (or flatter)



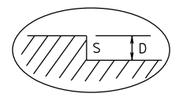


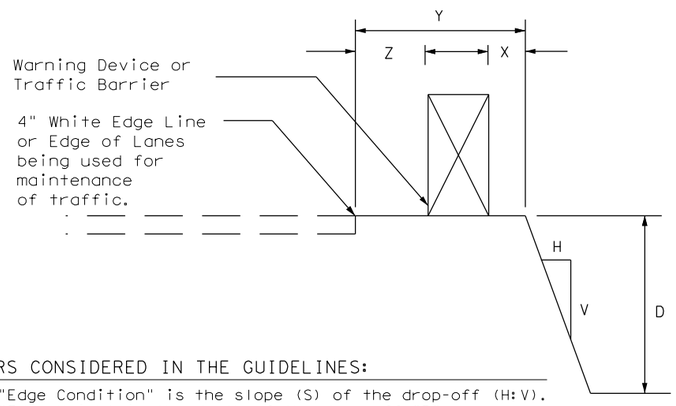
Edge Condition II
S = ((2.99):1) to (1:1)





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:

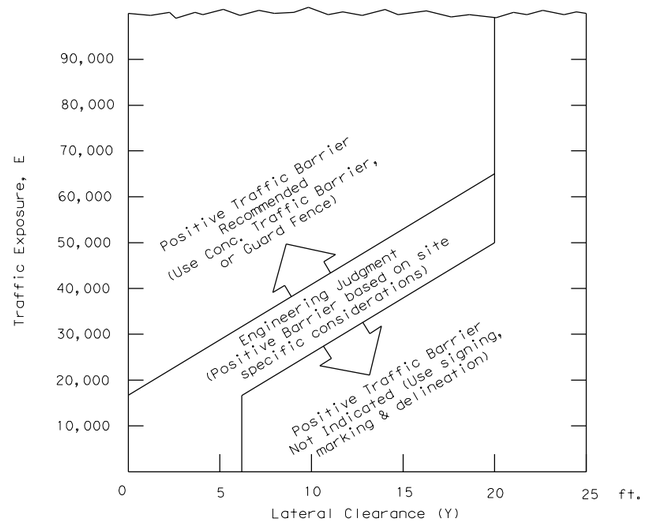
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED
PROFESSIONAL ENGINEER
F-2966

Date 2/7/2023

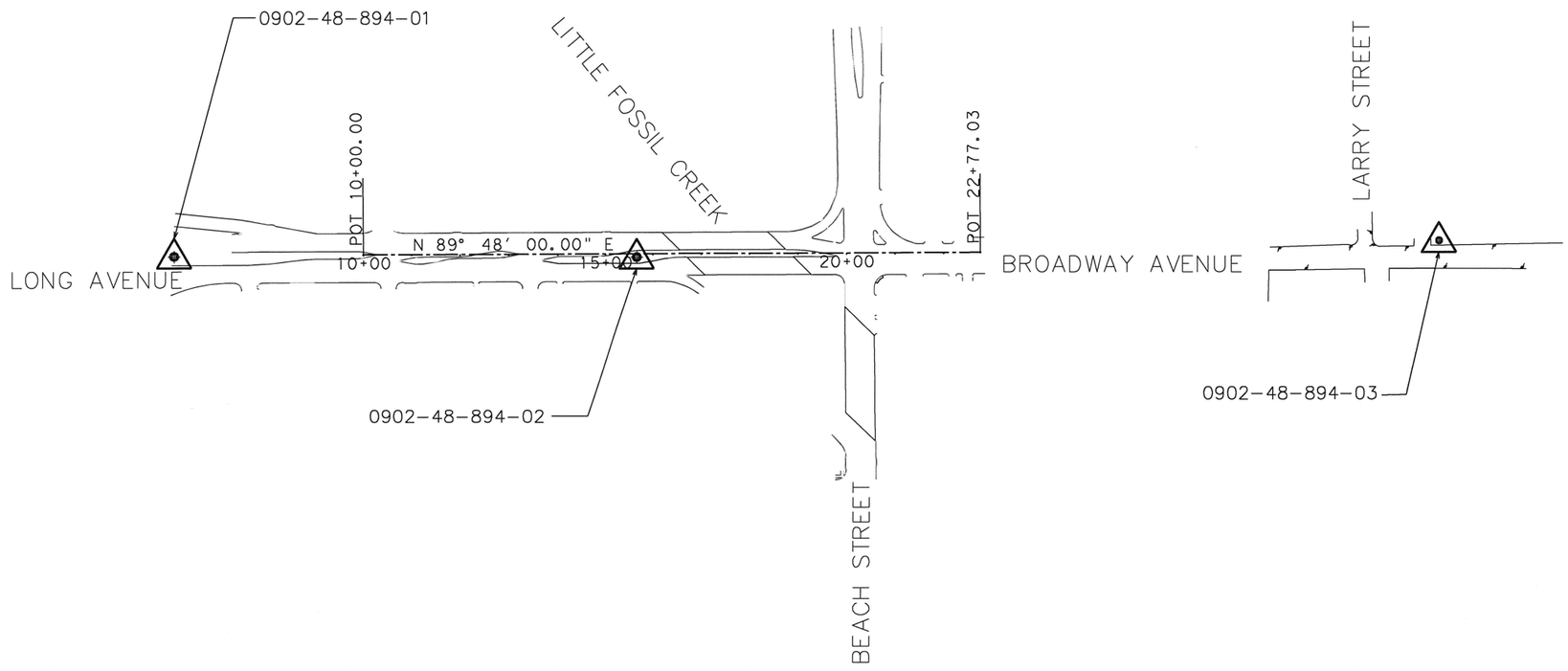
Texas Department of Transportation

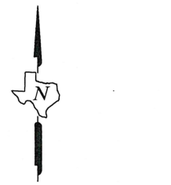
Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		54

DATE: 1/18/2023 4:00:14 PM
FILE: ...\TCP\Long Ave\894edgecon-21.dgn





200 0 200 400
GRAPHIC SCALE IN FEET

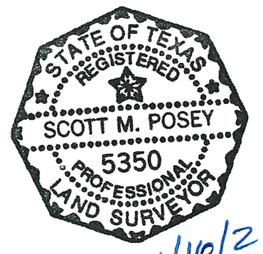
PLEASE REFER TO BAR SCALE. DRAWING MAY HAVE BEEN REDUCED OR ENLARGED.
IF PRINTED ON A 11 X 17 USE 1" = 400'
IF PRINTED ON A 22 X 34 USE 1" = 200'

CONTROL POINT	SURFACE COORDINATES NORTHING	SURFACE COORDINATES EASTING	ELEVATION	GRID COORDINATES NORTHING	GRID COORDINATES EASTING	DESCRIPTION
0902-48-894-01	6,980,510.807	2,338,924.705	576.20'	6,979,673.246	2,338,644.068	3 1/2" ALUMINUM DISC IN CONCRETE
0902-48-894-02	6,980,509.774	2,339,882.773	560.16'	6,979,672.214	2,339,602.021	3 1/2" ALUMINUM DISC IN CONCRETE
0902-48-894-03	6,980,543.529	2,341,543.473	563.08'	6,979,705.965	2,341,262.521	3 1/2" ALUMINUM DISC IN CONCRETE

NOTES:

HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE 4202 AND ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011), AND WERE DERIVED FROM THE TXDOT REAL TIME NETWORK UTILIZING VIRTUAL REFERENCE STATION METHODOLOGIES IN OCTOBER OF 2021. ALL SURFACE DISTANCES AND COORDINATES SHOWN HEREON MAY BE CONVERTED TO GRID VALUES BY MULTIPLYING THE SURFACE VALUES BY A COMBINED SCALE FACTOR OF 0.999880014398, OR BY DIVIDING THOSE SURFACE VALUES BY THE DENTON COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00012.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WERE DETERMINED FROM MULTIPLE GNSS OBSERVATIONS MADE UTILIZING TXDOT'S VIRTUAL REFERENCE NETWORK AND FROM DIFFERENTIAL LEVELING, IN OCTOBER OF 2021 AND ARE AS SHOWN HEREON.



1/16/23

Scott M. Posey
Registered Professional Land Surveyor
No. 5350

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

EAST LONG AVE

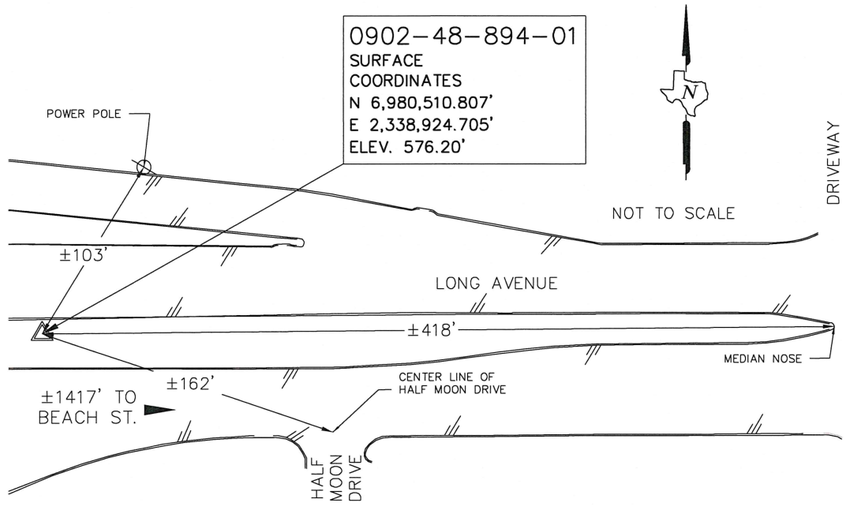
CONTROL DATA INDEX SHEET

CONTROL POINT LEGEND

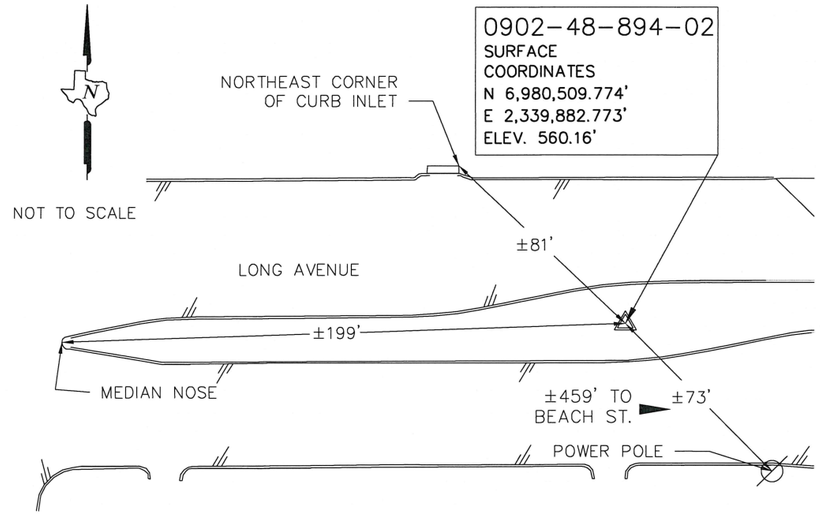
PRIMARY CONTROL POINT:
5/8" IRON ROD WITH ALUMINUM CAP IN CONCRETE STAMPED "TEXAS DEPT OF TRANSPORTATION CONTROL POINT" PROVIDED BY TxDOT

SHEET 1 OF 1

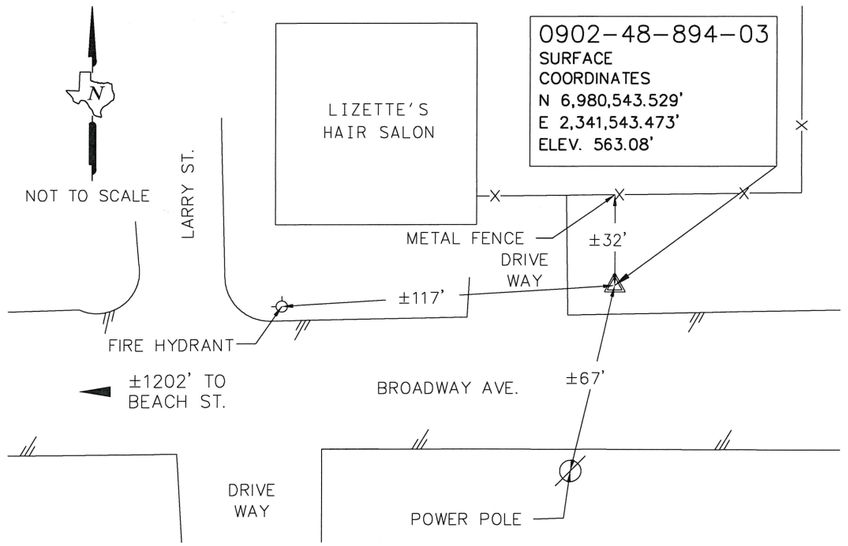
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
CHECK	6	(See Title Sheet)		ELA
	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS	TEXAS	FW	TARRANT	
CHECK	CONTROL	SECTION	JOB	55
	0902	48	894	



STAMPED 0902-48-894 01	A 3 1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-48-894-01" SET IN CONCRETE IN A MEDIAN OF LONG AVE. WEST OF BEACH ST. 1417'±, ±103' SW OF A POWER POLE, ±418' WEST OF THE MEDIAN NOSE, ±162' NW OF THE CL OF HALF MOON DR.



STAMPED 0902-48-894 02	A 3 1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-48-894-02" SET IN CONCRETE IN A MEDIAN OF LONG AVE. WEST OF BEACH ST. 459'±, ±73' NW OF A POWER POLE, ±199' EAST OF THE MEDIAN NOSE, ±81' SW OF THE NW CORNER OF A CURB INLET



STAMPED 0902-48-894 03	A 3 1/2" ALUMINUM DISC STAMPED "TEXAS DEPARTMENT OF TRANSPORTATION CONTROL MARK 0902-48-894-03" SET IN CONCRETE ON NORTH SIDE OF BROADWAY AVE EAST OF BEACH ST. 1202'±, ±67' NE OF A POWER POLE, ±117' EAST OF A FIRE HYDRANT, ±32' SOUTH OF A METAL FENCE

NOTES:

HORIZONTAL COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE 4202 AND ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011), AND WERE DERIVED FROM THE TXDOT REAL TIME NETWORK UTILIZING VIRTUAL REFERENCE STATION METHODOLOGIES IN OCTOBER OF 2021. ALL SURFACE DISTANCES AND COORDINATES SHOWN HEREON MAY BE CONVERTED TO GRID VALUES BY MULTIPLYING THE SURFACE VALUES BY A COMBINED SCALE FACTOR OF 0.999880014398, OR BY DIVIDING THOSE SURFACE VALUES BY THE DENTON COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00012.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WERE DETERMINED FROM MULTIPLE GNSS OBSERVATIONS MADE UTILIZING TXDOT'S VIRTUAL REFERENCE NETWORK AND FROM DIFFERENTIAL LEVELING, IN OCTOBER OF 2021 AND ARE AS SHOWN HEREON.

1/16/23

Scott M. Posey
Registered Professional Land Surveyor
No. 5350

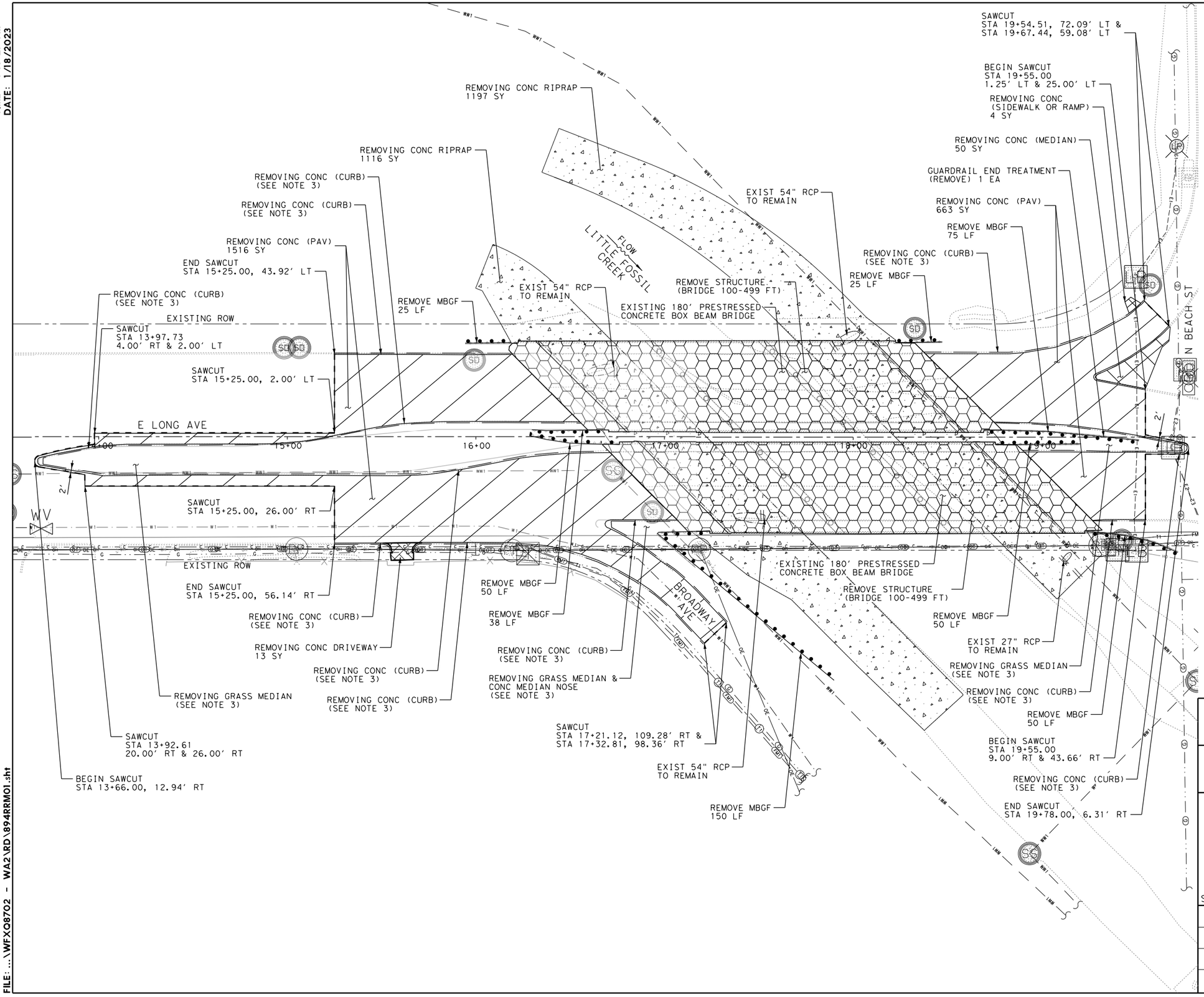
LAMB-STAR ENGINEERING, L.L.C.
3801 PARKWOOD BOULEVARD, SUITE 550
FRISCO, TX 75034
TBPLS # 10046300

EAST LONG AVE

HORIZONTAL AND VERTICAL CONTROL

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
CHECK	6	(See Title Sheet)		ELA
	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS	TEXAS	FW	TARRANT	56
CHECK	CONTROL	SECTION	JOB	
	0902	48	894	

TIME: 1:19:21 PM
DATE: 1/18/2023



LEGEND

- REMOVE CONCRETE PAVEMENT
- REMOVE STRUCTURE (BRIDGE 100 -499 FT) (SEE BRIDGE PLANS)
- MEDIAN REMOVAL
- REMOVE CONCRETE RIPRAP
- REMOVE METAL BEAM GUARD FENCE
- REMOVE CONCRETE DRIVEWAY

NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING UTILITIES PRIOR TO THE BEGINNING OF REMOVAL OPERATIONS.
2. ANY ITEMS REQUIRING REMOVAL THAT ARE NOT DIRECTLY CALLED OUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 100, PREP ROW.
3. THE FOLLOWING ARE SUBSIDIARY TO ITEM 104:
   -SAWCUT
   -CURB REMOVAL AT EXIST CONC PAV REMOVAL
   -CURB REMOVAL AT EXIST CONC MEDIAN REMOVAL
   -GRASS MEDIAN REMOVAL AT EXIST CURB REMOVAL
   -CONC MEDIAN NOSE REMOVAL AT EXIST CURB REMOVAL
4. REMOVAL OF GUARDRAIL ATTACHED TO BRIDGE RAIL IS SUBSIDIARY TO ITEM 496.

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

E. LONG AVENUE

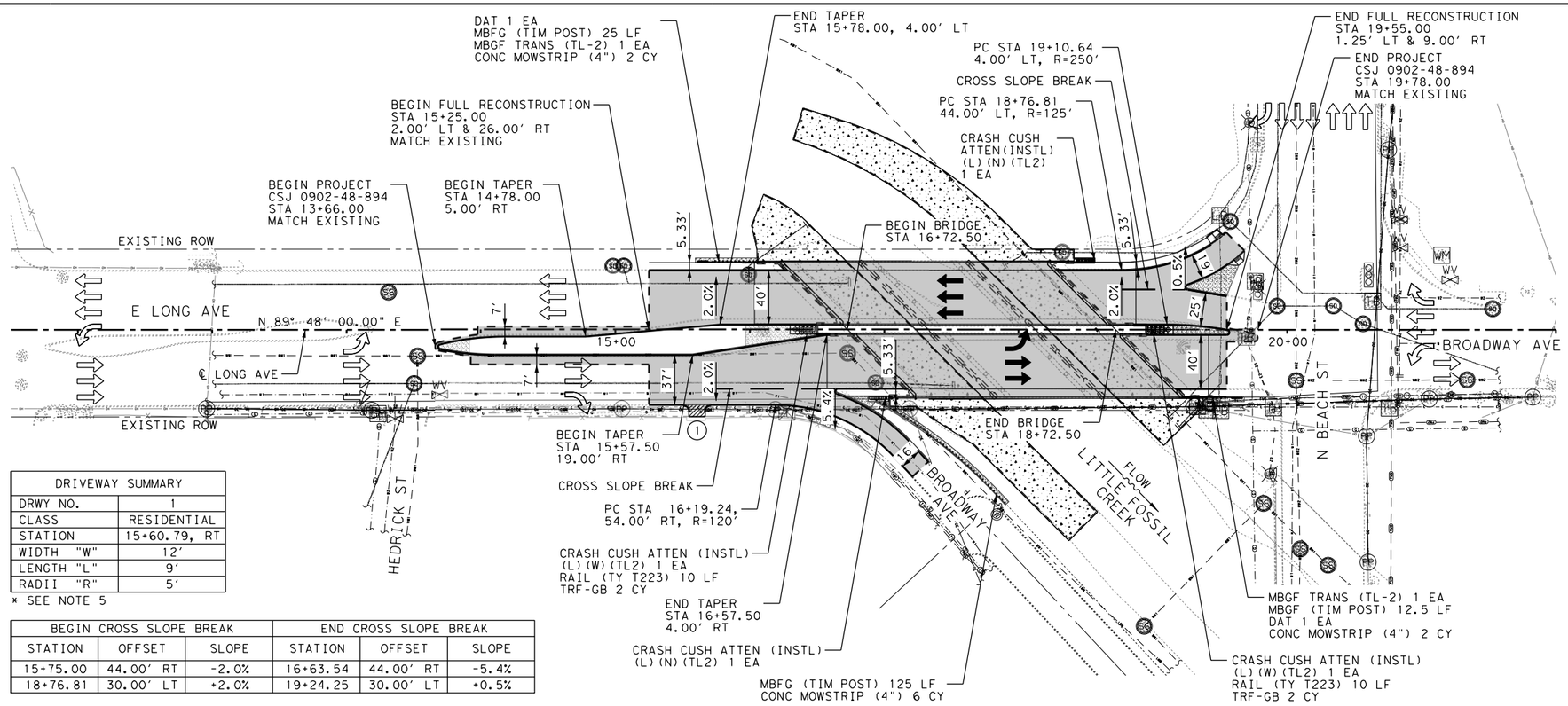
ROADWAY REMOVAL PLANS

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	57
BHK				
CHECK	0902	48	894	
PKC				

FILE: ...\WFX08702 - WA2\RD\894RRM01.sht

TIME: 1:19:42 PM
DATE: 1/18/2023



DRIVEWAY SUMMARY	
DRWY NO.	1
CLASS	RESIDENTIAL
STATION	15+60.79, RT
WIDTH "W"	12'
LENGTH "L"	9'
RADII "R"	5'

* SEE NOTE 5

BEGIN CROSS SLOPE BREAK			END CROSS SLOPE BREAK		
STATION	OFFSET	SLOPE	STATION	OFFSET	SLOPE
15+75.00	44.00' RT	-2.0%	16+63.54	44.00' RT	-5.4%
18+76.81	30.00' LT	+2.0%	19+24.25	30.00' LT	+0.5%

N

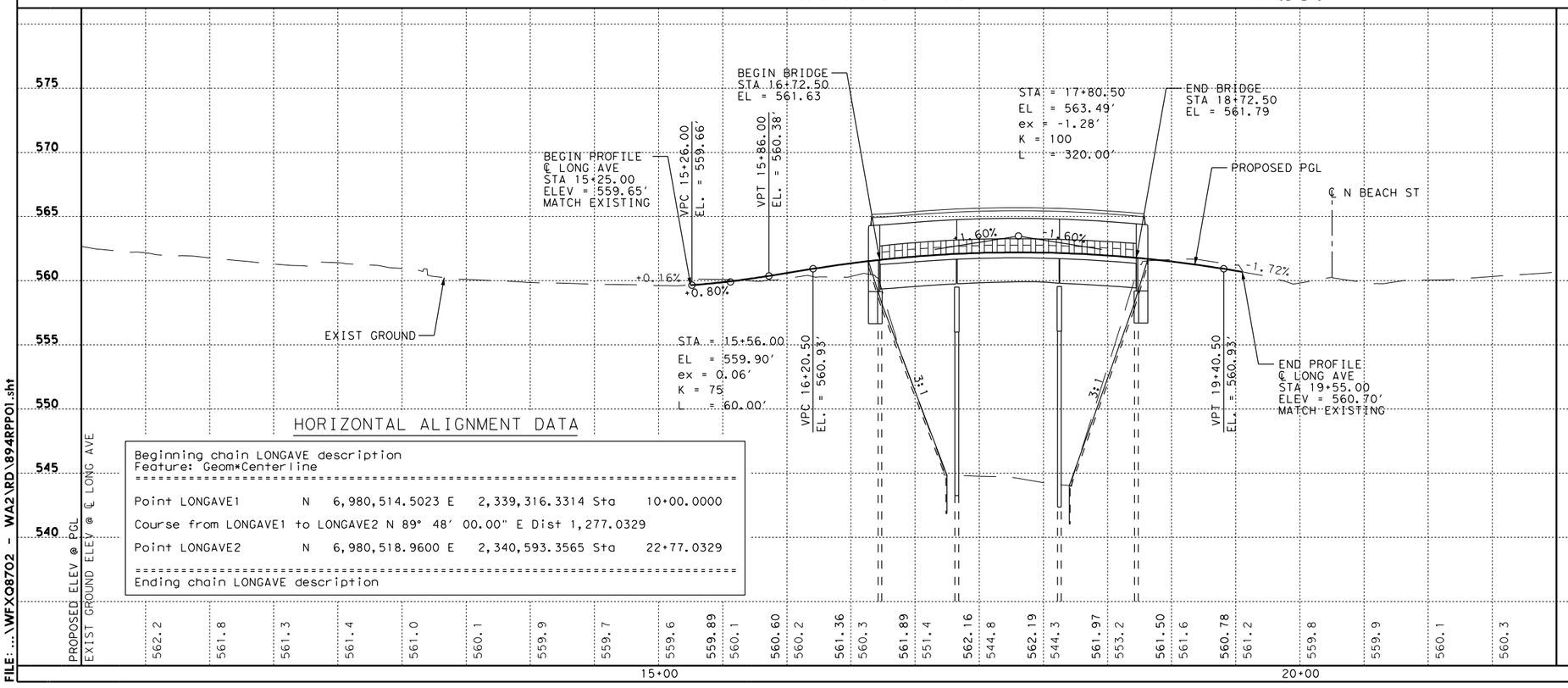
0 25 50 100 (H)
0 5 10 (V)

LEGEND

- EXISTING ROW
- PROPOSED TRAFFIC LANE
- EXISTING TRAFFIC LANE
- CONC RIPRAP (RR8)
- CONC MOWSTRIP (4")
- PROPOSED PAVEMENT/BRIDGE
- PROPOSED DRIVEWAY (CONC)(HES)
- (#) DRIVEWAY NUMBER

NOTES:

1. ALL DIMENSIONS TO EDGE OF PAVEMENT OR NOMINAL FACE OF CURB OR RAIL UNLESS NOTED OTHERWISE.
2. ALL STATIONS AND OFFSETS REFER TO ℄ LONG AVE UNLESS NOTED OTHERWISE.
3. REFER TO GRADING LAYOUT FOR RIPRAP LIMITS AND TYPE.
4. REFER TO REMOVAL LAYOUT FOR ADDITIONAL SAWCUT INFORMATION.
5. REFER TO CONCRETE DRIVEWAY DETAILS FOR ADDITIONAL DRIVEWAY INFORMATION.



Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

E. LONG AVENUE

ROADWAY PLAN AND PROFILE

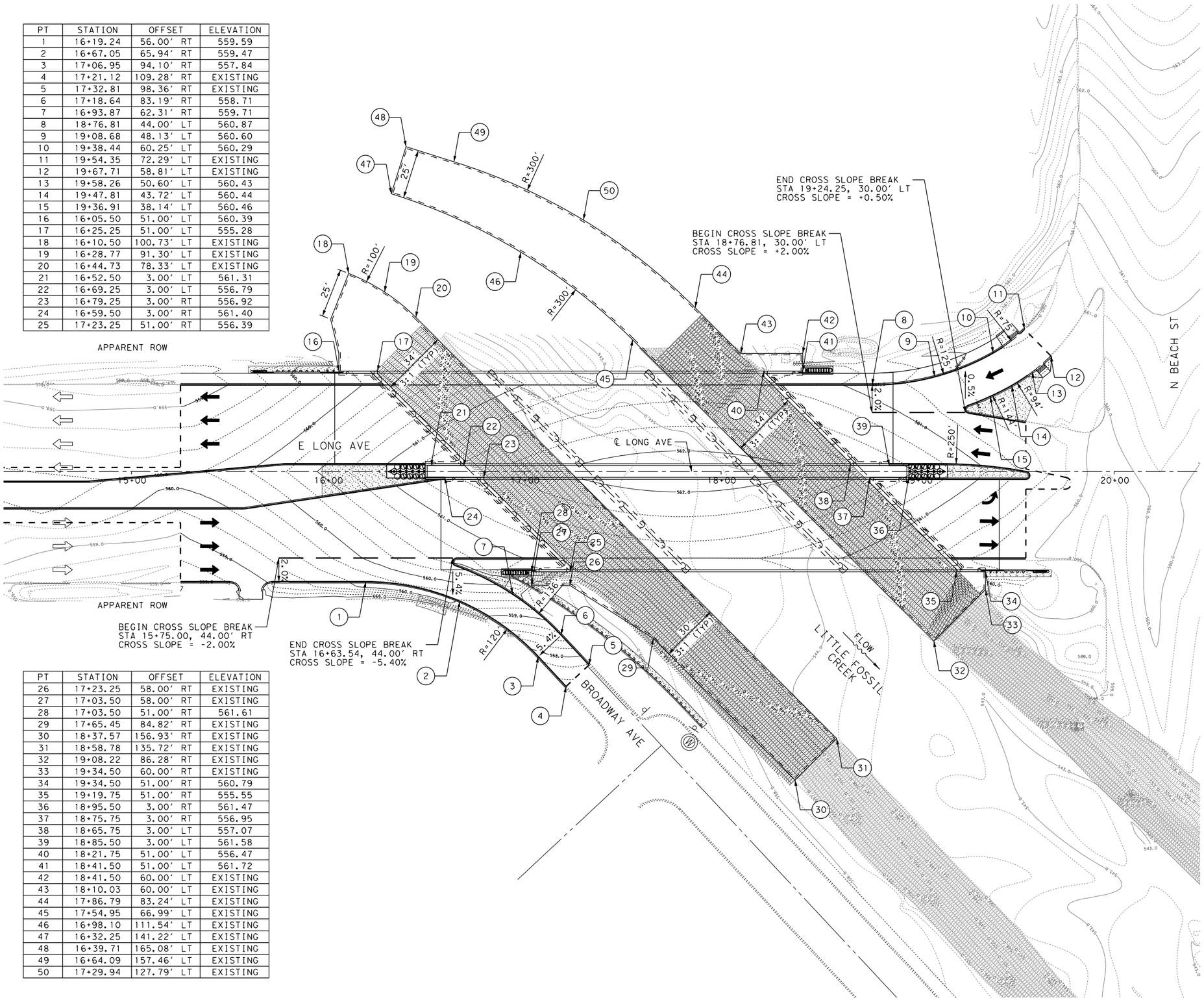
SCALE: 1"=100' (H) 1"=10' (V) SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	58
BHK	0902	48	894	
CHECK				
PKC				

FILE: ...\WFXQ8702 - WA2\RD\894RPP01.sht

TIME: 1:20:03 PM
DATE: 1/18/2023

PT	STATION	OFFSET	ELEVATION
1	16+19.24	56.00' RT	559.59
2	16+67.05	65.94' RT	559.47
3	17+06.95	94.10' RT	557.84
4	17+21.12	109.28' RT	EXISTING
5	17+32.81	98.36' RT	EXISTING
6	17+18.64	83.19' RT	558.71
7	16+93.87	62.31' RT	559.71
8	18+76.81	44.00' LT	560.87
9	19+08.68	48.13' LT	560.60
10	19+38.44	60.25' LT	560.29
11	19+54.35	72.29' LT	EXISTING
12	19+67.71	58.81' LT	EXISTING
13	19+58.26	50.60' LT	560.43
14	19+47.81	43.72' LT	560.44
15	19+36.91	38.14' LT	560.46
16	16+05.50	51.00' LT	560.39
17	16+25.25	51.00' LT	555.28
18	16+10.50	100.73' LT	EXISTING
19	16+28.77	91.30' LT	EXISTING
20	16+44.73	78.33' LT	EXISTING
21	16+52.50	3.00' LT	561.31
22	16+69.25	3.00' LT	556.79
23	16+79.25	3.00' RT	556.92
24	16+59.50	3.00' RT	561.40
25	17+23.25	51.00' RT	556.39



PT	STATION	OFFSET	ELEVATION
26	17+23.25	58.00' RT	EXISTING
27	17+03.50	58.00' RT	EXISTING
28	17+03.50	51.00' RT	561.61
29	17+65.45	84.82' RT	EXISTING
30	18+37.57	156.93' RT	EXISTING
31	18+58.78	135.72' RT	EXISTING
32	19+08.22	86.28' RT	EXISTING
33	19+34.50	60.00' RT	EXISTING
34	19+34.50	51.00' RT	560.79
35	19+19.75	51.00' RT	555.55
36	18+95.50	3.00' RT	561.47
37	18+75.75	3.00' RT	556.95
38	18+65.75	3.00' LT	557.07
39	18+85.50	3.00' LT	561.58
40	18+21.75	51.00' LT	556.47
41	18+41.50	51.00' LT	561.72
42	18+41.50	60.00' LT	EXISTING
43	18+10.03	60.00' LT	EXISTING
44	17+86.79	83.24' LT	EXISTING
45	17+54.95	66.99' LT	EXISTING
46	16+98.10	111.54' LT	EXISTING
47	16+32.25	141.22' LT	EXISTING
48	16+39.71	165.08' LT	EXISTING
49	16+64.09	157.46' LT	EXISTING
50	17+29.94	127.79' LT	EXISTING

0 25 50
SCALE IN FEET

N

LEGEND

- PROPOSED TRAFFIC LANE
- EXISTING TRAFFIC LANE
- CONC RIPRAP (RR8)
- CONC MOWSTRIP (4")
- PROPOSED PAVEMENT/BRIDGE
- (XXX-X) CURVE NUMBER

NOTES:

1. ALL DIMENSIONS TO EDGE OF PAVEMENT OR NOMINAL FACE OF CURB OR RAIL UNLESS NOTED OTHERWISE.
2. ALL STATIONS AND OFFSETS REFER TO ℄ LONG AVE UNLESS NOTED OTHERWISE.

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

E. LONG AVENUE

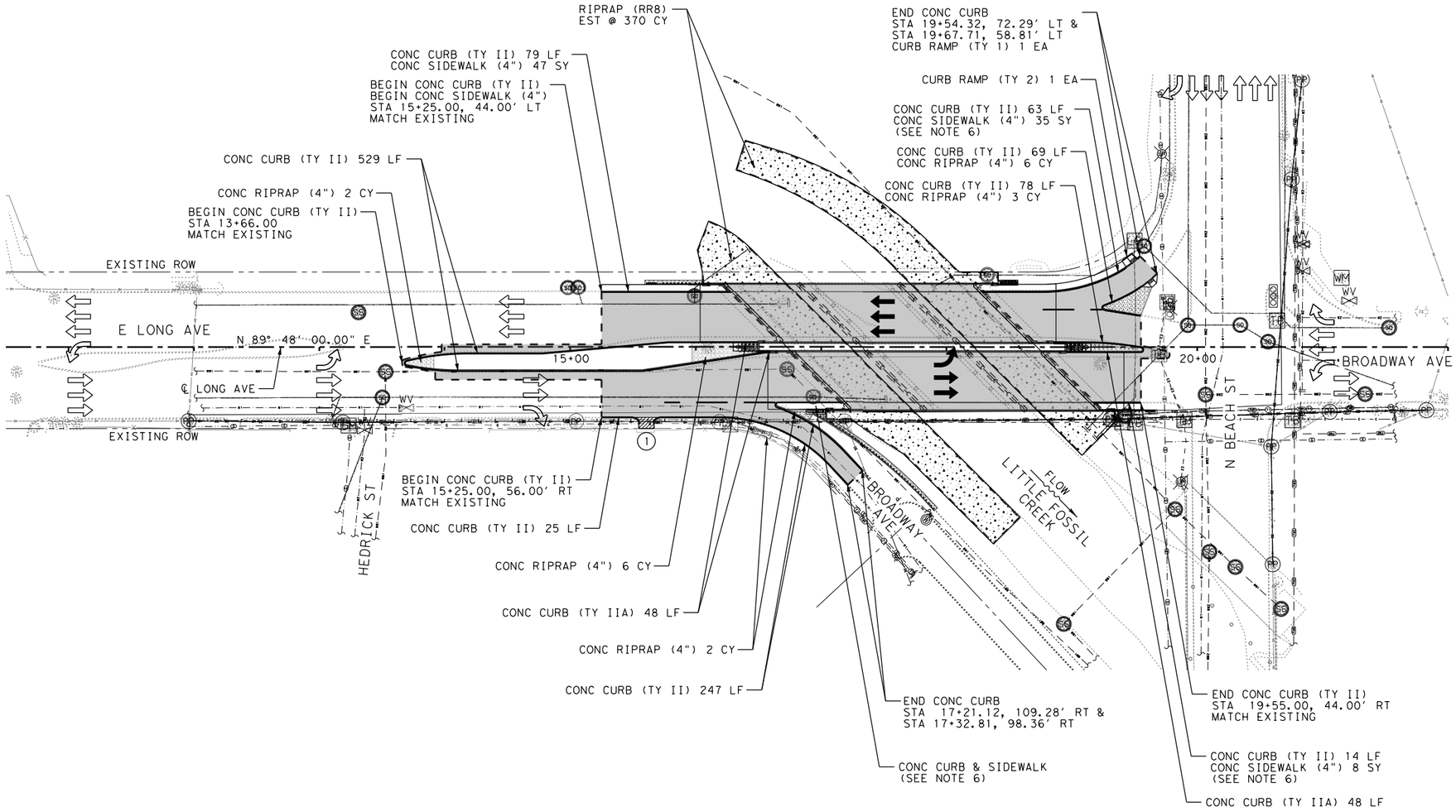
ROADWAY GRADING LAYOUT

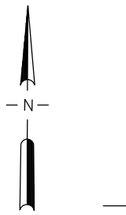
SCALE: 1"=50' (H) SHEET 1 OF 1

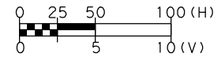
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER			HIGHWAY NO.
MBT	6	(See Title Sheet)			CS
CHECK REL	STATE	DISTRICT	COUNTY		SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT		59
CHECK PKC	CONTROL	SECTION	JOB		
	0902	48	894		

FILE: ...\WFXO8702 - WA2\RD\894GRD01.sht

TIME: 1:20:30 PM
DATE: 1/18/2023





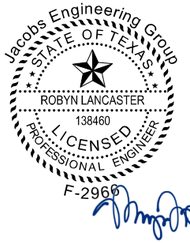


LEGEND

- EXISTING ROW
- PROPOSED TRAFFIC LANE
- EXISTING TRAFFIC LANE
- CONC RIPRAP (RR8)
- CONC MOWSTRIP (4")
- PROPOSED PAVEMENT/BRIDGE
- PROPOSED DRIVEWAY (CONC)(HES)
- (#) DRIVEWAY NUMBER

NOTES:

1. ALL DIMENSIONS TO EDGE OF PAVEMENT OR NOMINAL FACE OF CURB OR RAIL UNLESS NOTED OTHERWISE.
2. ALL STATIONS AND OFFSETS REFER TO ℄ LONG AVE UNLESS NOTED OTHERWISE.
3. REFER TO GRADING LAYOUT FOR RIPRAP LIMITS AND TYPE.
4. REFER TO REMOVAL LAYOUT FOR ADDITIONAL SAWCUT INFORMATION.
5. REFER TO CONCRETE DRIVEWAY DETAILS FOR ADDITIONAL DRIVEWAY INFORMATION.
6. SEE BRIDGE PLANS FOR CONC CURB AND SIDEWALK ON BRIDGE APPROACH SLAB.



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

Texas Department of Transportation

E. LONG AVENUE

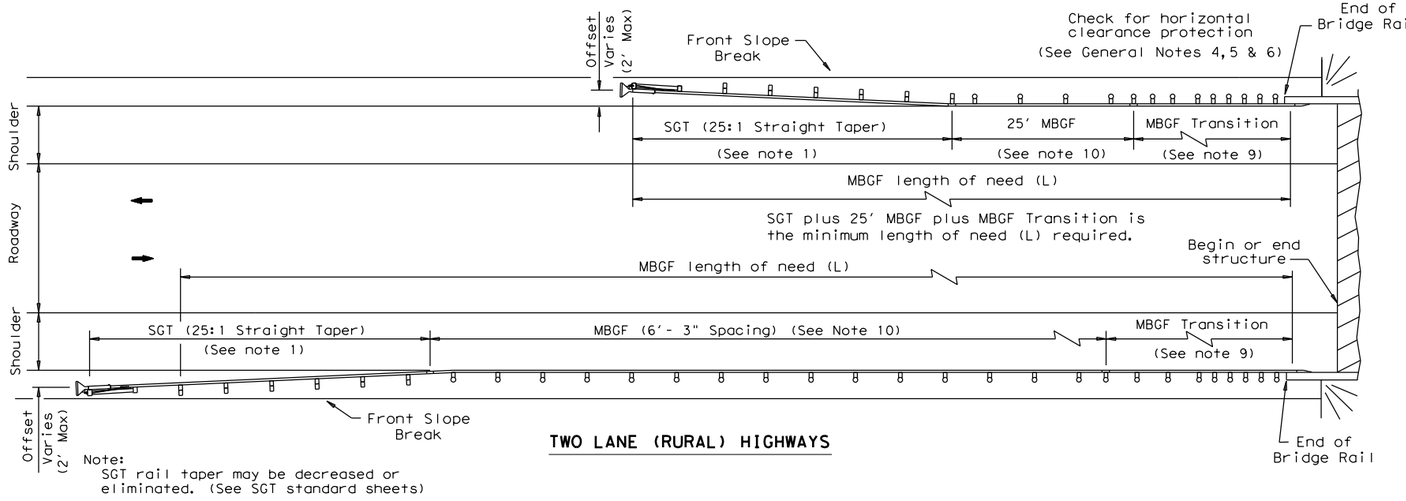
ROADWAY
MISC DETAILS

SCALE: 1"=100' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	60
GRAPHICS	CONTROL	SECTION	JOB	
BHK	0902	48	894	
CHECK				
PKC				

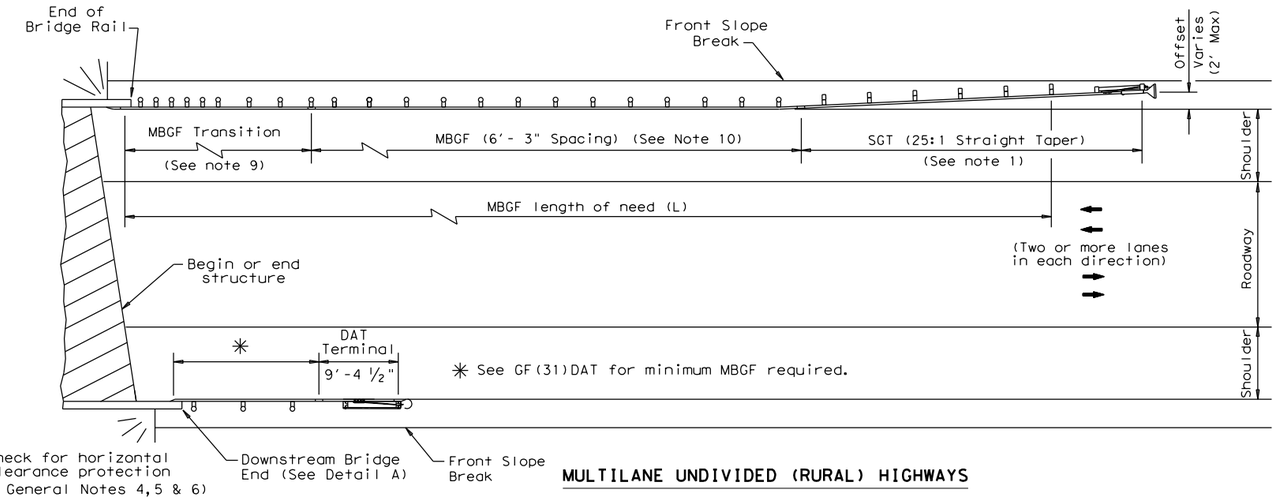
FILE: ...\WFX08702 - WA2\RD\894RPP02.sht

DATE: 1/18/2023 1:21:06 PM
FILE: ...\Roadway\Long Ave\894bed14.dgn

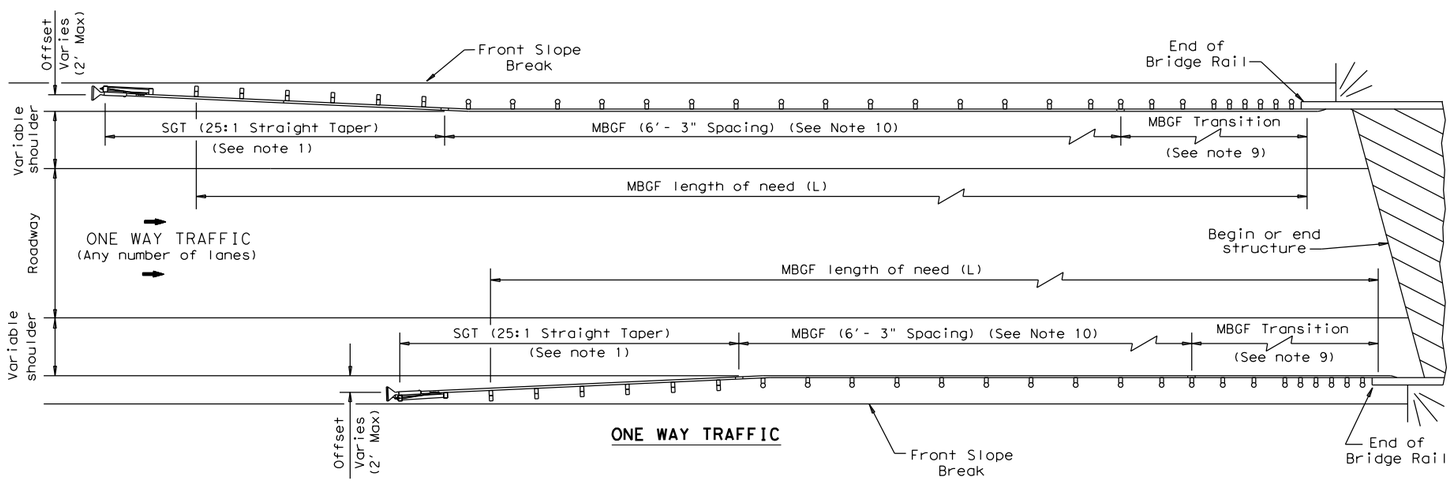


TWO LANE (RURAL) HIGHWAYS

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



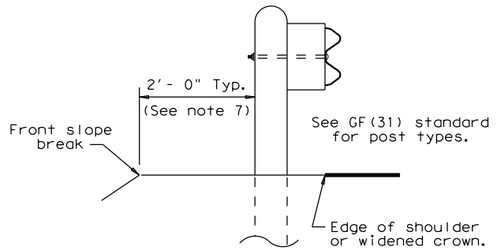
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



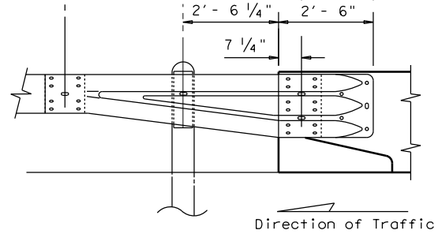
ONE WAY TRAFFIC

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

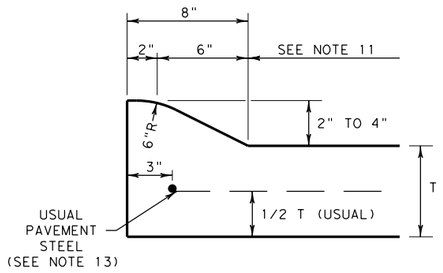
Design Division Standard

BRIDGE END DETAILS

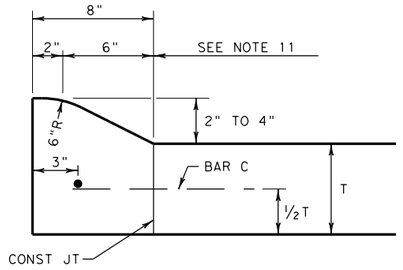
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

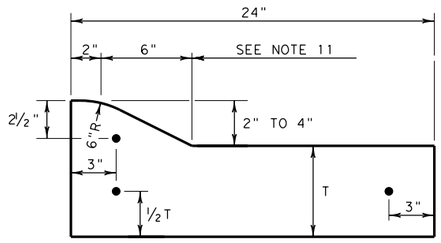
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		61



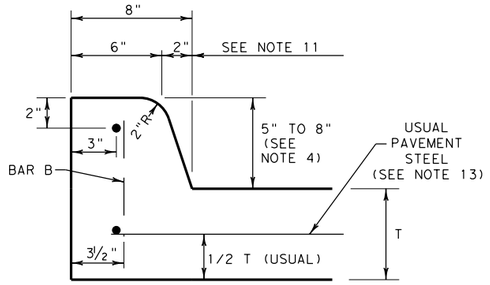
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



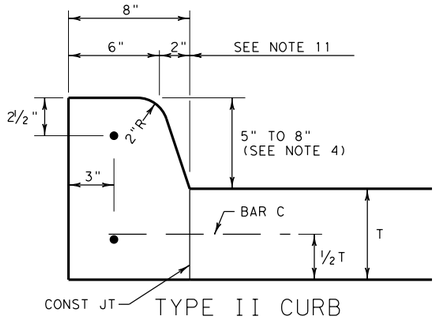
TYPE I CURB
2" - 4" HEIGHT



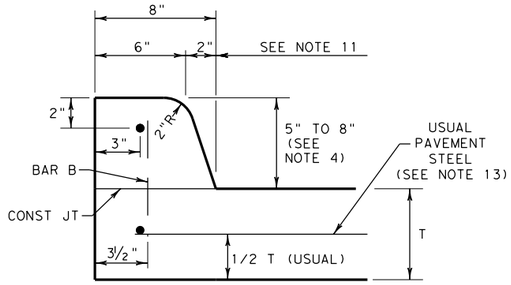
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



TYPE II CURB (MONOLITHIC)
5" - 8" HEIGHT



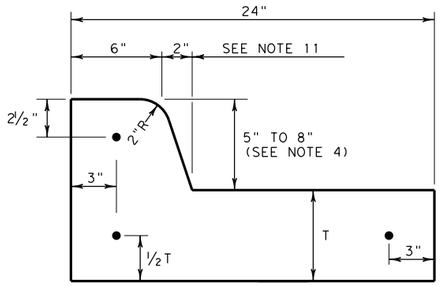
TYPE II CURB
5" - 8" HEIGHT
DOWELED VERTICAL JOINT



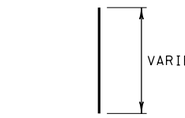
TYPE II CURB
5" - 8" HEIGHT
DOWELED HORIZONTAL JOINT

GENERAL NOTES

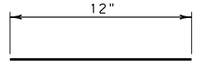
1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ITEM 529, "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
2. ALL CONCRETE SHALL BE CLASS "A".
3. ALL REINFORCING BARS SHALL BE #4, UNLESS OTHERWISE SHOWN.
4. UNLESS OTHERWISE SHOWN, ALL TYPE II CURB SHALL BE 6" HEIGHT .
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4".
6. ALL EXISTING CURBS AND DRIVEWAYS TO BE REMOVED SHALL BE SAW CUT FULL DEPTH OR REMOVED AT EXISTING JOINTS.
7. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED OR EPOXIED IN PLACE.
8. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINTS IN ALL CURBS OR CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS OR DRIVEWAYS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
9. VERTICAL AND HORIZONTAL DOWELS BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4' C-C.
10. DIMENSION "T" SHOWN IS THE THICKNESS OF ADJACENT CONCRETE PAVEMENT, OR, WHEN CURB IS INSTALLED ADJACENT TO FLEXIBLE PAVEMENT, "T" IS 6" MINIMUM, 8" MAXIMUM.
11. USUAL PROFILE GRADE LINE. REFER TO TYPICAL SECTIONS AND PLAN-PROFILE SHEETS FOR EXACT LOCATIONS.
12. A SEALED, 1/2" EXPANSION JOINT SHALL BE PROVIDED WHERE CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP.
13. LONGITUDINAL AND TRANSVERSE PAVEMENT STEEL SHALL BE PLACED IN ACCORDANCE WITH PAVEMENT DETAILS SHOWN ELSEWHERE IN THE PLANS.



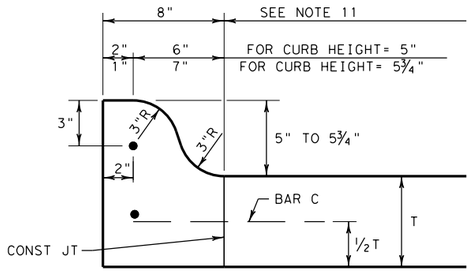
TYPE II CURB AND GUTTER
5" - 8" HEIGHT



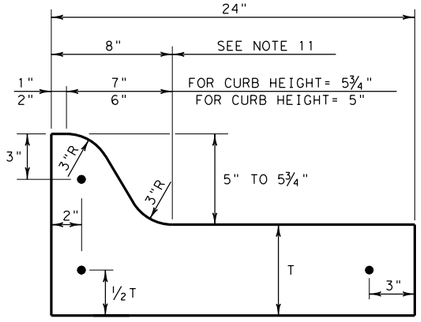
BAR B
L = (T/2) + (H- 1 1/2")
WHERE "H" = CURB HEIGHT
FOR NEW PAVEMENT, EMBED T/2 INTO FRESH CONCRETE.
FOR EXISTING PAVEMENT, DRILL 3/8" DIAM HOLE T/2 + 1/4" INTO PAVEMENT. SECURE WITH TY III EPOXY, CLASS "E" OR "F".



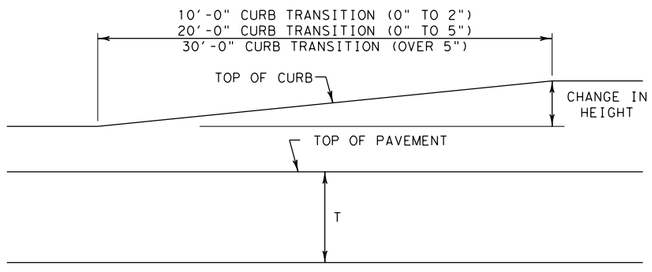
BAR C
EMBED 6" INTO EXISTING CONCRETE PAVEMENT.
DRILL 3/8" X 6 1/4" HOLE SECURE WITH TY III EPOXY, CLASS "E" OR "F".



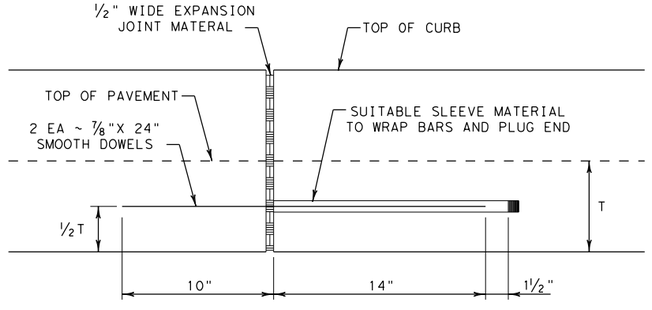
TYPE IIA CURB
5" - 5 3/4" HEIGHT



TYPE IIA CURB AND GUTTER
5" - 5 3/4" HEIGHT



CURB TRANSITION
NOTE: TO BE PAID FOR AS HIGHEST CURB



EXPANSION JOINT DETAIL

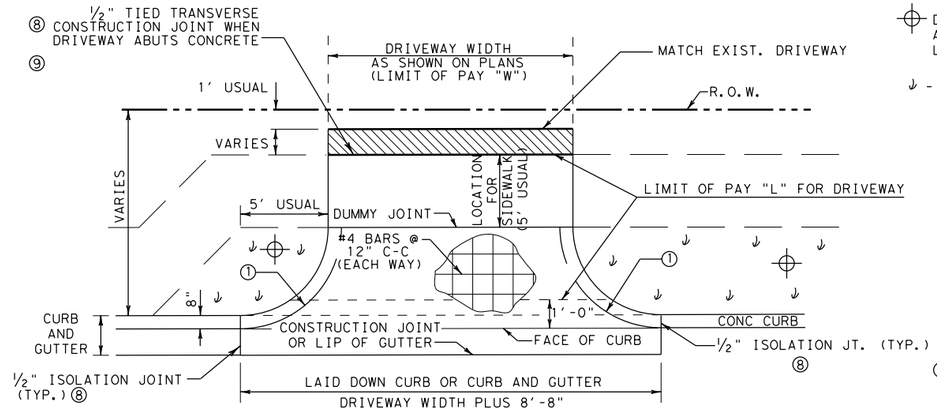
Texas Department of Transportation

Fort Worth District Standard

CONCRETE CURB AND CURB AND GUTTER DETAILS

CCCG (FTW)

ORIGINAL DRAWING: 05/2019	cccg-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	(See Title Sheet)		62
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
07/2022	DESIGNATE USUAL 6" HEIGHT	TEXAS	FTW	TARRANT	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0902	48	894	CS



PLAN VIEW

⊕ DO NOT PAVE AREA BETWEEN SIDEWALK AND DRIVEWAY CURB. SEED, SOD, OR LANDSCAPE AS DIRECTED.

↓ - SEEDING OR OTHER SURFACE NOT SUITABLE AS PEDESTRIAN WALKWAY.

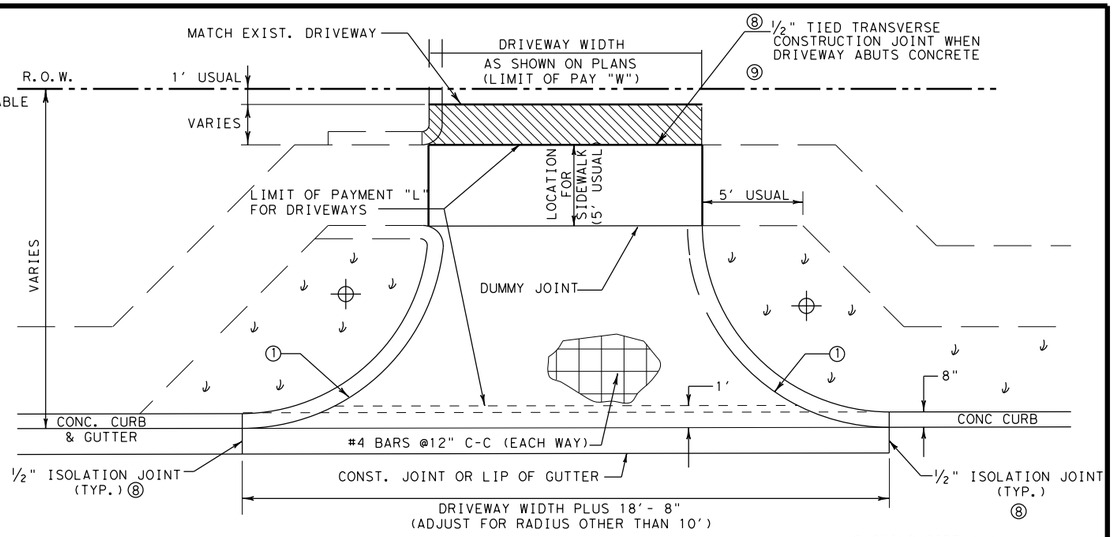
PAY AREA FOR DRIVEWAY SHALL BE THE PRODUCT OF "L" x "W"

S.Y. NON-PAY CONCRETE IN DRIVEWAY RADIUS	
2-90° RADII (FT)	NON-PAY CONC. (S.Y.)
5	0.42
10	3.04
15	10.73
20	15.36
25	29.81
30	37.19

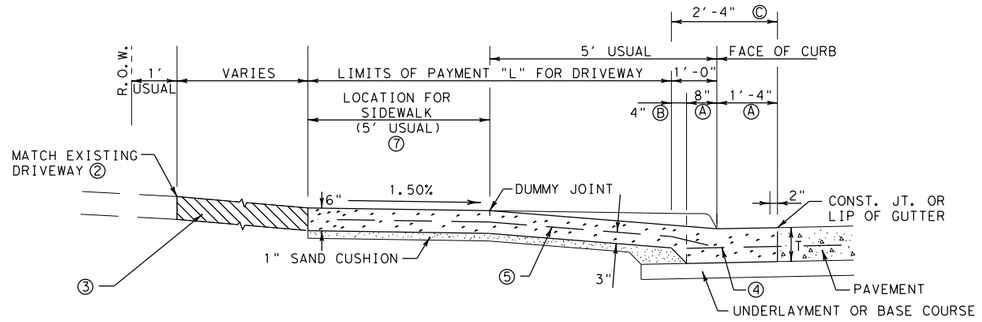
① RADII AS SHOWN ON PLANS

SEE ROADWAY DESIGN MANUAL, APPENDIX C FOR RECOMMENDED RADII.

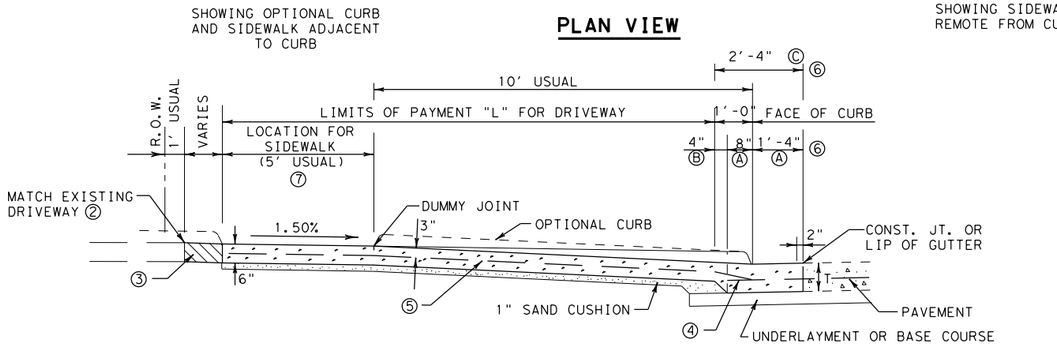
② FULL DEPTH SAW CUT IF CONCRETE



PLAN VIEW



SECTION VIEW
CONCRETE RESIDENTIAL DRIVEWAY



SECTION VIEW
CONCRETE COMMERCIAL DRIVEWAY

③ REPLACE EXISTING DRIVEWAY WITH EQUAL OR BETTER MATERIAL:

IF CONCRETE, PAY FOR AS CONCRETE DRIVEWAY.

IF HOT MIX OR OTHER MATERIAL, PAY FOR IN ACCORDANCE WITH APPROPRIATE BID ITEMS.

④ WHERE DRIVEWAY IS ADJACENT TO CONCRETE PAVEMENT, 36" - #4 TIE BAR, 12" EMBEDMENT INTO PAVEMENT (CAST-IN-PLACE OR DRILLED AND GROUTED). SPACING TO MATCH TRANSVERSE STEEL IN CONCRETE PAVEMENT.

MULTIPLE-PIECE TIE BARS OR 24" EXTENSION OF TRANSVERSE PAVING STEEL MAY BE USED IN LIEU OF TIE BARS.

LONGITUDINAL STEEL IN GUTTER PORTION TO MATCH CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER DETAILS.

⑤ #4 BARS @ 12" C-C EACH WAY (EXTEND TO FACE OF CURB) BEND AS REQ'D TO TIE TO PAVING STEEL OR TIE BARS.

⑥ IF ADJACENT TO CONCRETE PAVEMENT:
Ⓐ PAID FOR AS CONCRETE PAVEMENT,
Ⓑ PAID FOR AS CONCRETE CURB.

IF ADJACENT TO HOT MIX OR FLEXIBLE PAVEMENT:
Ⓒ PAID FOR AS CONCRETE CURB AND GUTTER.

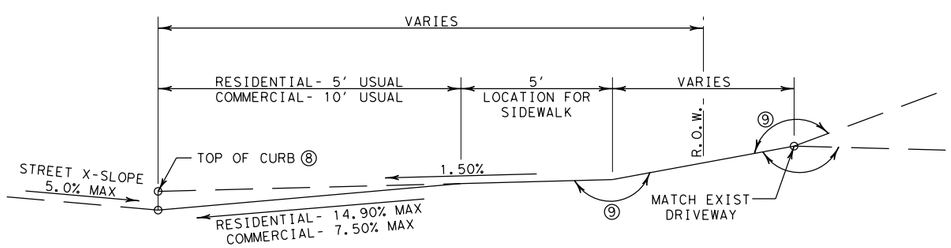
T = THICKNESS OF CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER

⑦ LOCATION FOR SIDEWALK TO BE PROVIDED ON ALL DRIVEWAYS

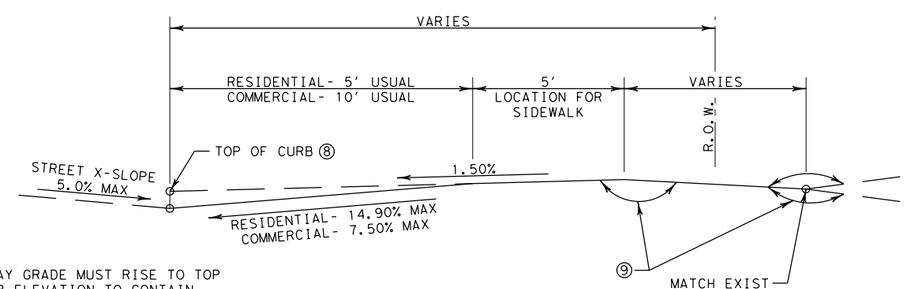
FOR SIDEWALK DETAILS, SEE STANDARD CSWD(FTW)

⑧ SEE STANDARD JS (FTW) FOR JOINT DETAILS.

⑨ IF, IN THE OPINION OF THE ENGINEER, ADJACENT CONCRETE IS NOT SOUND, 1/2" ISOLATION JOINT MAY BE USED IN LIEU OF TIED JOINT.



SAG CONDITION



CREST CONDITION

⑧ DRIVEWAY GRADE MUST RISE TO TOP OF CURB ELEVATION TO CONTAIN DRAINAGE IN STREET GUTTER.

⑨ 8% MAX CHANGE IN GRADE

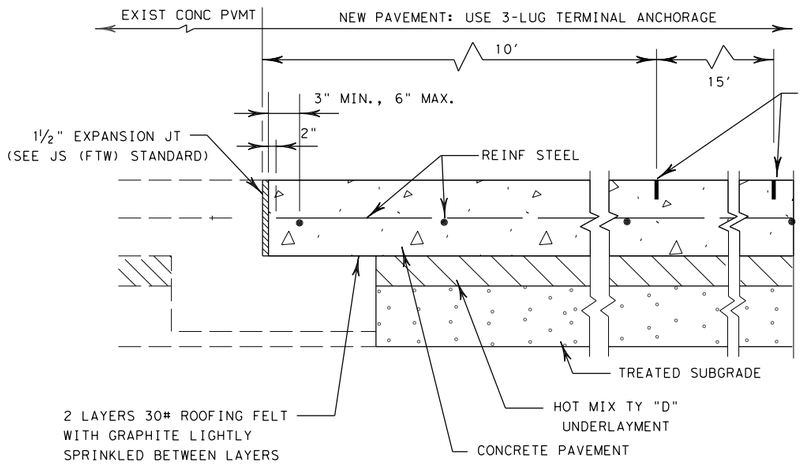
ALLOWABLE DRIVEWAY GRADES

Texas Department of Transportation

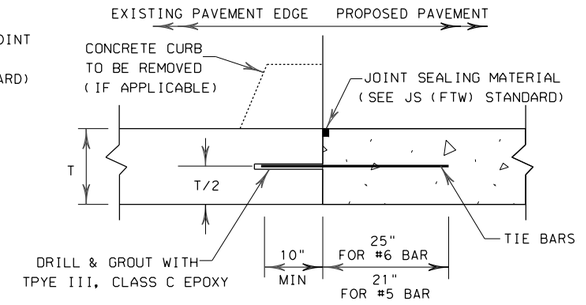
Fort Worth District Standard

CONCRETE DRIVEWAY DETAILS
CDD (FTW)

ORIGINAL DRAWING: 05/2019	cdd-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS	(See Title Sheet)			63
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
11/2020	REVISED JOINT NOMENCLATURE REVISED NOTE 4 ADD NOTE 9	TEXAS	FTW	TARRANT	
07/2022	ELIMINATE 1" RISE AT GUTTER LINE	CONT.	SECT.	JOB	HIGHWAY NO.
		0902	48	894	CS

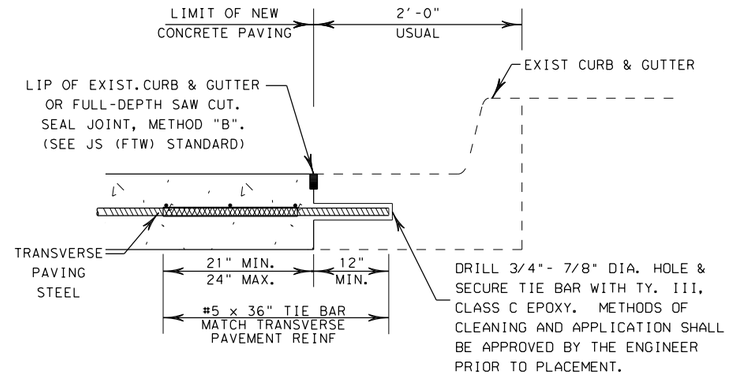


TIE TO EXIST. CONCRETE PAVEMENT
(TRANSVERSE JOINTS W/EXISTING "SLEEPER" SLAB)
N.T.S.



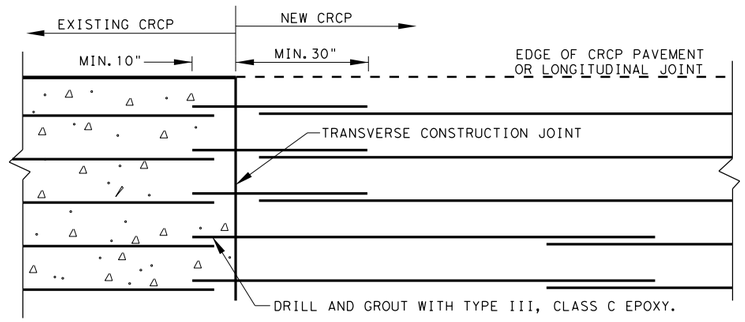
1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQURIMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL
N.T.S.



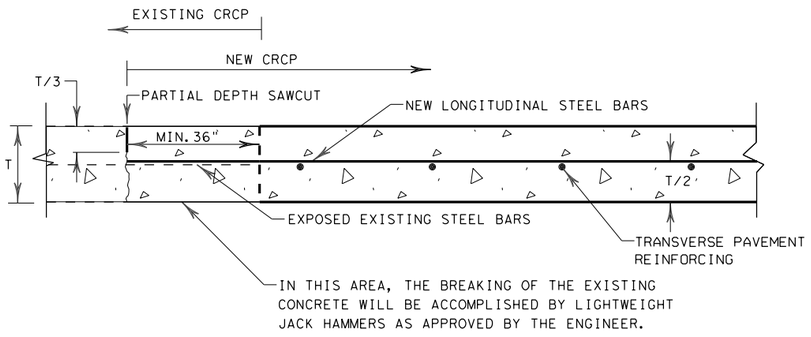
TIE TO EXIST. CONC. CURB & GUTTER
N.T.S.

NOTE:
SAWING OF PAVEMENT AND REMOVAL OF EXISTING CONC. WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

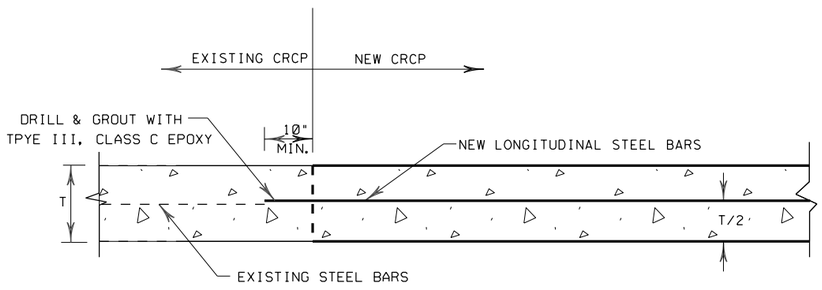


NOTE:
TIE BAR SIZE AND SPACING TO MATCH LONGITUDINAL REINFORCING. FOR LONGITUDINAL BAR SIZE AND SPACING, REFER TO CONCRETE PAVEMENT STANDARDS.

IF, IN THE OPINION OF THE ENGINEER, THE LENGTH OF AREA OF NEW PAVEMENT DOES NOT WARRANT STAGGERED LAPPING AS SHOWN, THIS REQUIREMENT MAY BE WAIVED.



TIED TRANSVERSE CONSTRUCTION JOINT DETAIL
EXISTING CRCP TO NEW CRCP
BREAKBACK AND LAP
N.T.S.



TIED TRANSVERSE CONSTRUCTION JOINT DETAIL
EXISTING CRCP TO NEW CRCP
DRILL AND EPOXY
N.T.S.

GENERAL NOTES

TIE BARS SHALL BE SECURED INTO THE EXISTING CONCRETE THE MINIMUM LENGTHS SHOWN, USING TY III EPOXY, CLASS "C" AND MUST MEET THE REQUIREMENTS OF THE PULL-OUT TEST SPECIFIED IN ITEM 361.

ALL HOLES FOR TIE BARS OR CONCRETE ANCHORS SHALL BE DRILLED WITH A CORE OR ROTARY DRILL. THE USE OF HAMMER DRILLS WILL NOT BE PERMITTED.

SEE JS (FTW) STANDARD FOR JOINT DETAILS.

SEE CONCRETE PAVEMENT STANDARD FOR ADDITIONAL INFORMATION

Texas Department of Transportation

Fort Worth District Standard

CONCRETE PAVEMENT TIES TO EXISTING PAVEMENT
CP-TEP (FTW)

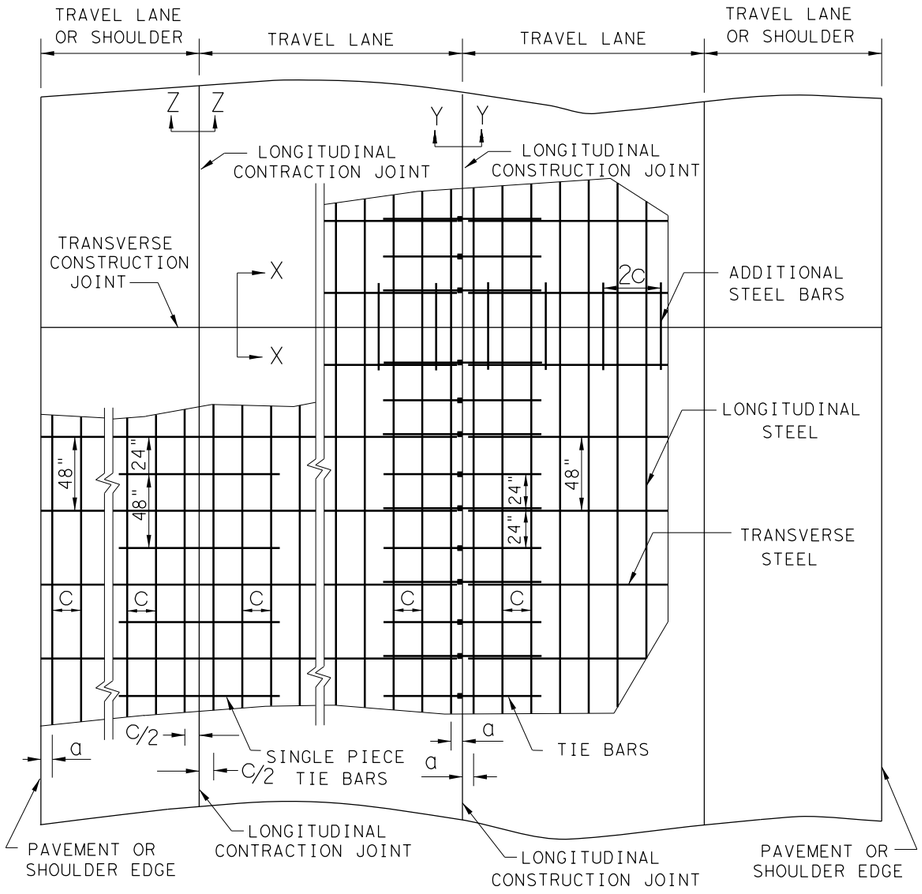
ORIGINAL DRAWING: 05/2019	cptep-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6	(See Title Sheet)		64
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY	
06/2020	ADD LONGITUDINAL AND TRAVERSE JOINTS	TEXAS	FTW	TARRANT	
11/2020	ADD DRILL AND EPOXY TRANSVERSE JOINT DETAIL, REVISED JOINT NOMENCLATURE, ADD REFERENCE TO CONC PAVING STANDARDS	CONT.	SECT.	JOB	HIGHWAY NO.
		0902	48	894	CS

DATE: 1/18/2023 1:22:20 PM
FILE: ...\Long Ave\894crcp120.dgn

GENERAL NOTES

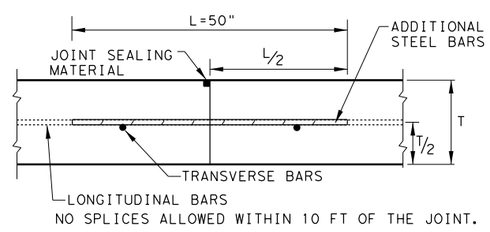
TABLE NO. 1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 X C (IN.)	LENGTH L (IN.)
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24



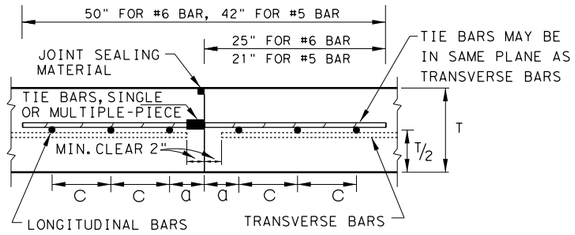
TYPICAL PAVEMENT LAYOUT

PLAN VIEW (NOT TO SCALE)



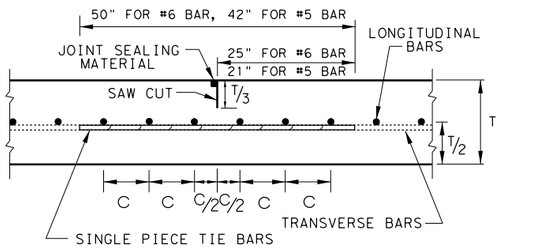
TRANSVERSE CONSTRUCTION JOINT

SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT

SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT

SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

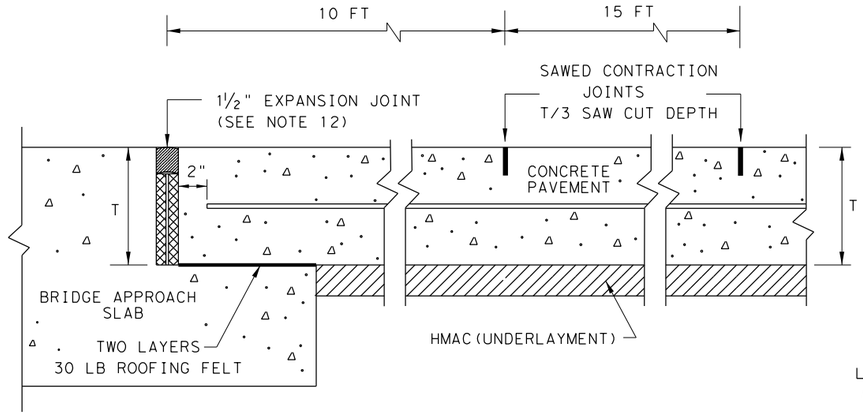
Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

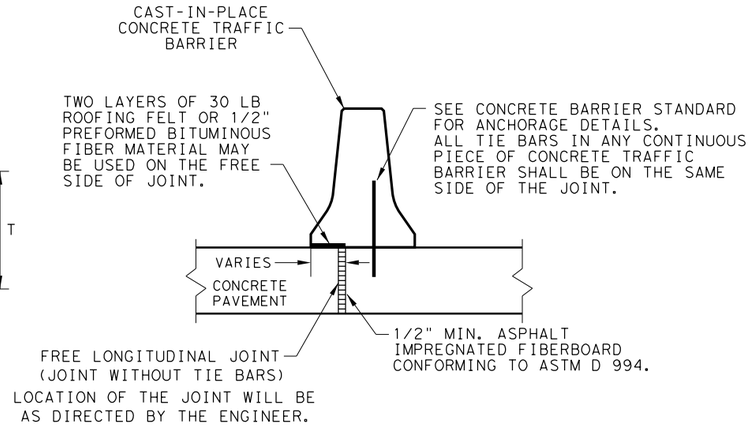
ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

CRCP(1)-20

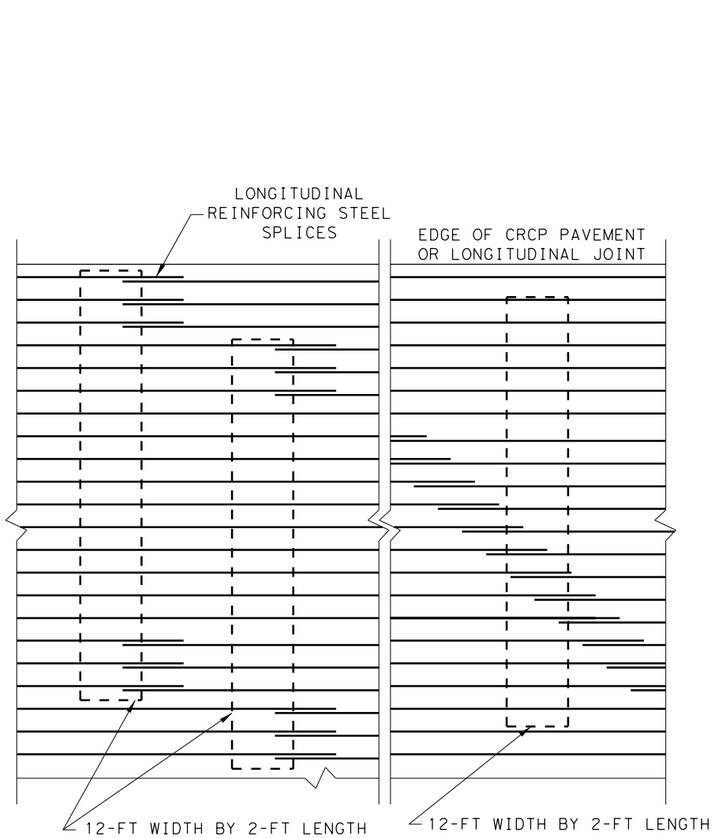
FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10/10/2011 ADD GN #12	DIST	COUNTY		SHEET NO.
04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS	FTW	TARRANT		65
05/05/2017 CoTE AS RATED 4.3				



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

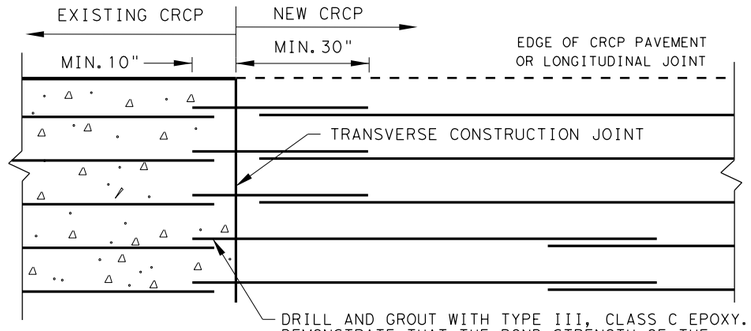


FREE LONGITUDINAL JOINT DETAIL

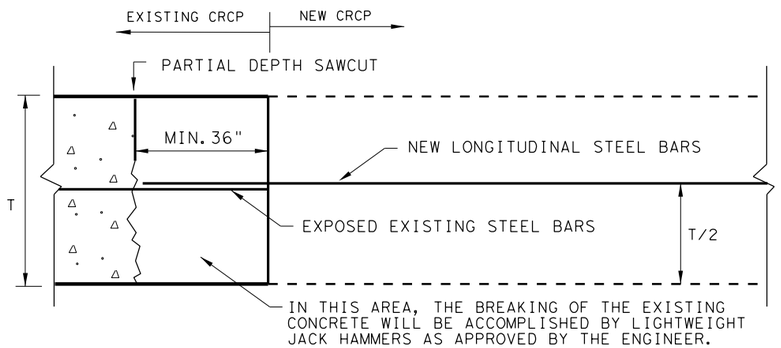


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)

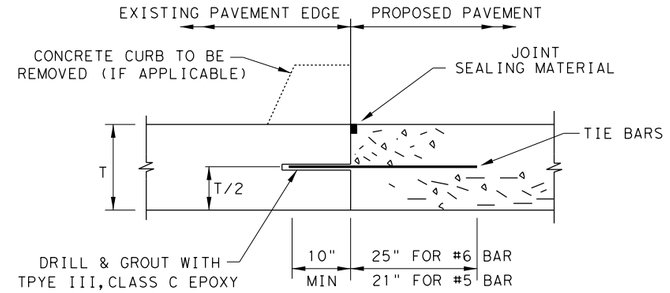


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
EXISTING CRCP TO NEW CRCP



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIRMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL

Texas Department of Transportation — Design Division Standard

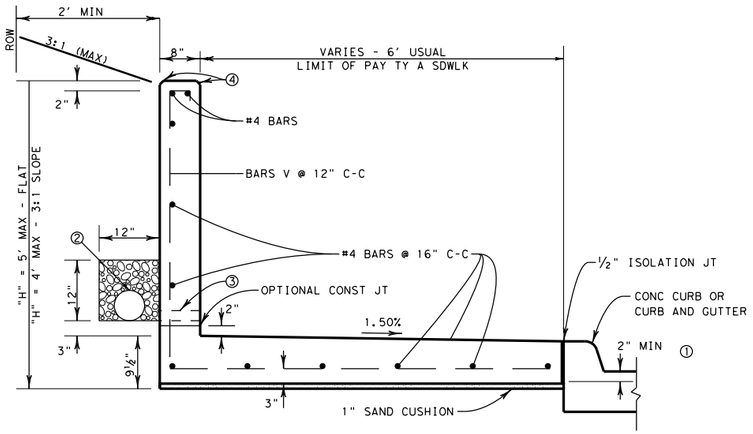
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

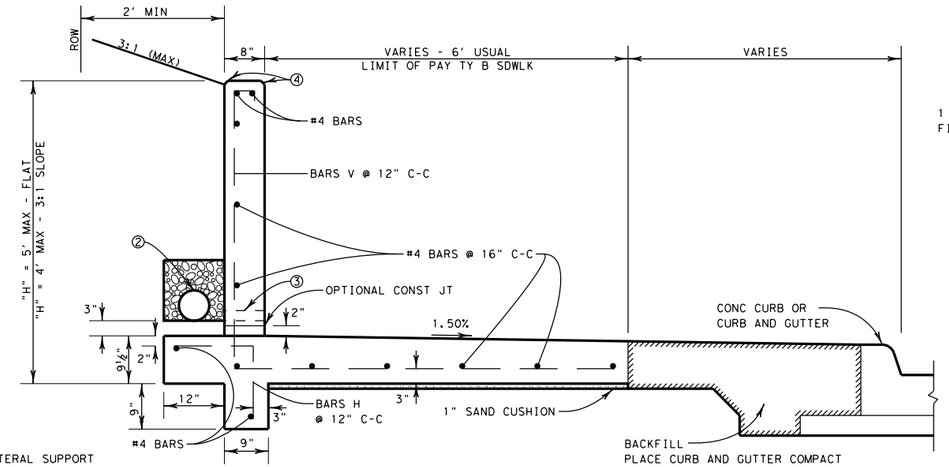
CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 03/16/2020 REMOVED TABLE 1A	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		66

DATE: 1/18/2023 1:22:20 PM
FILE: ...\Long Ave\894crcp120.dgn



TYPE A SIDEWALK-ADJACENT TO CURB

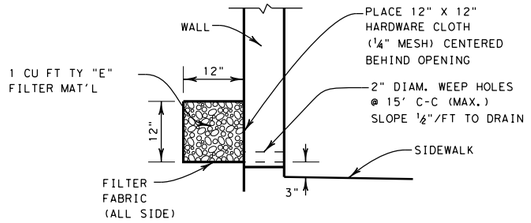


TYPE B SIDEWALK-REMOTE FROM CURB

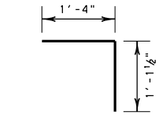
① 2" MINIMUM REQUIRED FOR LATERAL SUPPORT
② INSTALL 6" PIPE UNDERDRAIN (TY. 5, 6, 7, OR 8) ENTIRE LENGTH OF WALL. USE TY. "E" FILTER MATERIAL. SLOPE TO DRAIN AND CONNECT TO STORM DRAIN.
③ IF, IN THE OPINION OF THE ENGINEER, USE OF UNDERDRAIN IS IMPRACTICAL, INSTALL WEEP HOLES AS SHOWN.
④ ¾" CHAMFER

SPECIAL CONCRETE SIDEWALK w/ INTEGRATED RETAINING WALL

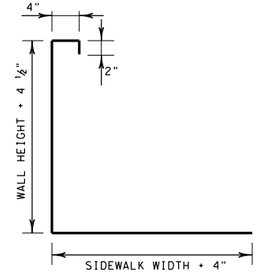
N. T. S.



WEEP HOLE DETAIL

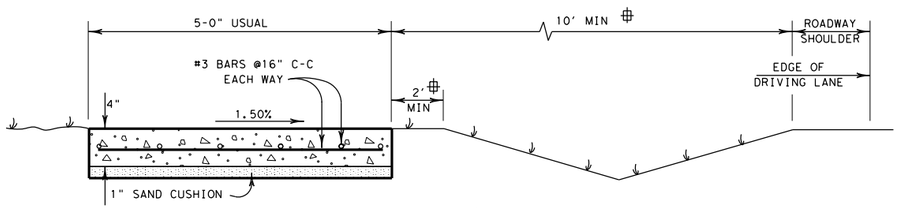


#4 BARS H @ 12" C-C



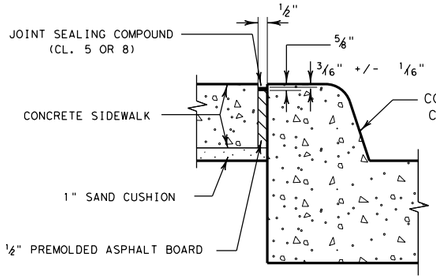
#4 BARS V @ 12" C-C

REINFORCING STEEL DETAILS



SIDEWALK TO BE 10' MIN. FROM EDGE OF SHOULDER OR 2' MIN. FROM TOP OF DITCH BACK SLOPE, WHICHEVER IS GREATER (10' MIN. FROM EDGE OF SHOULDER IF NO DITCH.)

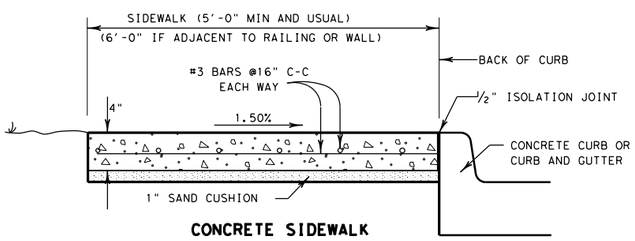
CONCRETE SIDEWALK
(ROADWAY W/O CURB)



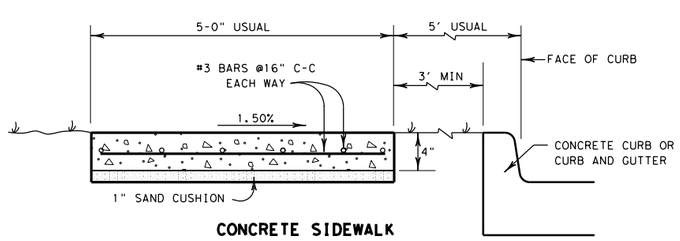
1/2" ISOLATION JOINT
(SIDEWALK ADJACENT TO CURB)

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS "C".
2. ALL REINFORCING STEEL SHALL BE GRADE 60, # 4 BARS UNLESS OTHERWISE INDICATED.
3. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
4. LONGITUDINAL SLOPE OF SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF SIDEWALK MAY MATCH THAT OF ROADWAY.
5. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' X 5' PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.
6. RETAINING WALL WILL BE SUBSIDIARY TO THE ITEM, "CONC SIDEWALKS (SPECIAL) (TYPE A)" OR "CONC SIDEWALKS (SPECIAL)(TYPE B)", WITH LIMITS OF PAY AS SHOWN.
7. SURFACE TREATMENT OF RETAINING WALL FACE DETAILED ELSEWHERE IN THE PLANS.
8. SEE PED STANDARDS FOR TREATMENT AT INTERSECTIONS AND CROSSWALKS.



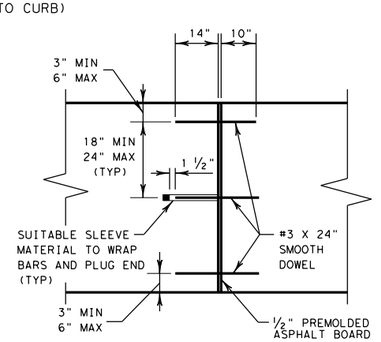
CONCRETE SIDEWALK
(ADJACENT TO CURB)



CONCRETE SIDEWALK
(REMOTE FROM CURB)

CONCRETE SIDEWALK DETAILS

N. T. S.



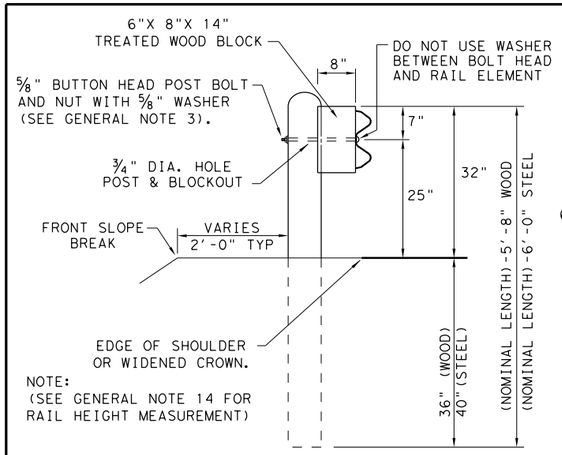
TRANSVERSE EXPANSION JOINT

Texas Department of Transportation

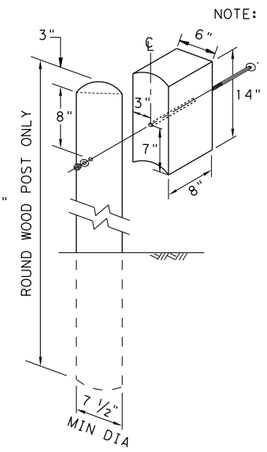
Fort Worth District Standard

CONCRETE SIDEWALK DETAILS
CSWD (FTW)

ORIGINAL DRAWING: 05/2019	cswd-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS	(See Title Sheet)			67
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
11/2020	REVISE JOINT NOMENCLATURE, REVISE ALLOWABLE SEALANT TYPES	TEXAS	FTW	TARRANT	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0902	48	894	CS

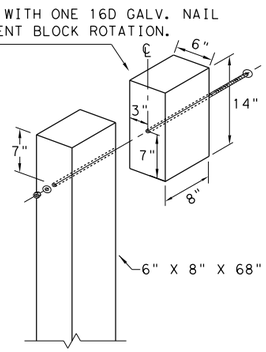


TYPICAL POST PLACEMENT

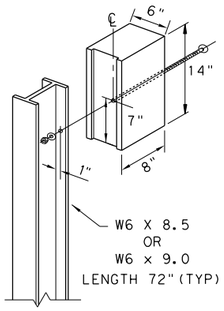


WOOD BLOCK TO ROUND WOOD POST

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

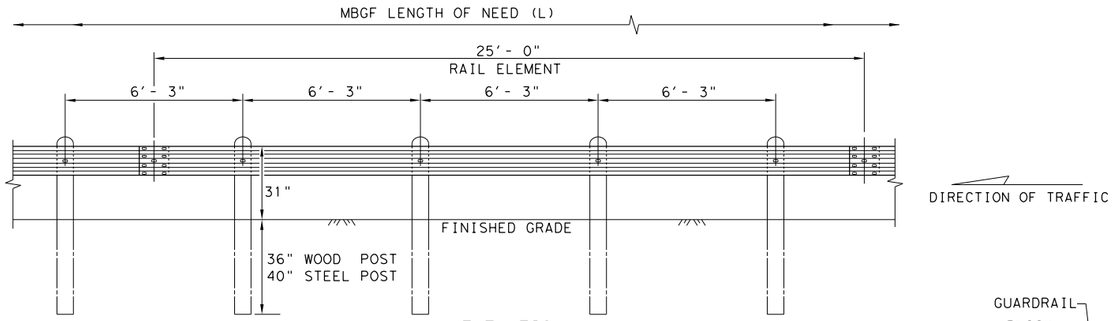


WOOD BLOCK TO RECTANGULAR WOOD POST



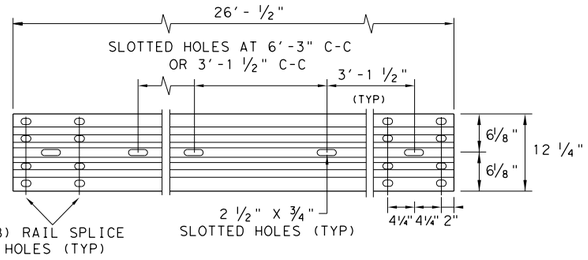
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

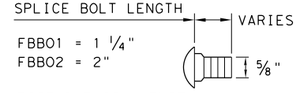
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

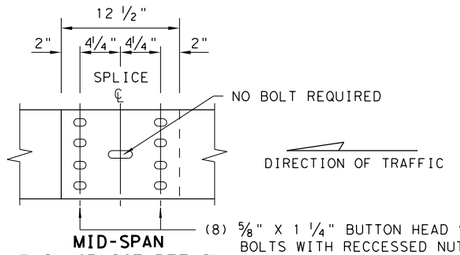
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



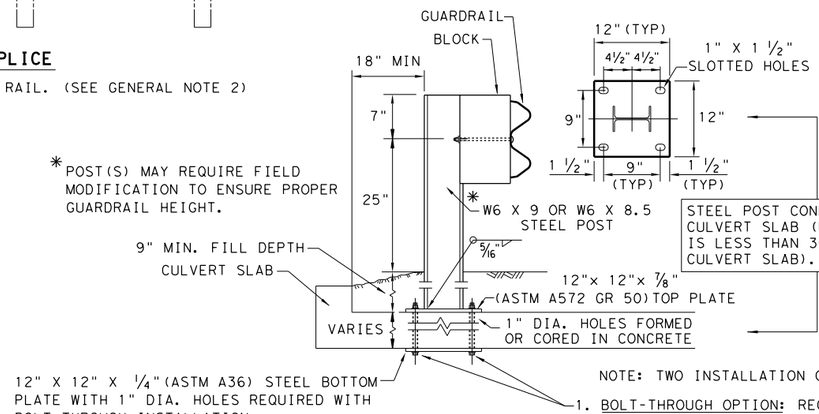
BUTTON HEAD BOLT

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 1/4"(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. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (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.

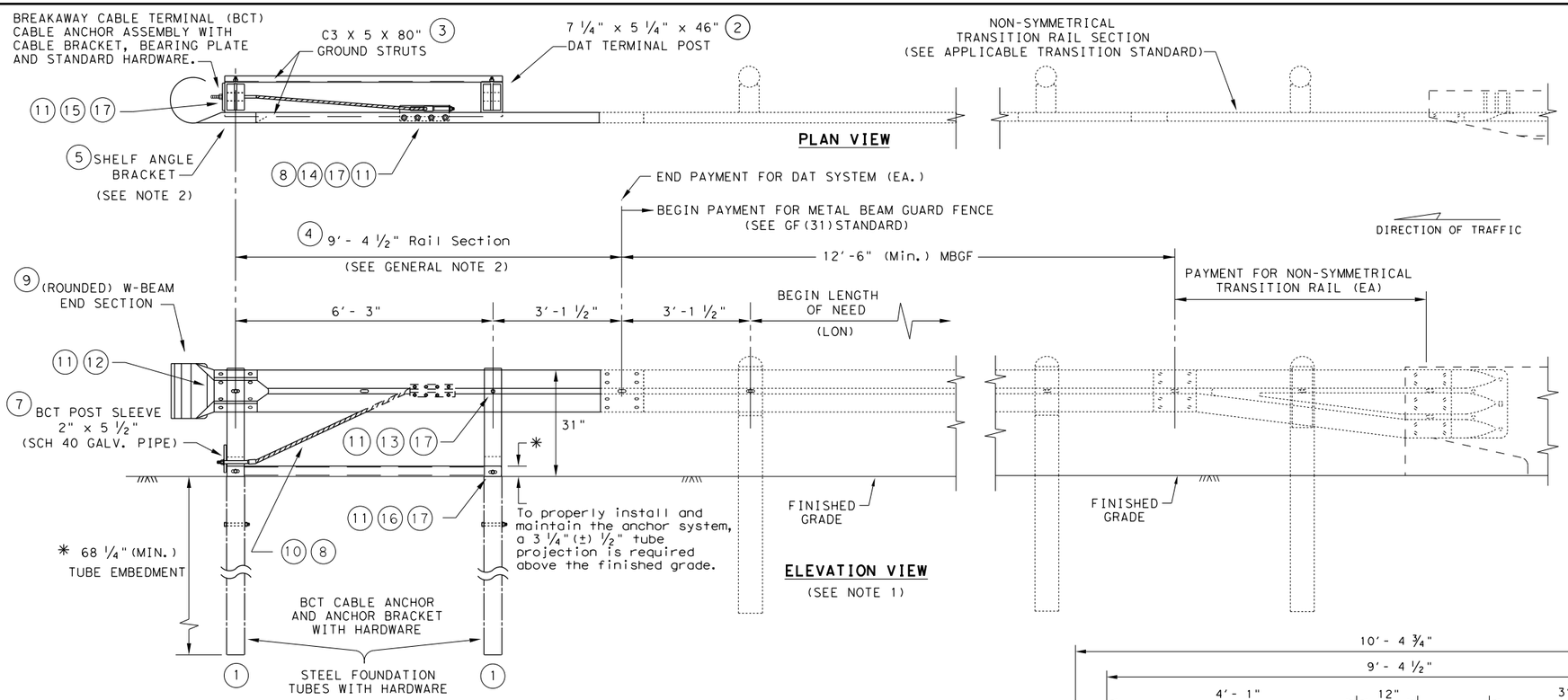
Texas Department of Transportation — Design Division Standard

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	0902	48	894	CS	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		68	

DATE: 1/18/2023
FILE: ...\Roadway\Long Ave\894gf3119.dgn

DATE: 1/18/2023
FILE: ...\Long Ave\894gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

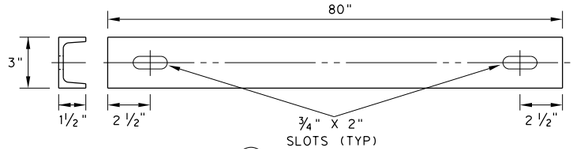
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

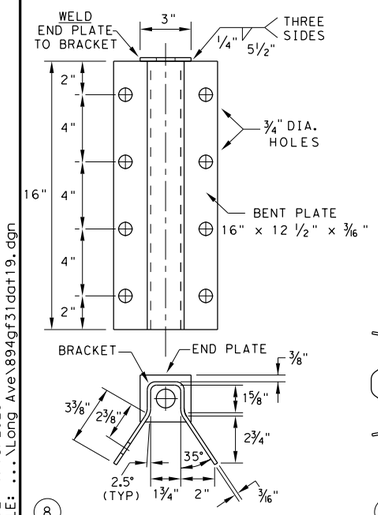
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

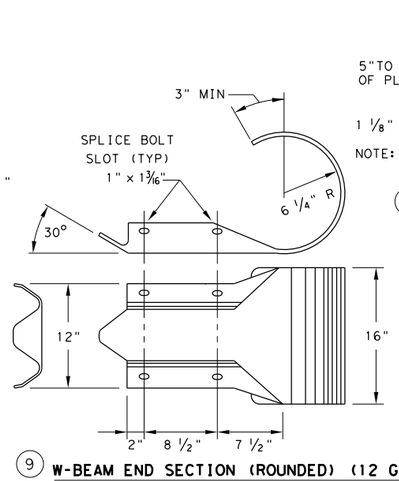
(4) TERMINAL RAIL ELEMENT FOR DAT



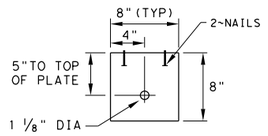
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

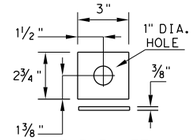


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

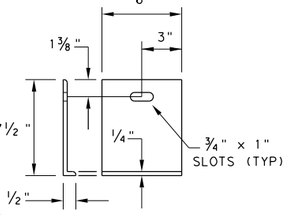


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

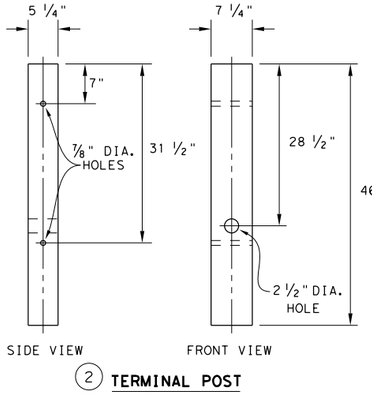
(6) BEARING PLATE
8"x 8"x 5/8" R



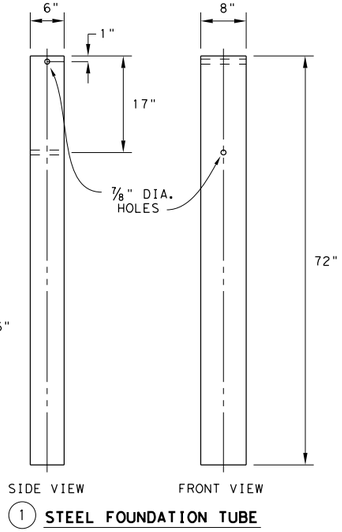
END PLATE



(5) SHELF ANGLE BRACKET



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



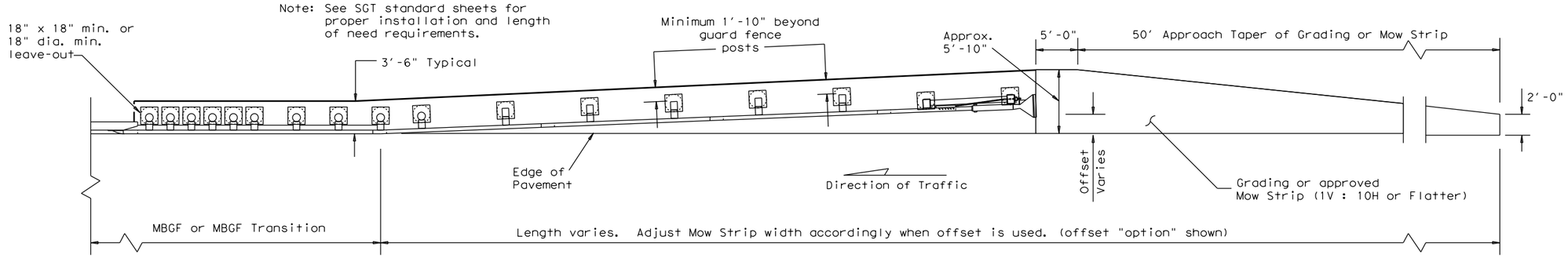
(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

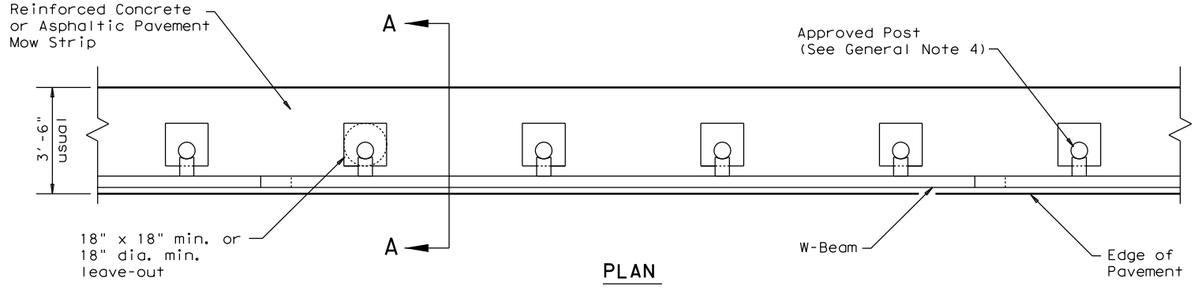
METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0902	48	894	CS	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		69	

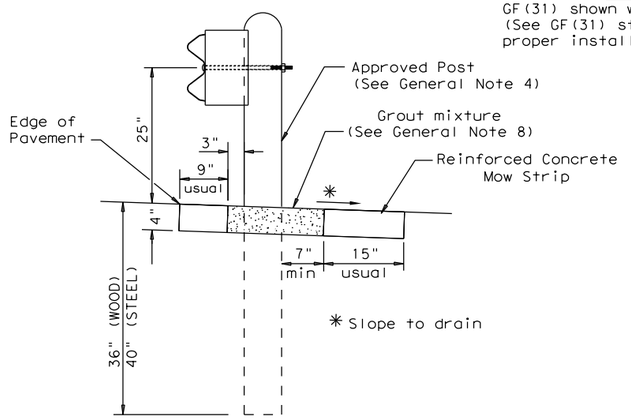


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



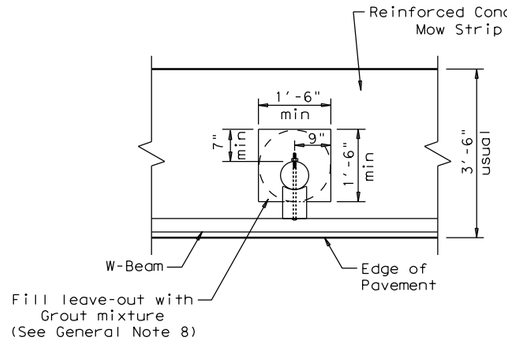
PLAN

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



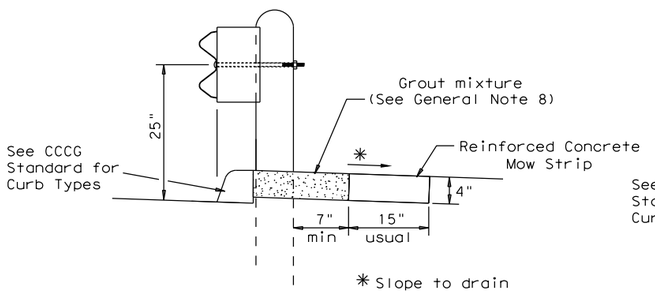
SECTION A-A

Typical



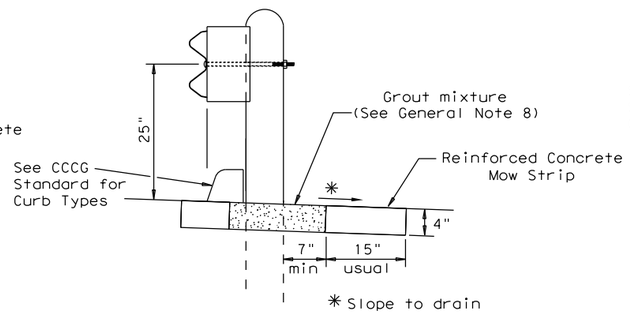
MOW STRIP DETAIL

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



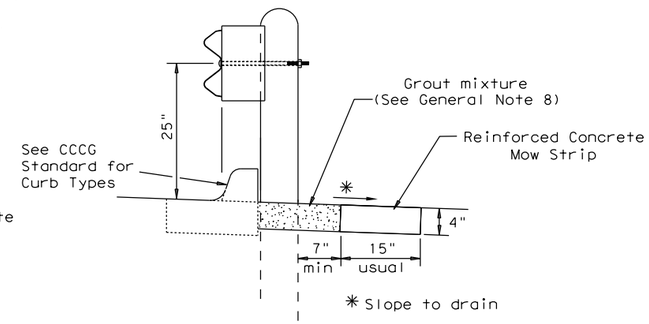
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

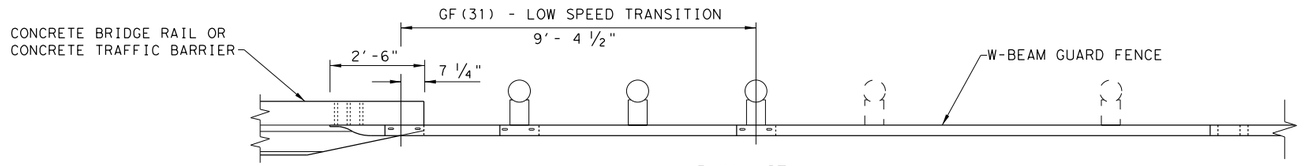
Design Division Standard

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

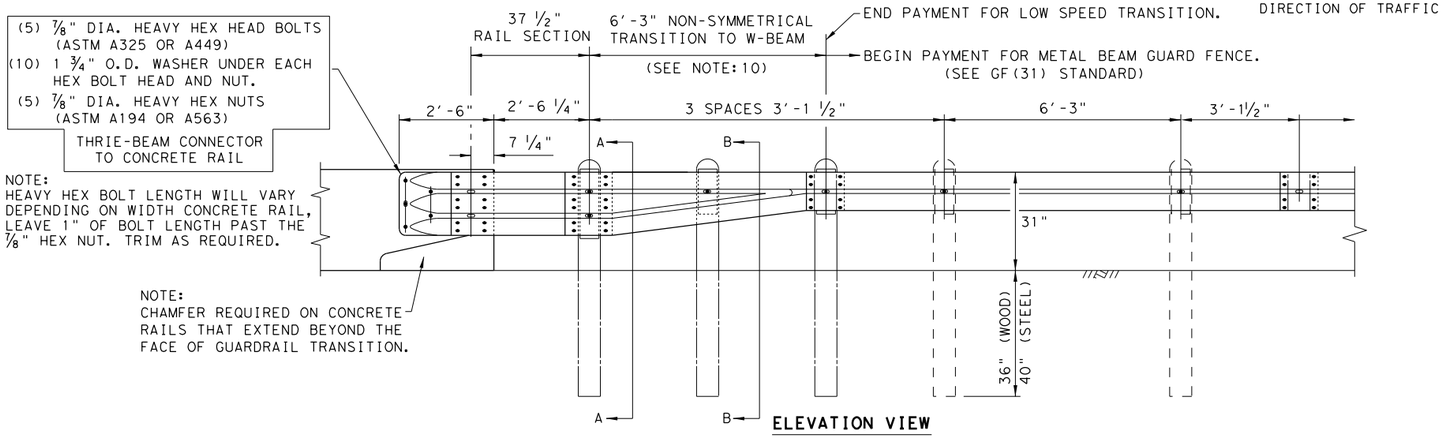
GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		70

DATE: 1/18/2023
FILE: ...\Long Ave\894gf31ms19.dgn



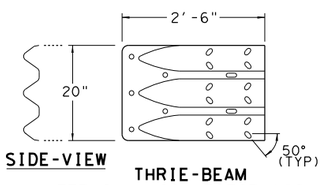
PLAN VIEW



ELEVATION VIEW

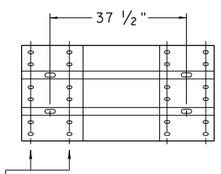
GENERAL NOTES

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 5/8" 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 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

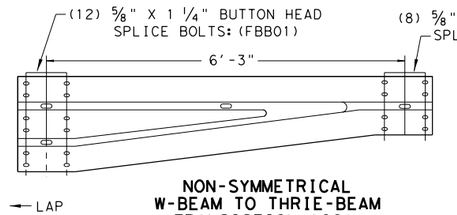


SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b



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



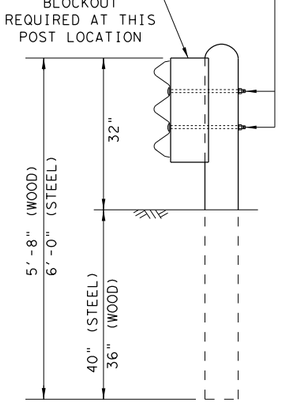
NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSISTION 10GA.
PART DESIGNATOR RWT02a OR RWT02b

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

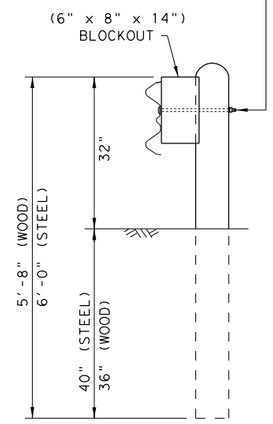
(1) 5/8" BUTTON HEAD POST BOLT & NUT: (FBB04)
(1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

PLATE WASHER INSTRUCTIONS

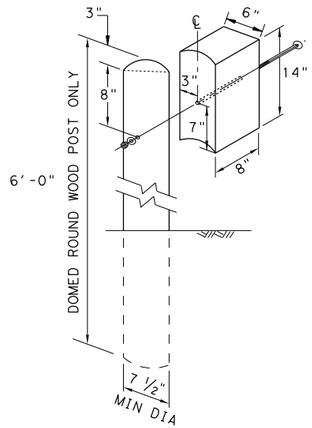
BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



SECTION A-A

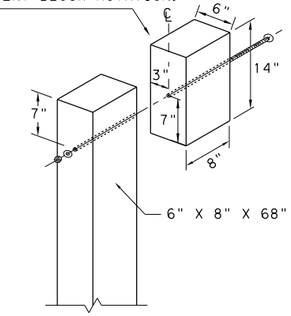


SECTION B-B

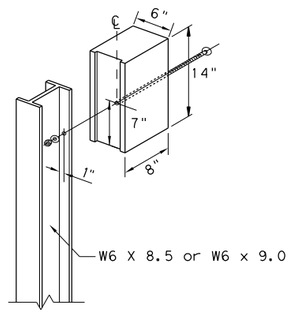


WOOD BLOCK TO ROUND WOOD POST

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



WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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

LOW-SPEED TRANSITION

Texas Department of Transportation | Design Division Standard

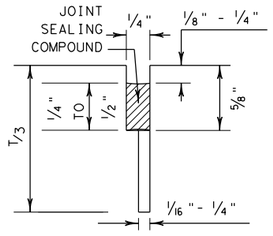
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

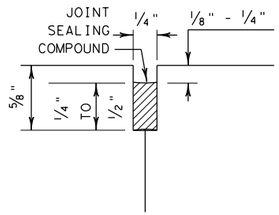
FILE: gf31tr1219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0902	48	894	CS	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		71	

DATE: 1/18/2023 1:23:58 PM
FILE: ...\Long Ave\894gf31tr1219.dgn

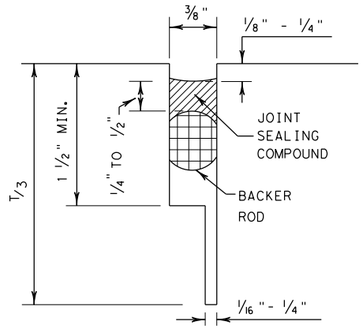
METHOD B: JOINT SEALING COMPOUND



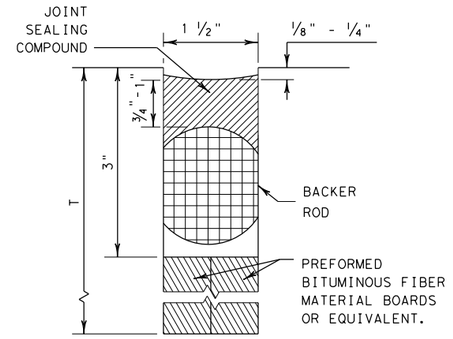
LONGITUDINAL SAWED
CONTRACTION JOINT



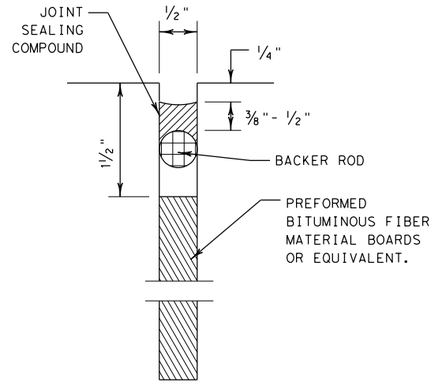
LONGITUDINAL OR TRANSVERSE
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT



TRANSVERSE FORMED
EXPANSION JOINT



FORMED
ISOLATION JOINT

GENERAL NOTES

1. PREFORMED COMPRESSION SEALS (METHOD A) WILL NOT BE PERMITTED.
2. DIMENSION "T" IS THICKNESS OF CONCRETE PAVEMENT.
3. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
4. THE JOINT RESERVOIR FOR SEALANT FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND SAWED JOINTS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR SEALANT CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINTS, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINTS, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLANS OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION JOINTS, TRANSVERSE FORMED EXPANSION JOINTS, AND ISOLATION/EXPANSION JOINTS, USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4, 5, 7, OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

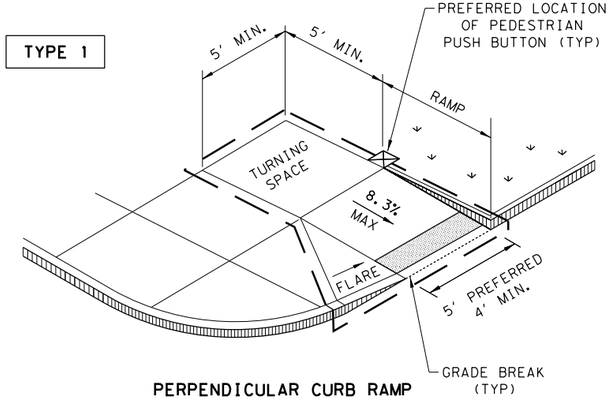
Fort Worth District Standard

CONCRETE PAVING DETAILS
JOINT SEALS
JS (FTW)

ORIGINAL DRAWING: 05/2019	js-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.			SHEET NO.
DATE	REVISIONS	6	(See Title Sheet)			72
05/2019	REPLACES JS-03(FW)	STATE	STATE DIST. NO.	COUNTY		
11/2020	REVISE NOMENCLATURE FOR ISOLATION JOINTS (OMIT "EXPANSION")	TEXAS	FTW	TARRANT		
		CONT.	SECT.	JOB	HIGHWAY NO.	
		0902	48	894	CS	

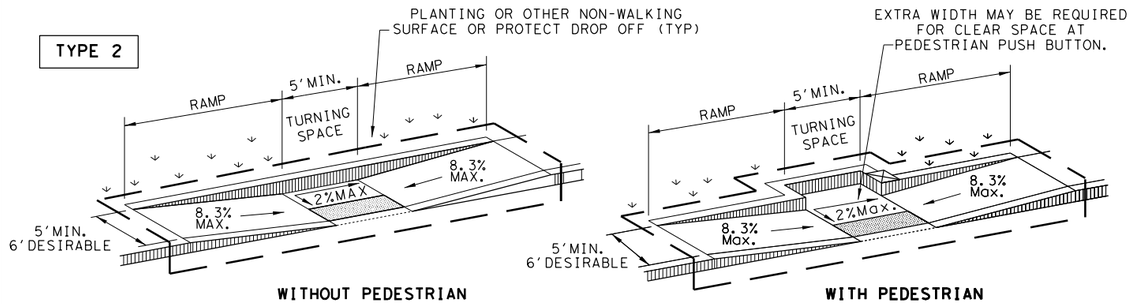
DATE: 1/18/2023
FILE: ...\Roadway\Long Ave\894ped18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

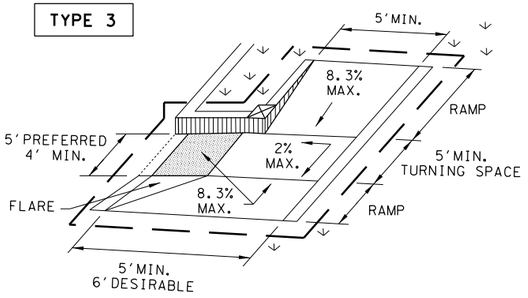


WITHOUT PEDESTRIAN PUSH BUTTON

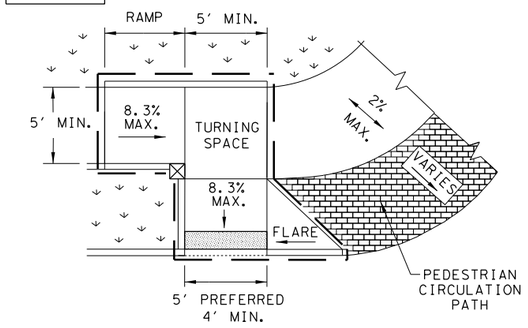
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

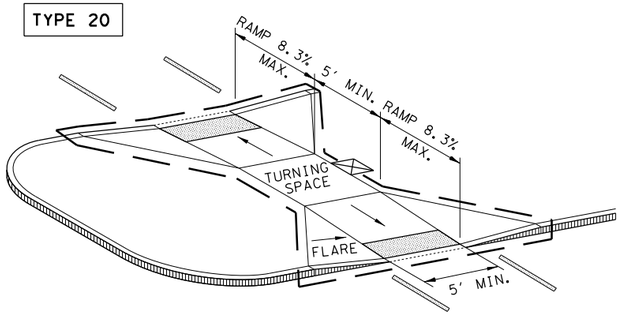


TYPE 6



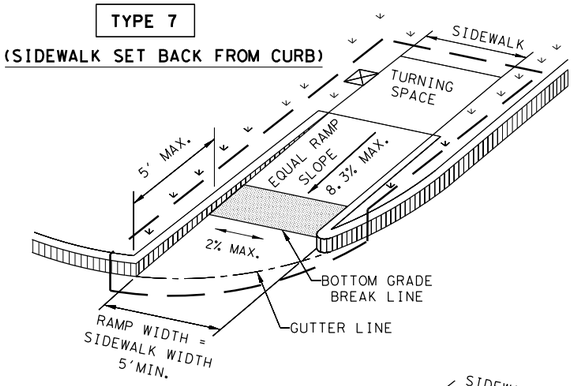
COMBINATION CURB RAMPS

TYPE 20

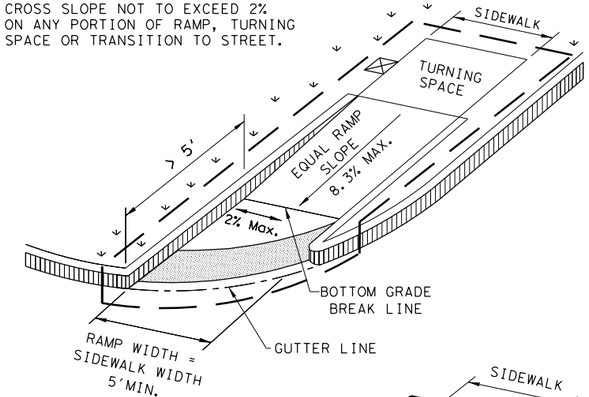


CURB RAMPS AT MEDIAN ISLANDS

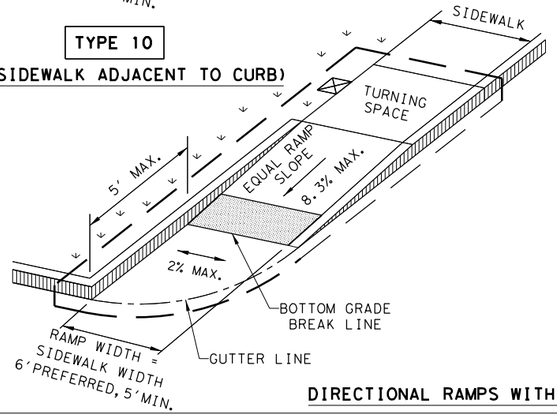
TYPE 7
(SIDEWALK SET BACK FROM CURB)



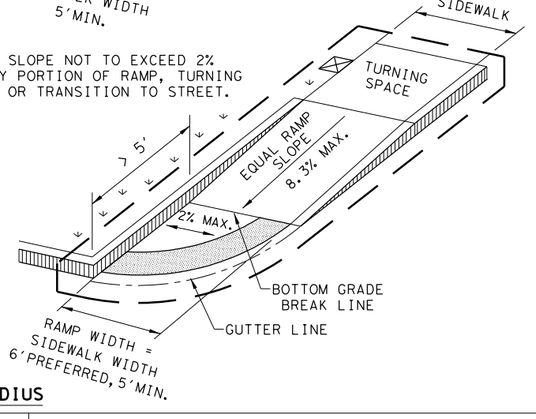
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

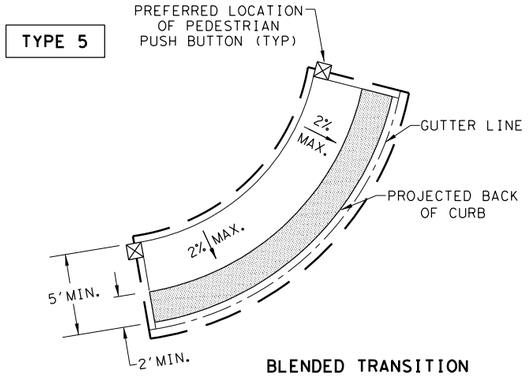


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

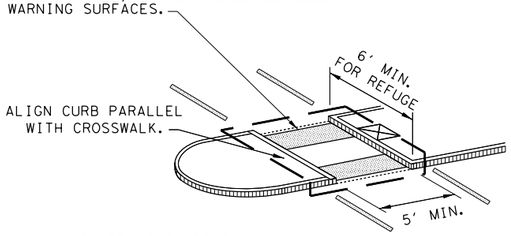
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

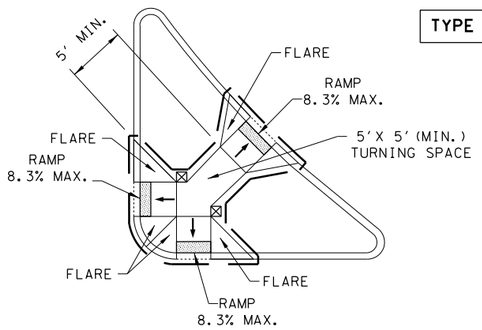
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



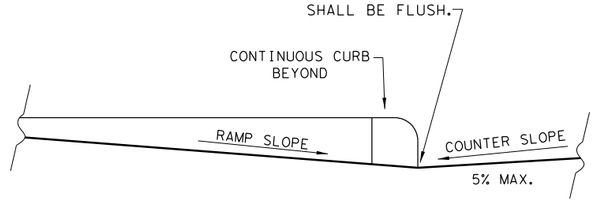
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0902	48	894		CS
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			73

DATE: 1/18/2023
FILE: ...\Roadway\Long Ave\894ped18.dgn

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

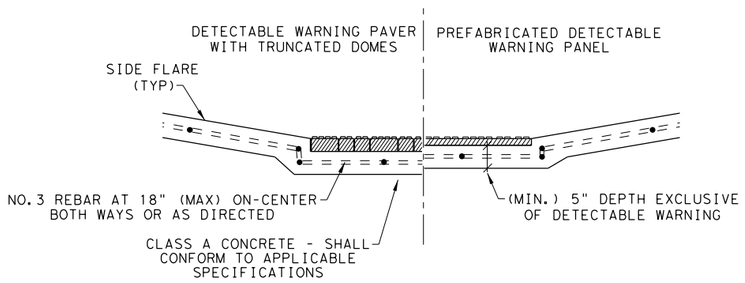
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

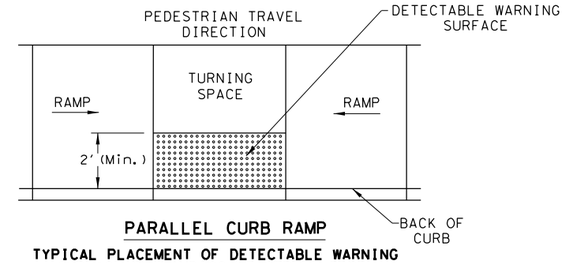
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.



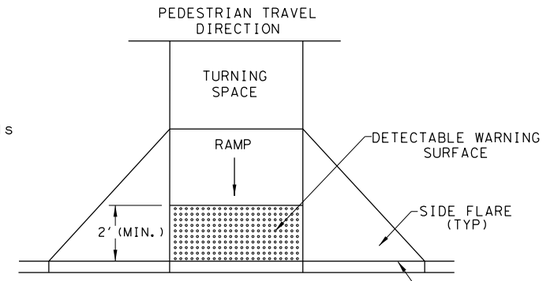
SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



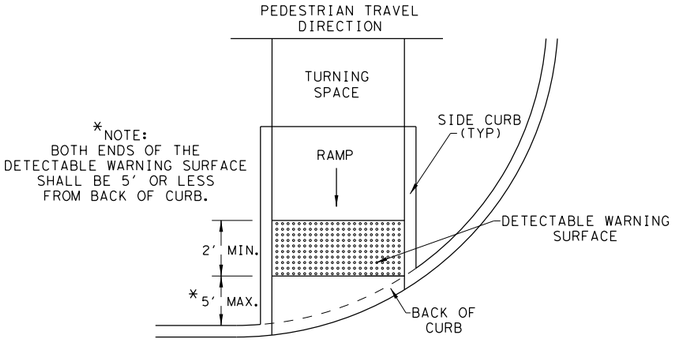
PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

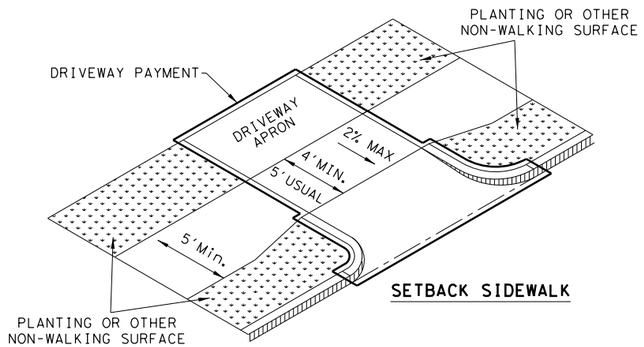
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

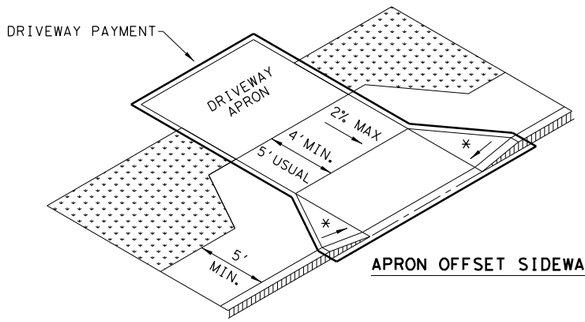
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0902	48	894		CS
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			74

DATE: 1/18/2023
FILE: ...\Roadway\Long Ave\894ped18.dgn

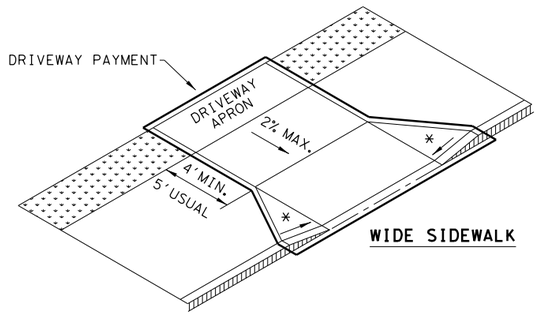
SIDEWALK TREATMENT AT DRIVEWAYS



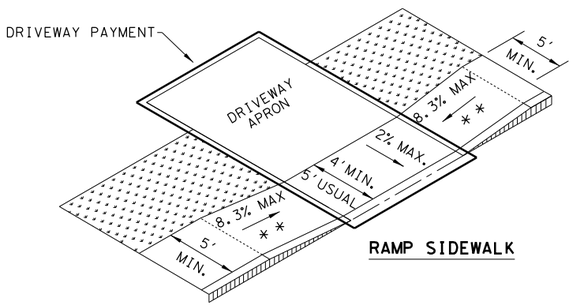
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

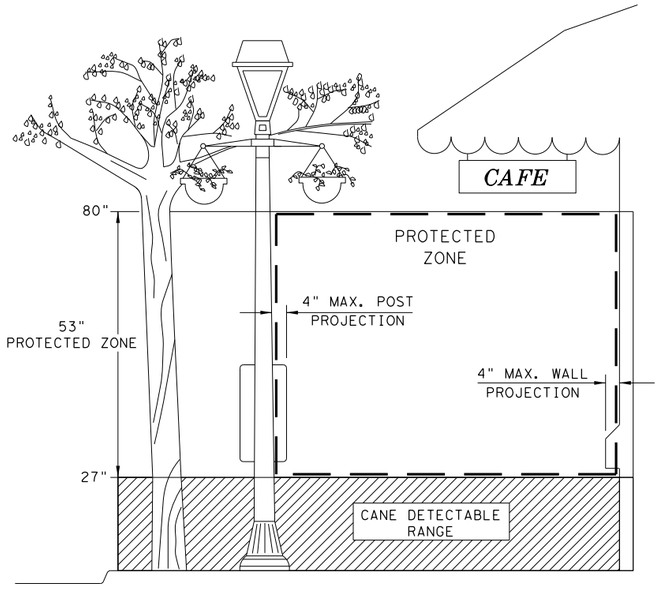


RAMP SIDEWALK

NOTES:

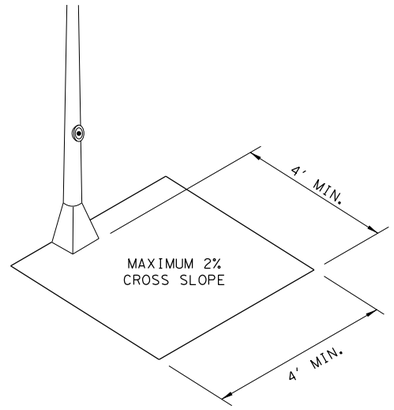
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

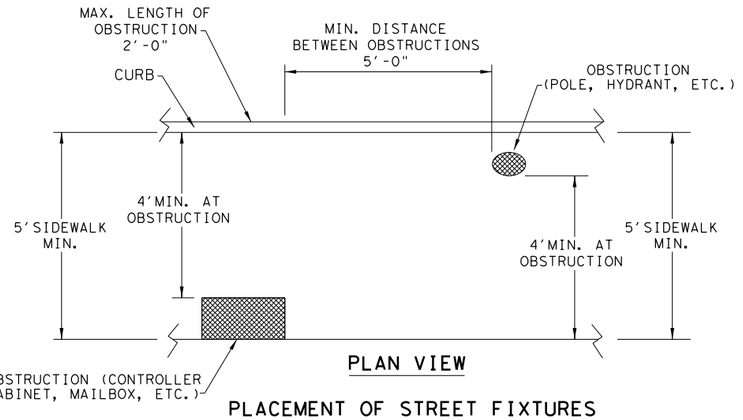


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



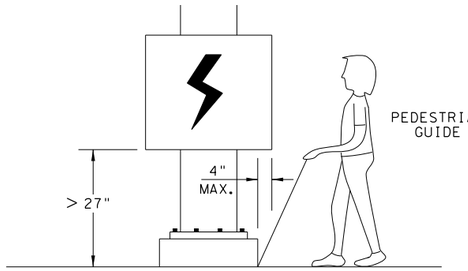
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



PLAN VIEW

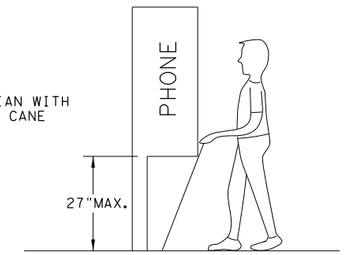
PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



PEDESTRIAN WITH GUIDE CANE

WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

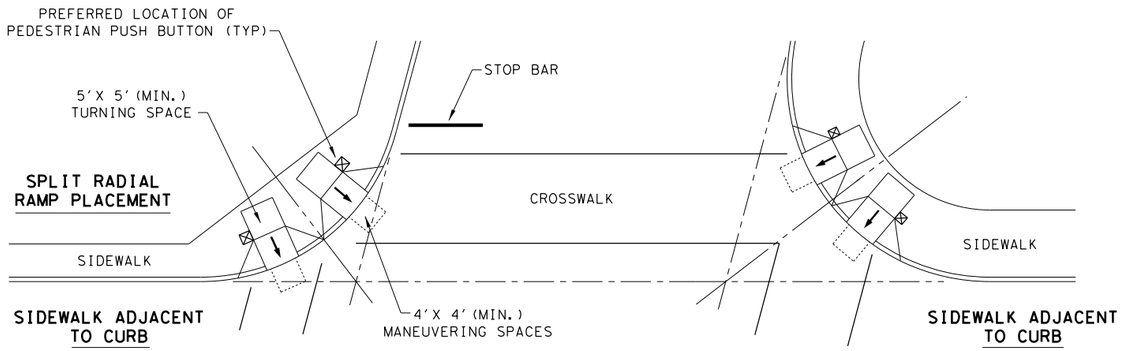
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

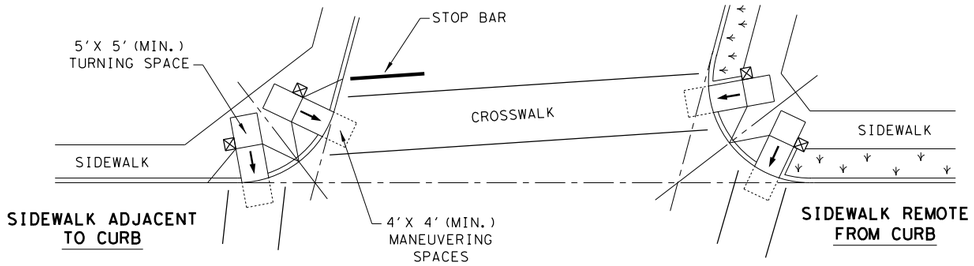
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0902	48	894		CS
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST		COUNTY		SHEET NO.
	FTW		TARRANT		75

DATE: 1/18/2023
FILE: ...\Roadway\Long Ave\894ped18.dgn

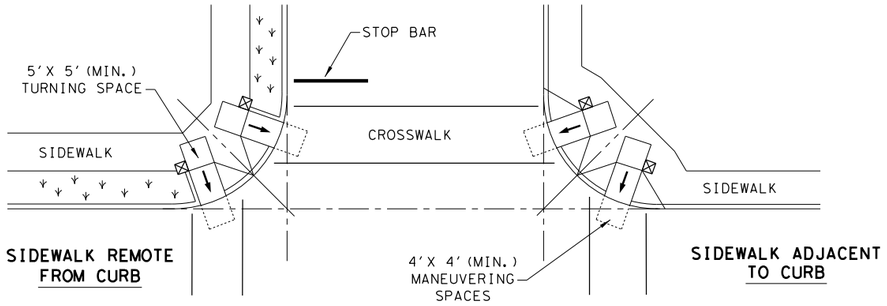
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



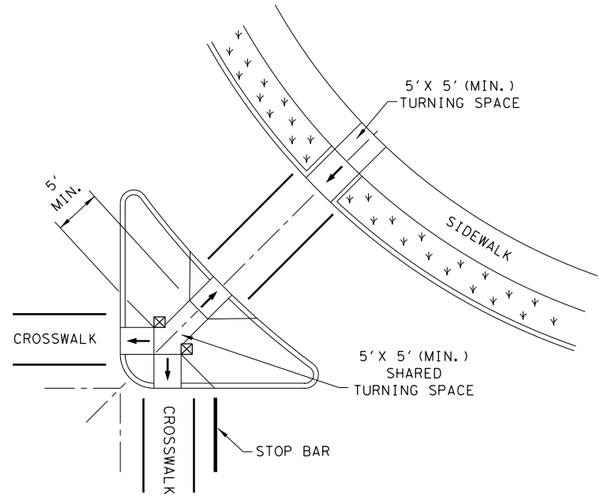
SKEWED INTERSECTION WITH "LARGE" RADIUS



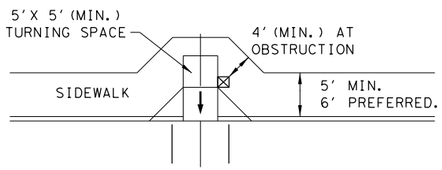
SKEWED INTERSECTION WITH "SMALL" RADIUS

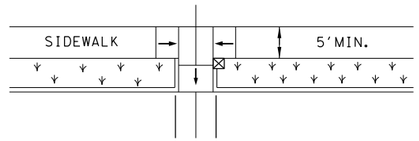


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

SHEET 4 OF 4

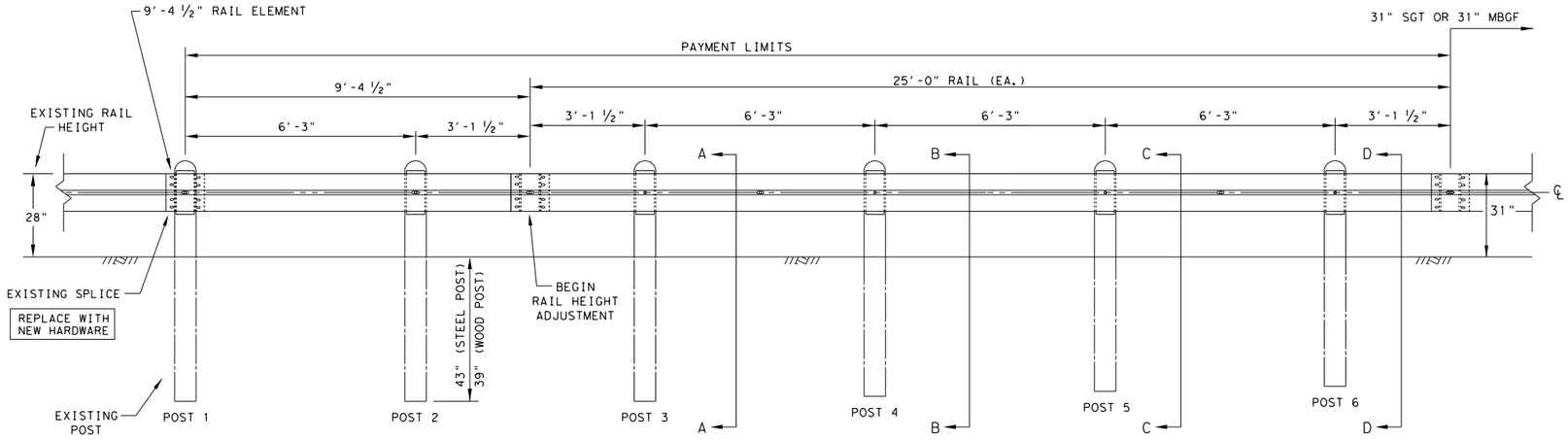
Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

PED-18

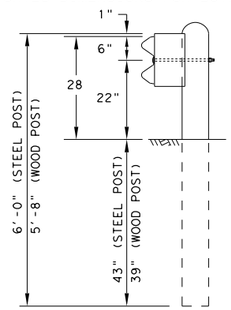
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0902	48	894		CS
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			76

PLAN VIEW

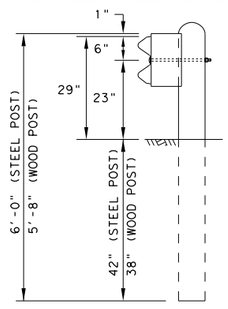


ELEVATION VIEW

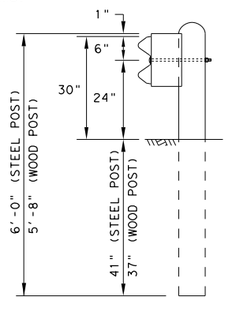
✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



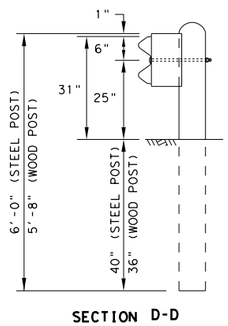
SECTION A-A



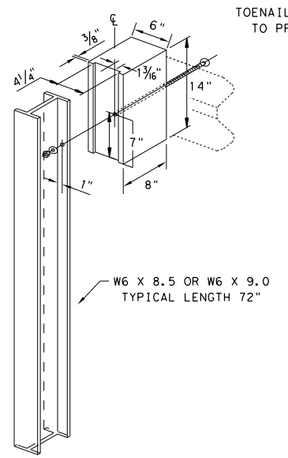
SECTION B-B



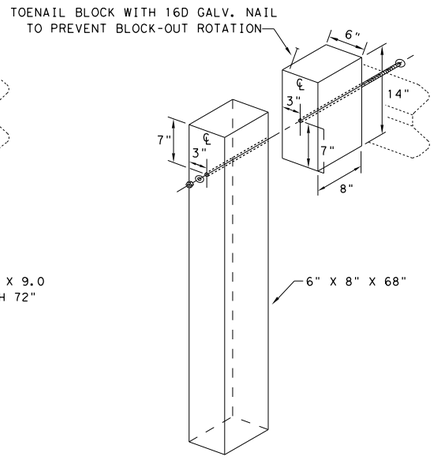
SECTION C-C



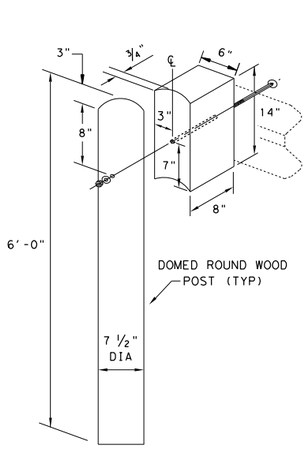
SECTION D-D



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

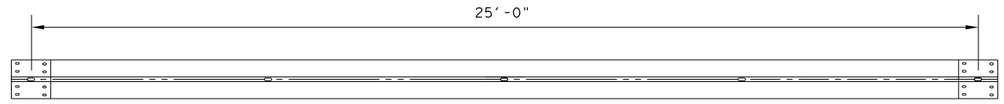
HARDWARE LIST	
QTY	DESCRIPTION
1	9′-4 ½" W-BEAM RAIL ELEMENT 12GA.
1	25′-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
6	7 ½" DIA X 6′-0" DOMED ROUND WOOD POSTS (TYP)
6	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
6	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
6	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
6	⅝" X 18" 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.

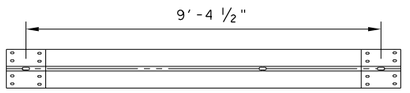
GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

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

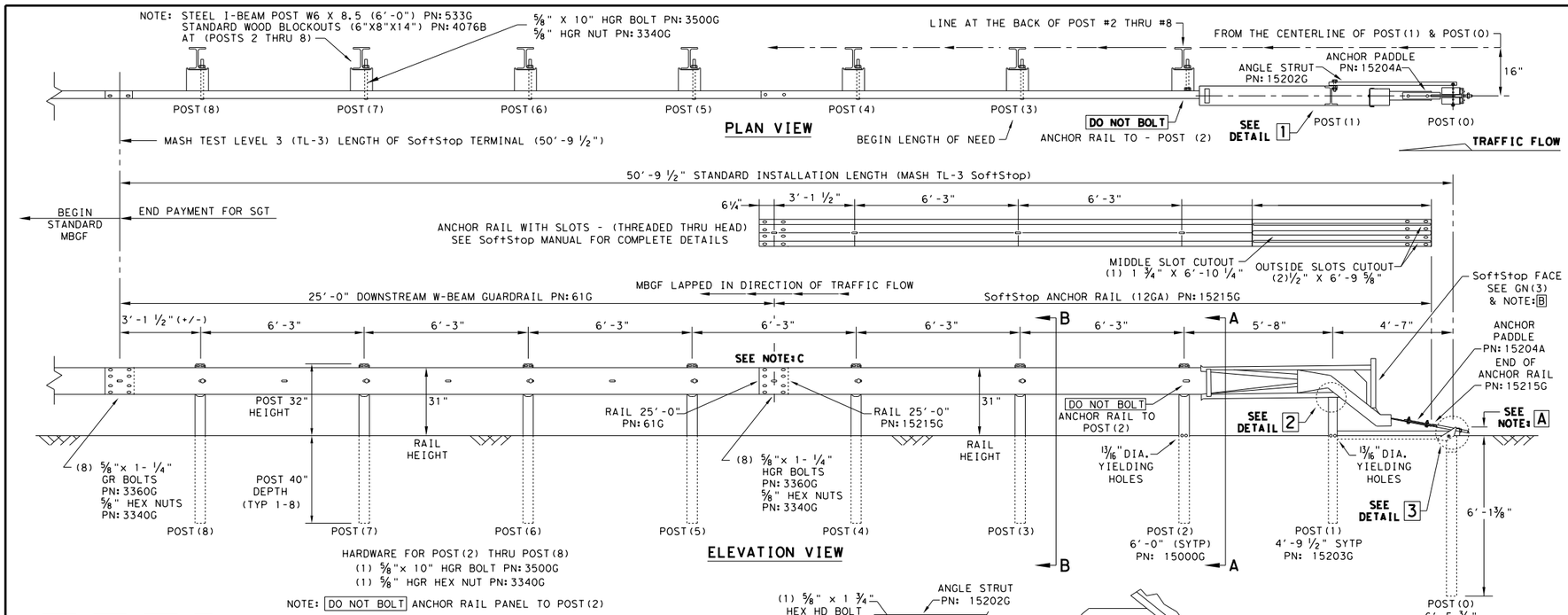
Texas Department of Transportation

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	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		77



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 3-3/4" 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 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
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 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" 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	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" 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
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		78

DATE: 1/18/2023
FILE: ...\Long Ave\894sgt10s3116.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

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

FIELD-SIDE
(RAIL 3)

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

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

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

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

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

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

PLAN VIEW

CABLES

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

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

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

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

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

DETAIL (D)

HEAD
HEIGHT

DETAIL (B)

32-¼"

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

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

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

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

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

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

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

7 5/16"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

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

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

ITEM (22)
BRACKET
SHIPPED FLAT

(RAIL 1)

ITEM (3)

ITEM (16)
4X

⁎ ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-17O1063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
⁎ 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
⁎⁎ 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
⁎⁎ 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

⁎ TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

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.

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

Texas Department of Transportation

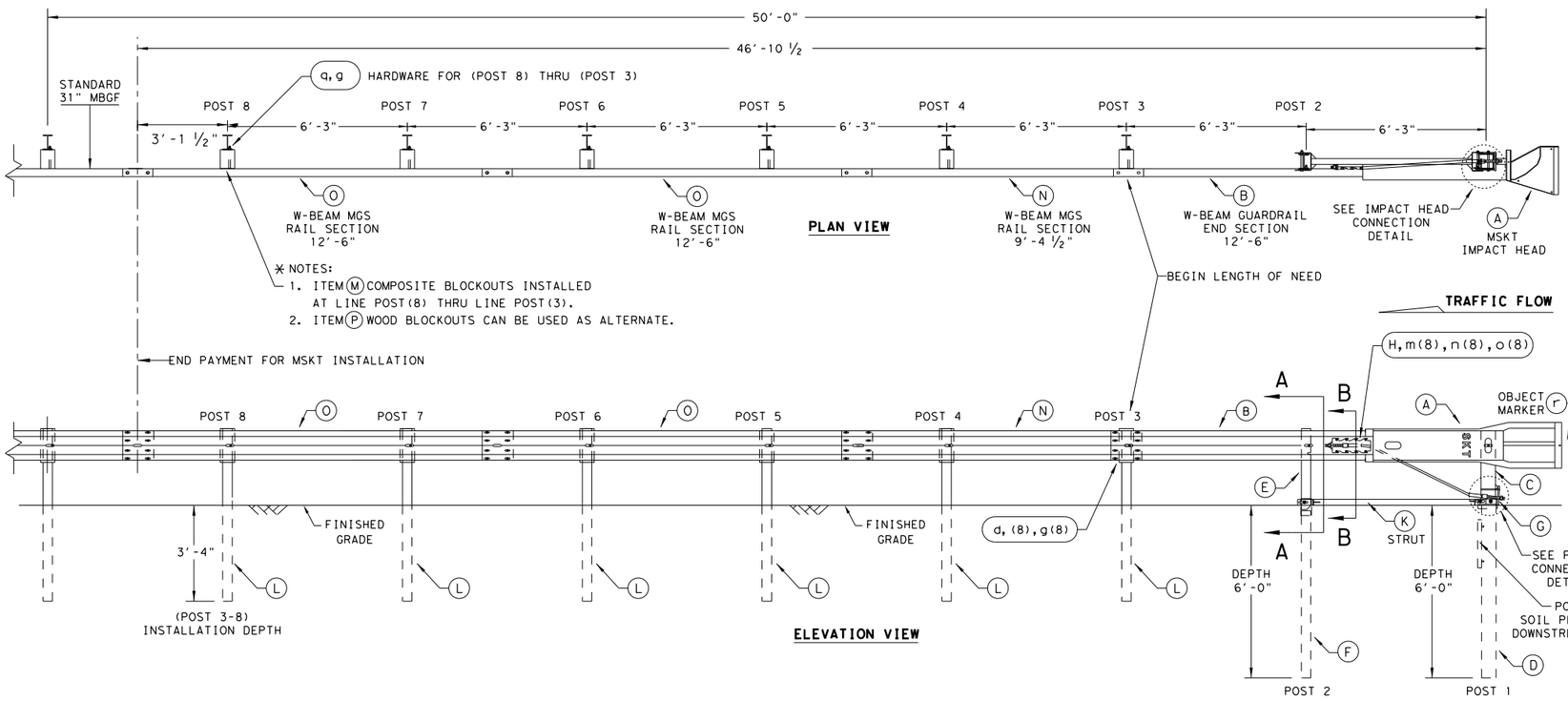
Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		79

DATE: 1/18/2023
FILE: ...\Long Ave\894sgt11s3118.dgn

DATE: 1/18/2023
FILE: ...\Long Ave\894sgt12s3118.dgn



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

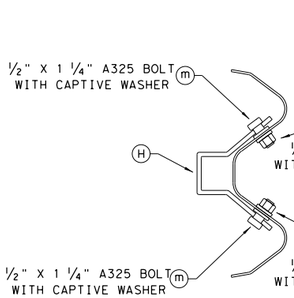
GENERAL NOTES

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.

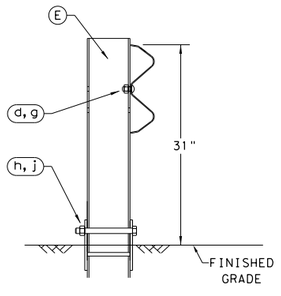
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	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	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" 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: ✳

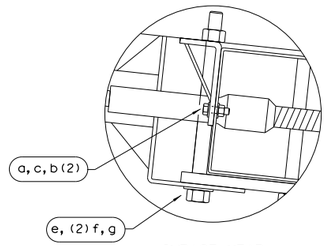
ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL



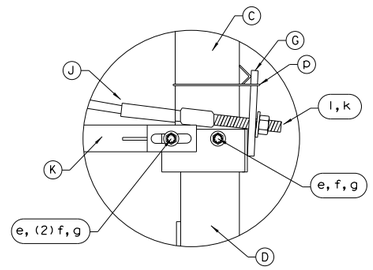
SECTION B-B
ANCHOR BRACKET



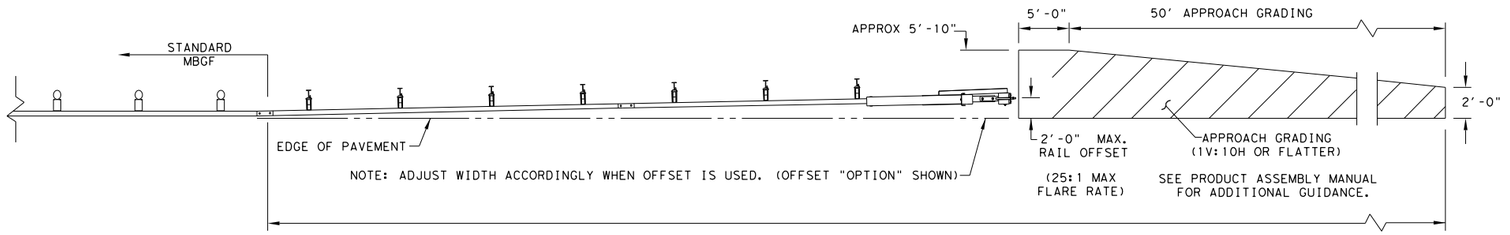
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

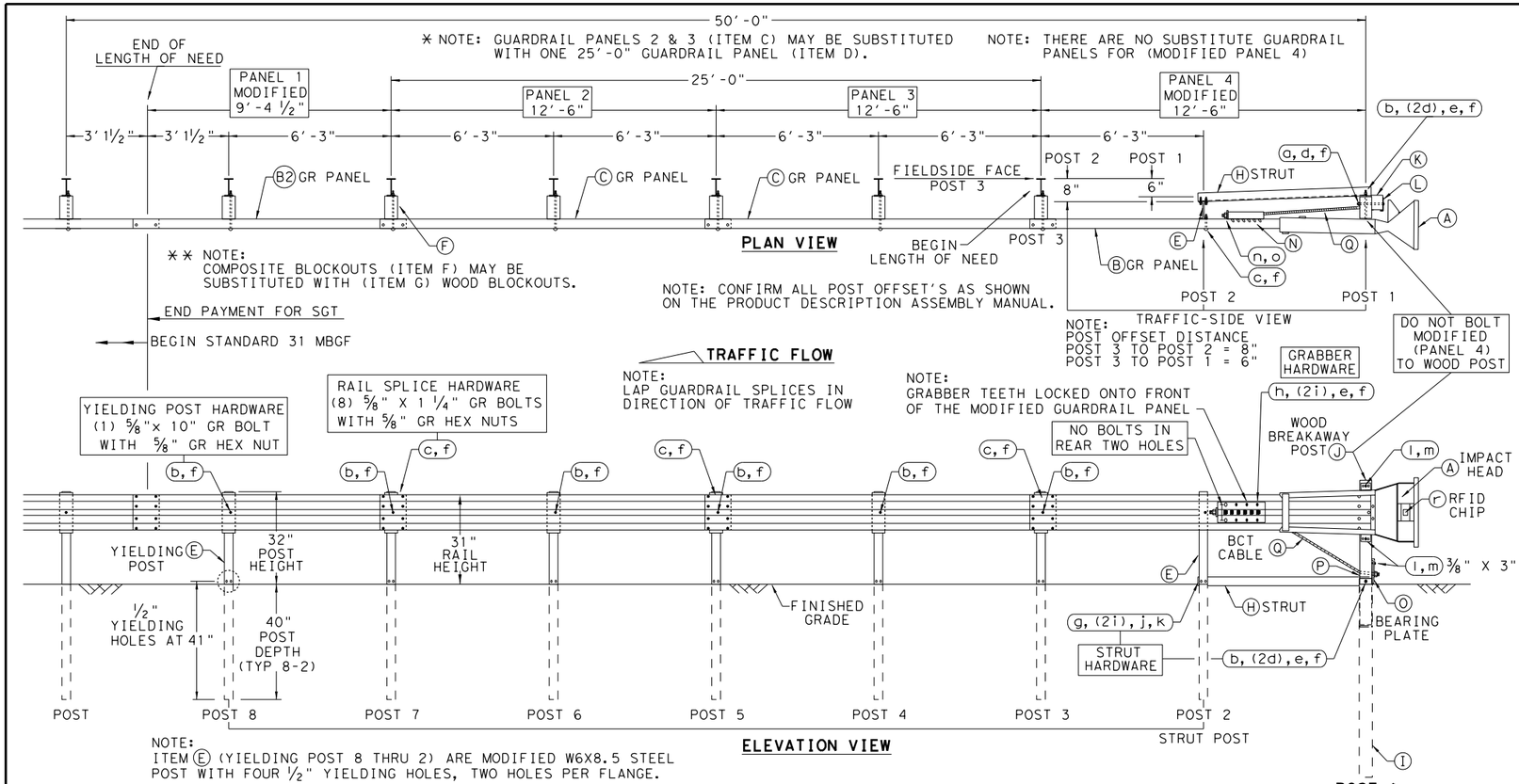
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0902	48	894		CS	
	DIST	COUNTY			SHEET NO.	
	FTW	TARRANT			80	

DATE: 1/18/2023
FILE: ...\Long Ave\894sgt153120.dgn

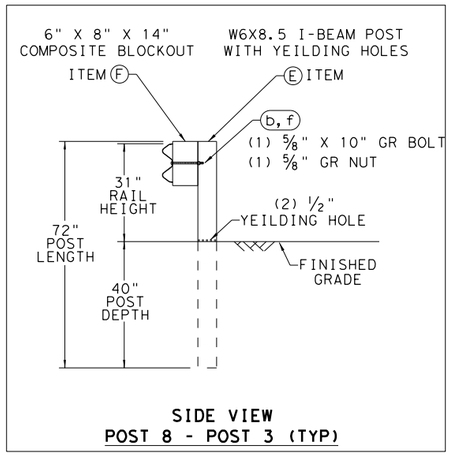


GENERAL NOTES

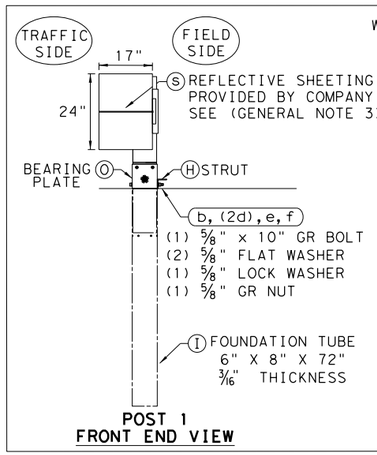
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

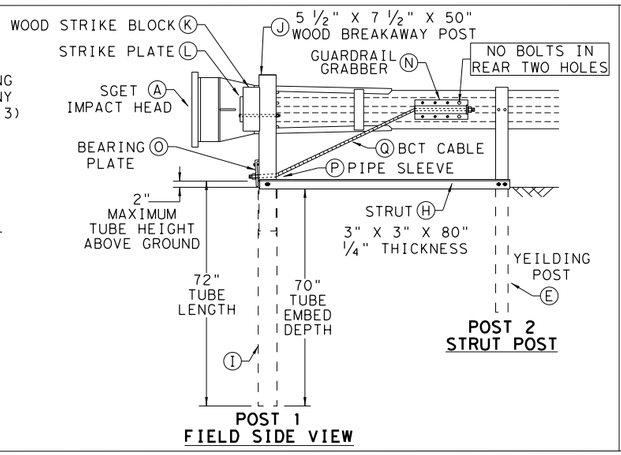
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

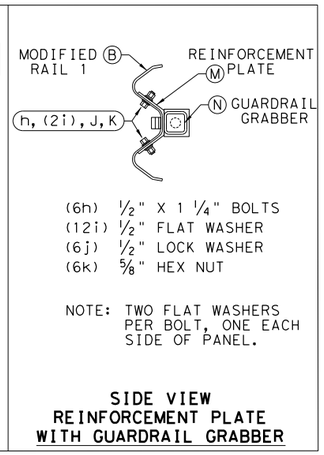


POST 1
FRONT END VIEW

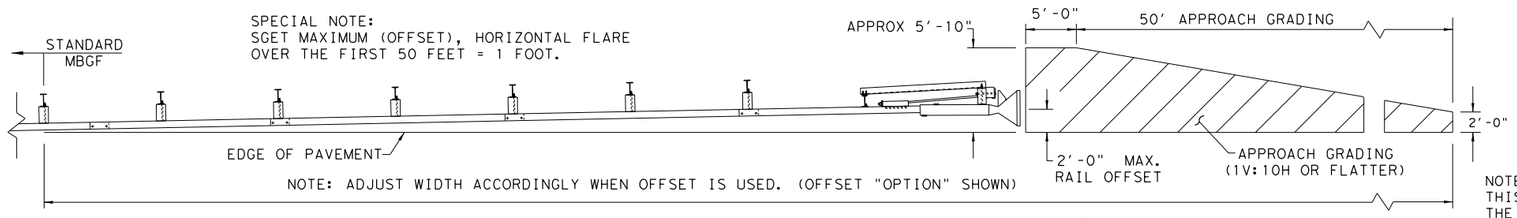


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



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

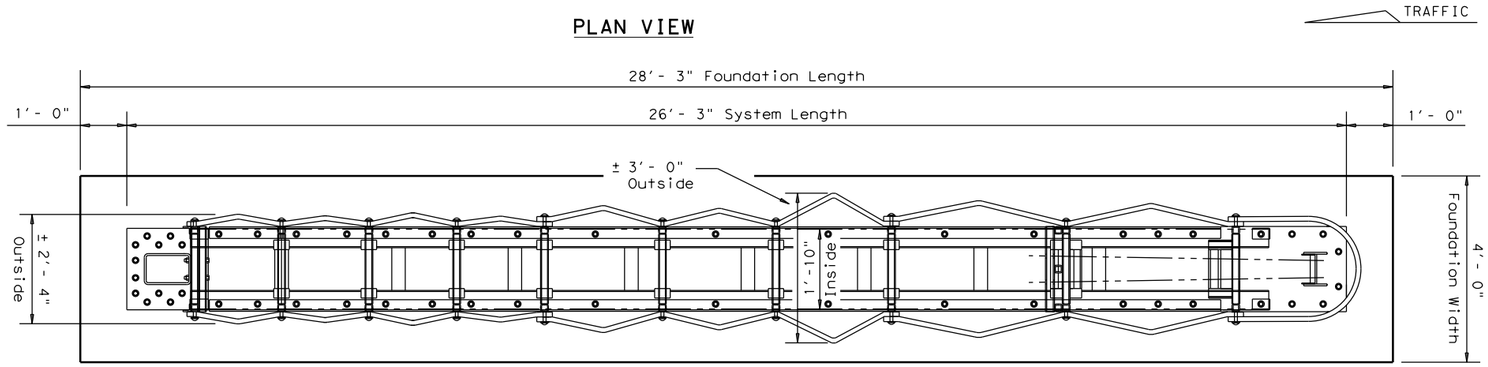
Design Division Standard

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
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		81

DATE: 1/18/2023
FILE: ...\Long Ave\894heart16.dgn

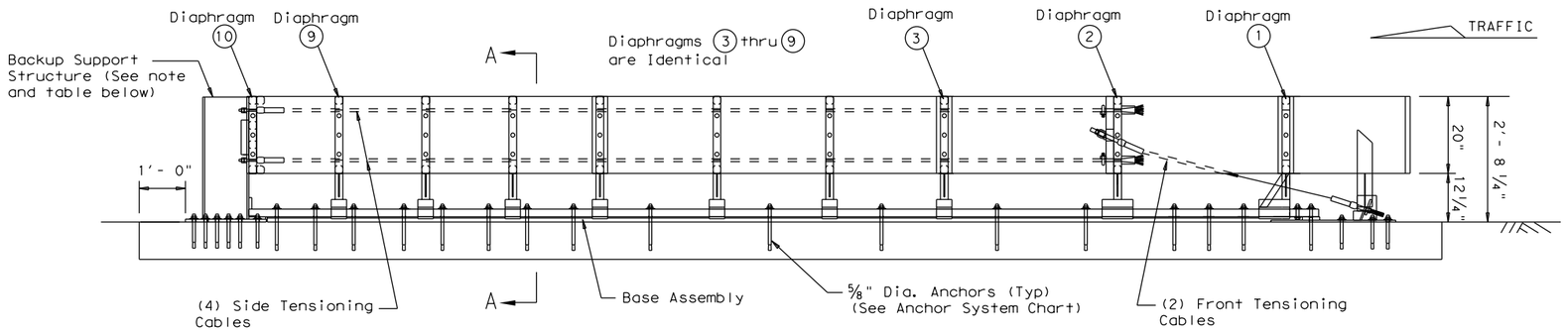
PLAN VIEW

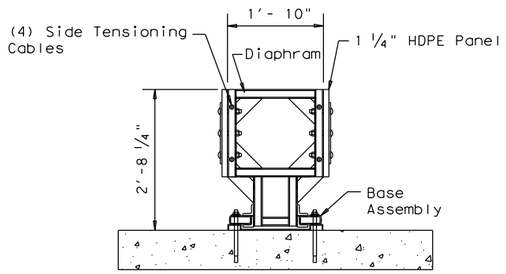


NOTE:
BACKUP SUPPORT SHOWN IS THE STEEL POST OPTION. THE HEART SYSTEM MAY BE CONNECTED WITH RECTANGULAR CROSS SECTIONS SUCH AS: PIERS, PARAPETS AND CONCRETE TRAFFIC BARRIERS.

SYSTEM SHOWN IS HEART (TL-3) WITH UNI-DIRECTIONAL TRAFFIC

ELEVATION VIEW





SECTION A-A

ANCHOR SYSTEM CHART
On Concrete: 10" Bolts used on base rails, 7 ½" Bolts used on base plates.
On Asphalt: 18" Bolts used on base rails and base plates.

HEART (NARROW) SYSTEM		
TEST LEVEL	SYSTEM LENGTH	PAD LENGTH
TL-2	13′- 9 ½"	15′- 9 ½"
TL-3	26′- 3"	28′- 3"
70	28′- 9"	30′- 9"

CONCRETE PAD LENGTH ON THE HEART SYSTEM DEPENDS ON BACKUP TYPE. (MINIMUM LENGTH SHOWN)

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
8" Minimum Asphalt
For asphalt overlays on concrete, contact the manufacturer.

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS (SEE MANUFACTURER'S PRODUCT MANUAL)

BACKUP SUPPORT OPTIONS
Steel Post Backup (Shown)
Rectangular Concrete Backup (18" Width Max.)
Concrete Barrier (CTB) Backup
Single Slope Concrete Barrier (SSCB)

TRANSITION OPTIONS
THE HEART SYSTEM IS APPROVED FOR USE AT BI-DIRECTIONAL SITES, ADDITIONAL HARDWARE IS REQUIRED. (SEE MANUFACTURER'S PRODUCT MANUAL)

BACKUP AND TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS. (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES)

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 bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the HEART and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require levelling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The HEART system should be approximately parallel with the barrier or ℄ of merging barriers.

LOW MAINTENANCE

Texas Department of Transportation — Design Division Standard

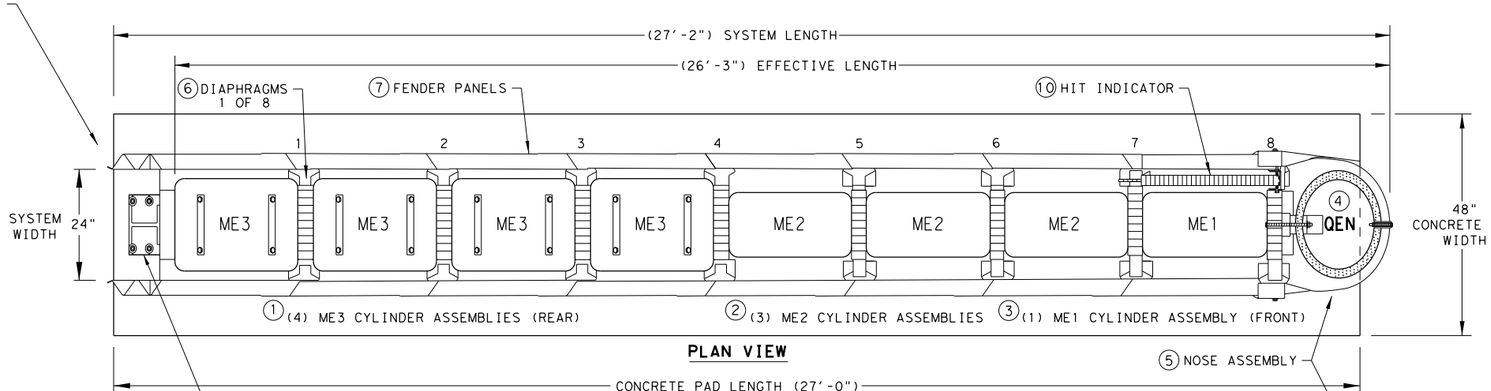
TRINITY HIGHWAY
HEART HYBRID ENERGY ABSORBING TERMINAL
HEART-16

FILE: heart16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06,2013 (VP) REVISED 03,2016 (VP)	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		82

DATE: 1/18/2023
FILE: ...\Long Ave\894qgelitem10n20.dgn

NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD EITE M10 24" WIDE (8 BAY) SYSTEM



PLAN VIEW

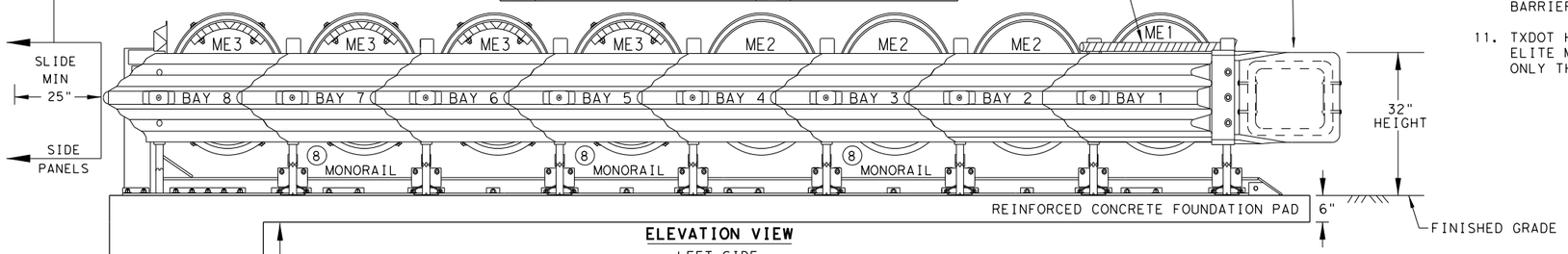
⑨ SHOWN WITH TENSION STRUT BACKUP ASSEMBLY

KEY		KEY	
①	ME3 CYLINDER ASSEMBLIES	⑥	DIAPHRAGMS
②	ME2 CYLINDER ASSEMBLIES	⑦	FENDER PANELS
③	ME1 CYLINDER ASSEMBLY	⑧	MONORAILS
④	QEN CYLINDER	⑨	TYPE OF BACKUP
⑤	NOSE BELT ASSEMBLY	⑩	HIT INDICATOR

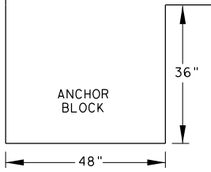
④ QEN CYLINDER INSTALLED INSIDE OF NOSE BELT ASSEMBLY ⑤

NOTE:
HIT INDICATOR WILL RAISE UPON IMPACT.

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 25" MIN.



ELEVATION VIEW
LEFT SIDE



NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE M10 FIELD INSTALATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

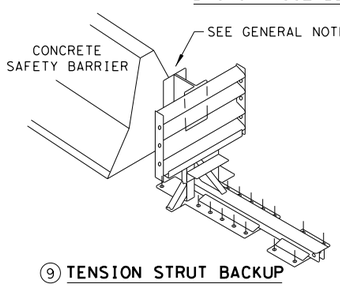
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD ELITE M10 8-BAY, 24" WIDE - NARROW SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	24"	REAR	FRONT		NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS

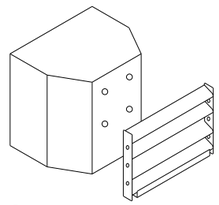


⑨ TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).



⑨ CONCRETE BACKUP

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD ELITE M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10, THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS,OR DEPRESSIONS.
9. THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD ELITE M10 SYSTEM. THE QUADGUARD ELITE M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

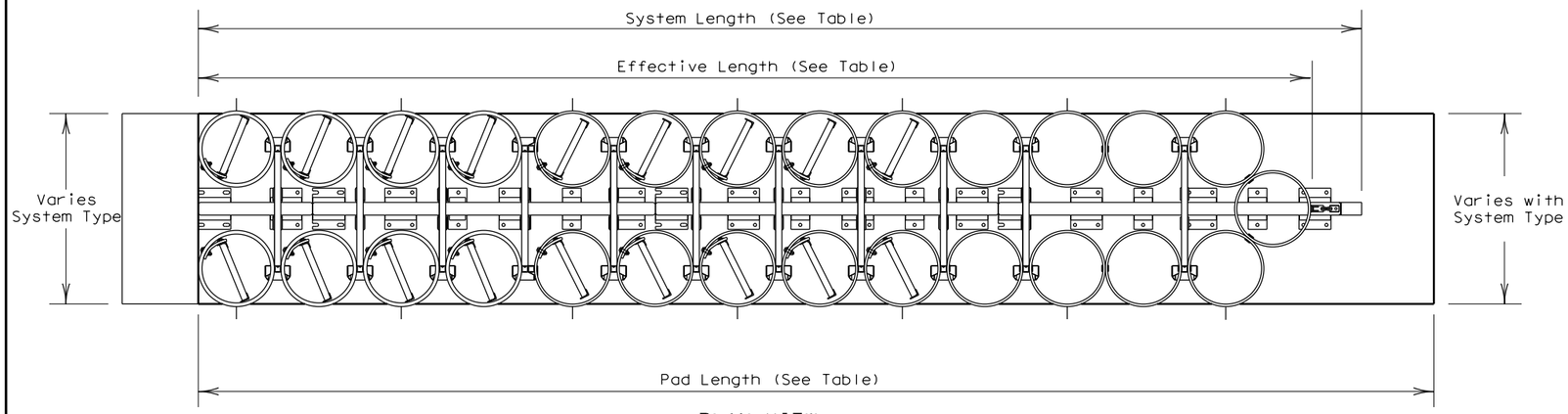
LOW MAINTENANCE

Texas Department of Transportation
Design Division Standard

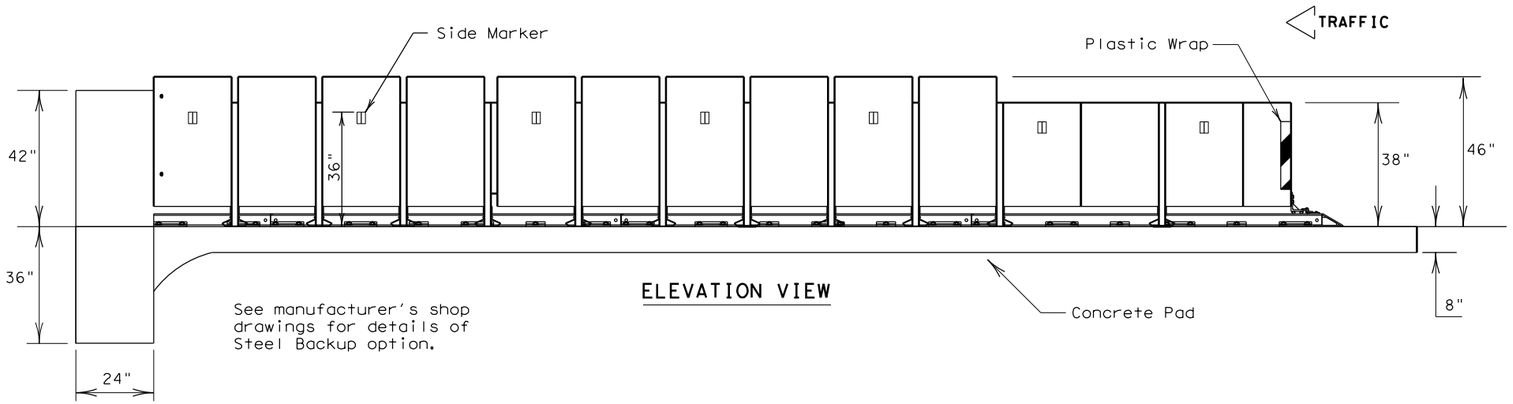
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 (MASH TL-3)

QGELITE(M10)(N)-20

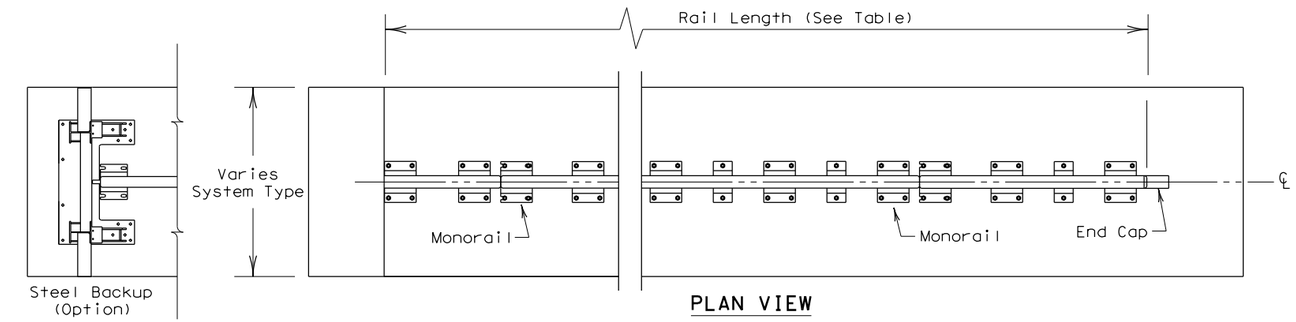
FILE: qgelitem10n20.dgn	DN: TxDOT	CK: KM	DW: VP	CK: AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		83



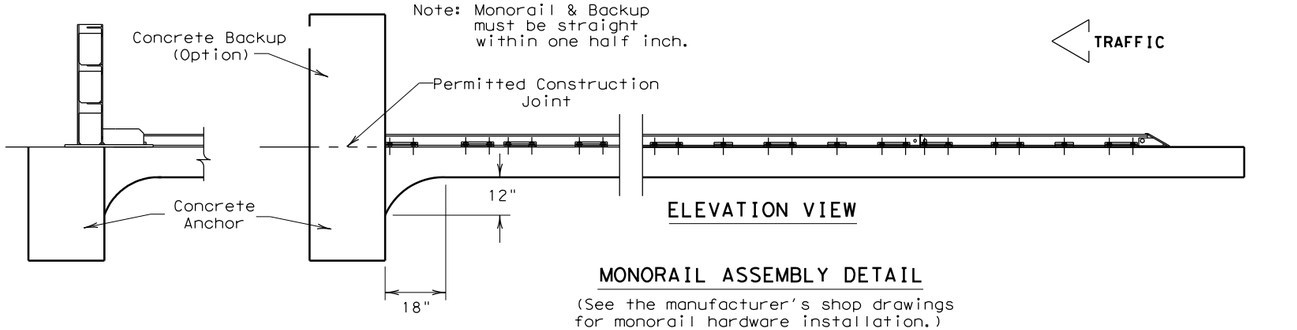
PLAN VIEW



ELEVATION VIEW



PLAN VIEW



ELEVATION VIEW

MONORAIL ASSEMBLY DETAIL

(See the manufacturer's shop drawings for monorail hardware installation.)

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. The nose of the REACT 350 shall be clad with a plastic wrap with standard delineation adhered to the wrap and shall have a series of side marker reflectors on both sides of the unit. See site plan views for marker and plastic wrap color orientation.
3. For bi-directional traffic, appropriate transition details will be as shown on the manufacturer's shop drawings.
4. Details of components for the REACT(W) and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The REACT(W) system should be approximately parallel with the barrier or ℄ of merging barriers.
8. All steel components to be hot dipped galvanized except stakes, drive spikes, threaded bolts in backup unit, and wedge fittings on cables.

WIDE REACT SYSTEMS					
SYSTEM TYPE	BACKUP WIDTH	TEST LEVEL	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH
W60	60"	TL-2 TL-3	18'-10" 30'-10"	16'-3" 29'-3"	19'-6" 32'-6"
W96	96"	TL-2 TL-3	18'-10" 34'-9"	17'-6" 32'-10"	19'-7" 35'-6"
W120	120"	TL-3	33'-10"	32'-2"	35'-6"

(See the manufacturer's shop drawings for additional details.)

ANCHOR SYSTEM TYPE
MP-3® polyester anchoring system with 7.5" studs, 5.5" embedment
FOUNDATION TYPES
Minimum 8" Reinforced concrete pad (Required reinforcing steel for concrete pad shall be shown on the manufacturer's shop drawings. Minimum 8" Non-reinforced concrete roadway (Measuring at least 12' wide by 50' long) Minimum 7" Concrete deck structure, or Minimum 6" Reinforced concrete roadway

LOW MAINTENANCE

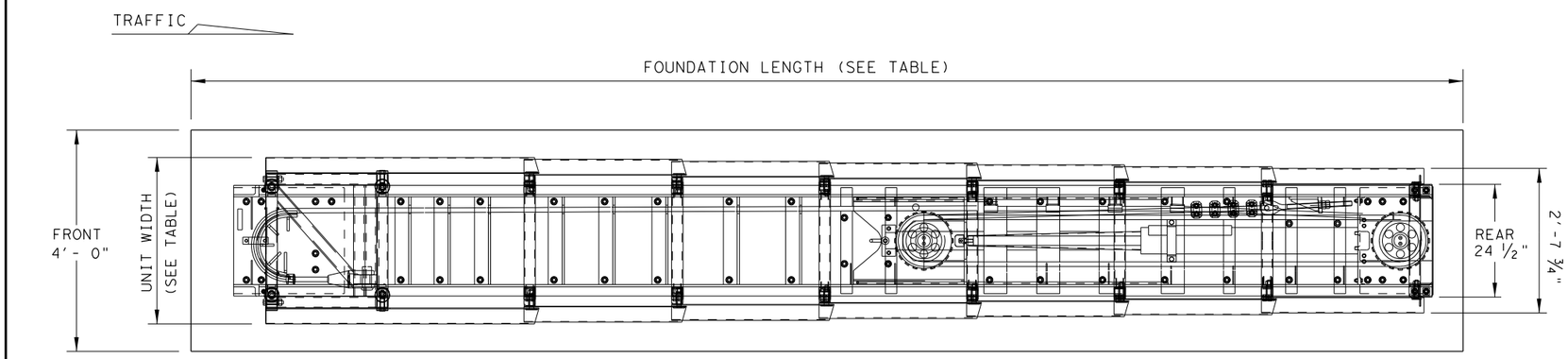
Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (REACT 350 WIDE)

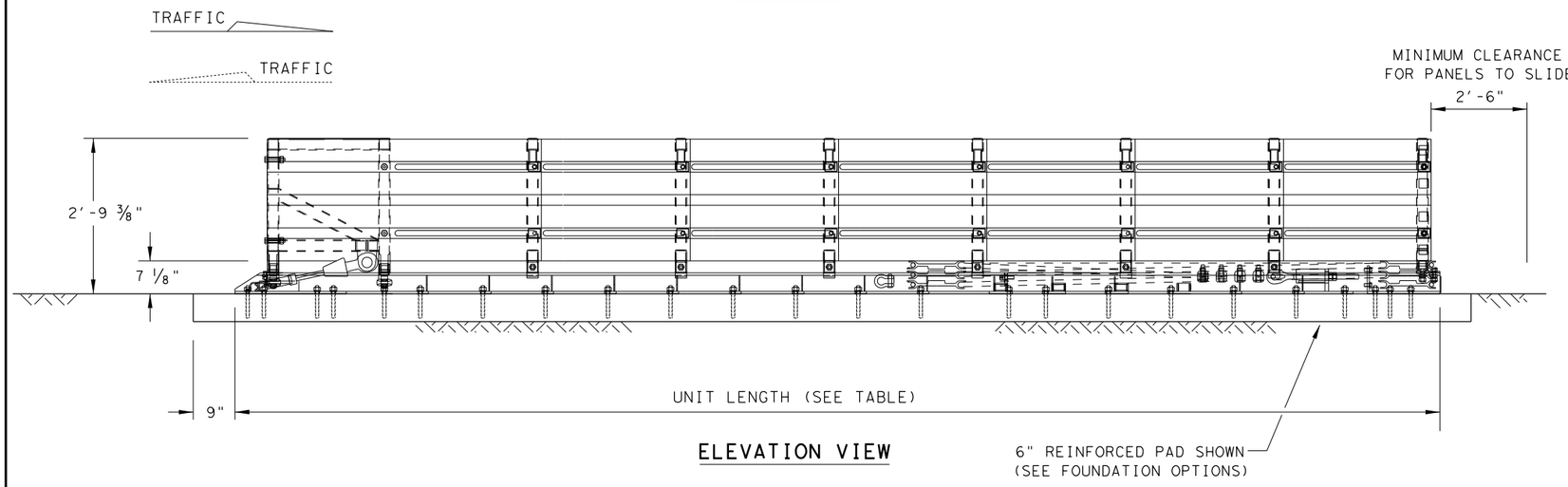
REACT(W)-16

FILE: reactw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: October 2001	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
REVISED 03,2016 (VP)	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		84

DATE: 1/18/2023
FILE: ...\Long Ave\894reactw16.dgn



PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13′-6"	2′-10 ⅝"	15′- 6 ¼"	24"to 36"
SCI100GM	TL-3	21′-6"	3′-1 ½"	23′- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

LOW MAINTENANCE

Texas Department of Transportation

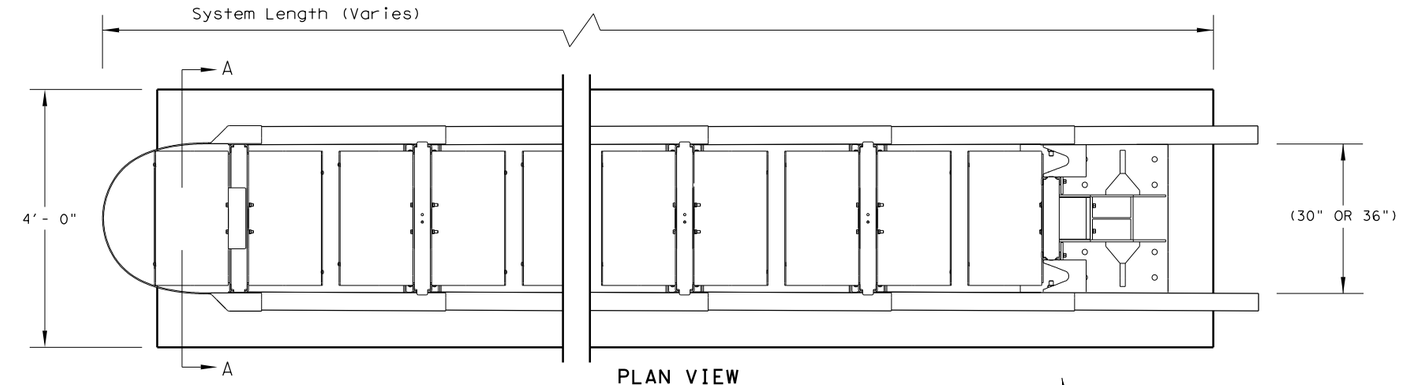
Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		85

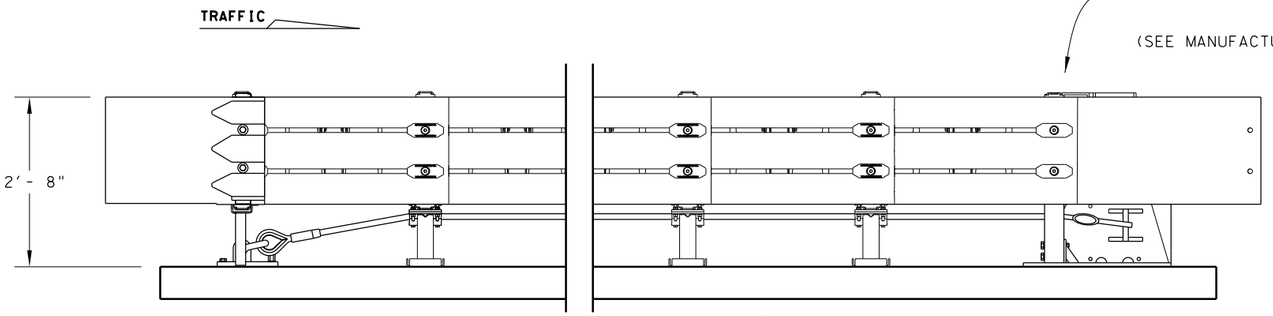
DATE: 1/18/2023
FILE: ...\Long Ave\894smtcn16.dgn



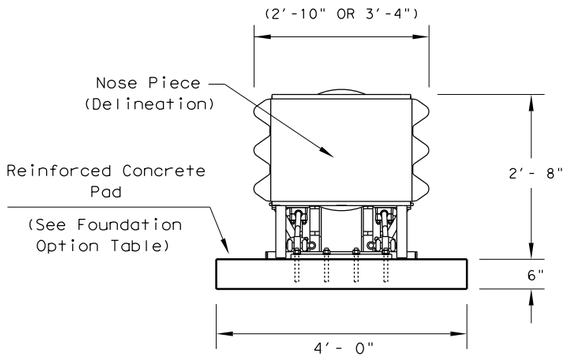
PLAN VIEW

Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available.

(SEE MANUFACTURER'S PRODUCT MANUAL)



ELEVATION VIEW



SECTION A-A

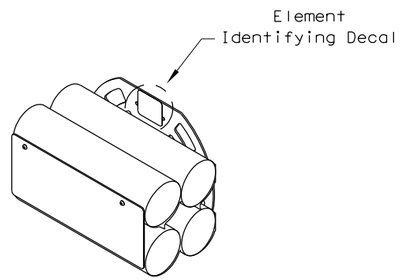
Nose Piece delineation orientation, is shown elsewhere on the plans.

TRANSITION OPTIONS
Vertical Wall
Concrete Traffic Barriers
W-Beam Guardrail
Thrie Beam Guardrail

For bi-directional transition panel and end shoe details. (See manufacturer's product manual.)

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
Asphalt over Concrete with Minimum 6" Embedment in Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

For steel placement in concrete foundations. (See manufacturer's product manual)



ENERGY ABSORBING ELEMENTS (EAE)

BACKUP SUPPORT OPTIONS
Compact (Stand Alone)
Flush Mount
PCB (Concrete Barrier)

TAU-II-R (NARROW) SYSTEM LENGTHS			
BACKSTOP	TL-2	TL-3	70 mph
PCB	13'-7"	27'-10"	30'-7"
Flush Mount	14'-0"	28'-3"	31'-0"
Compact	15'-3"	29'-6"	32'-3"

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

Note: System lengths are ± 2"

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. For bi-directional traffic, appropriate transition panels will be required.
3. Additional details for the backup support option, transition options and foundation option will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 psi.
5. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The TAU-II-R system should be approximately parallel with the barrier or center of merging barriers.
8. Refer to Universal TAU-II-R configuration chart for specific systems configuration number and location of each type of energy absorbing element.
9. 30-inch (30") model shown, also available in 36-inch (36") configuration.

BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	1	Backstop Assembly (See Table)
TBD	1	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
B010651	4	Pipe Panel Mount
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.

(See manufacturer's product manual for details)

LOW MAINTENANCE

Texas Department of Transportation

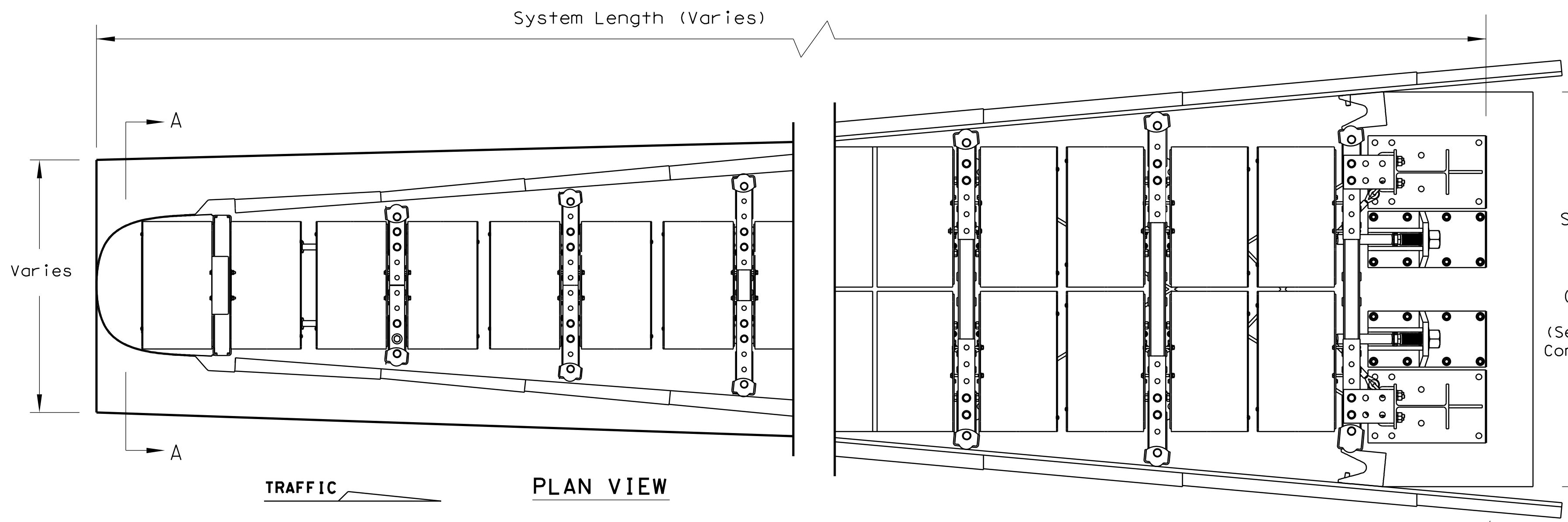
Design Division Standard

LTS-BARRIER SYSTEMS CRASH CUSHION (R-NARROW)

TAU-II-R(N)-16

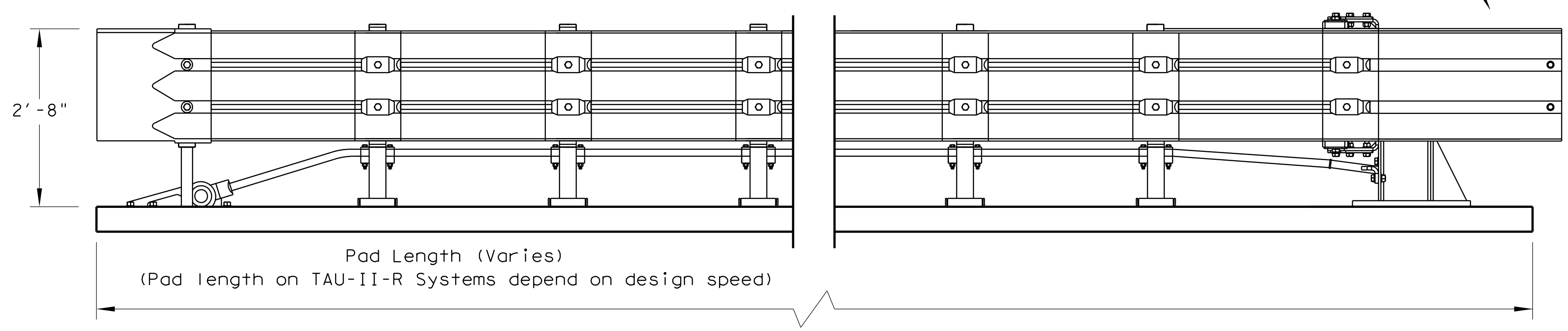
FILE: tauiirn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
REVISED 06,2013 (VP)	DIST	COUNTY		SHEET NO.
REVISED 03,2016 (VP)	FTW	TARRANT		86

DATE: 1/18/2023
FILE: ...\Long Ave\894tauiirn16.dgn



PLAN VIEW

Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available.
(See manufacturer's product manual)



ELEVATION VIEW

GENERAL NOTES

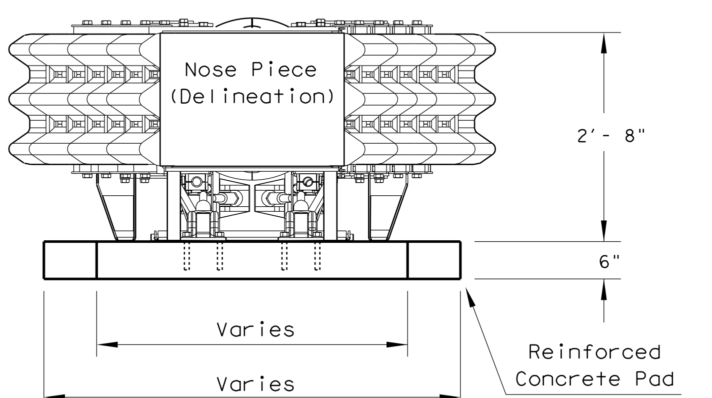
1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. For bi-directional traffic, appropriate transition panels will be required.
3. Additional details for the backup support option, transition option and foundation option will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 psi
5. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or groud depressions.
7. The TAU-II-R system should be installed approximately parallel with the barrier or center of merging barriers.
8. Refer to Universal TAU-II-R configuration chart for system configuration numbers and location of each type of energy absorbing element.

BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	TBD	XL Bulkhead
TBD	TBD	XXL Bulkhead
TBD	TBD	XXXL Bulkhead
TBD	1	Backstop Assembly (See Table)
TBD	2	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1109042-00	TBD	Energy Absorbing Element, Type 1S
BSI-1107116-00	TBD	Energy Absorbing Element, Type 2S
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001031	TBD	Lateral Support Kit
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.
(See manufacturer's product manual for details)

TRAFFIC

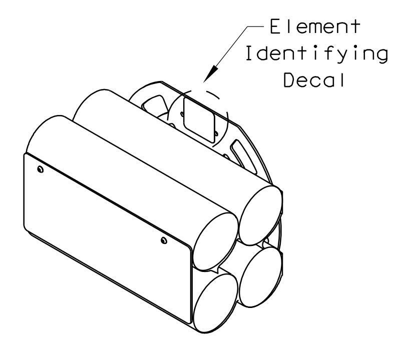


SECTION A-A

Nose Piece delineation orientation, is shown elsewhere on the plans.

TAU-II-R (WIDE) SYSTEM LENGTHS			
SYSTEM WIDTH	TL-2	TL-3	70 mph
42"	15'-4"	29'-5"	32'-3"
48"	15'-4"	29'-5"	32'-3"
54"	15'-4"	29'-5"	32'-3"
60"	12'-5"	29'-5"	32'-3"
66"	12'-5"	26'-7"	29'-5"
72"	12'-5"	26'-7"	26'-7"
78"	12'-5"	26'-7"	26'-7"
84"	12'-5"	26'-7"	26'-7"
90"	12'-5"	26'-7"	26'-7"
96"	12'-5"	26'-7"	26'-7"
102"			26'-7"

Note: System Lengths are +/-2"



ENERGY ABSORBING ELEMENTS (EAE)

BACKUP SUPPORT OPTIONS
Wide Flange (Stand alone)

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
Asphalt over Concrete with Minimum 6" Embedment in Concrete

For steel placement in concrete foundations.
(See manufacturer's product manual)

TRANSITION OPTIONS
Vertical Wall
Concrete Traffic Barriers
W-Beam Guardrail
Thrie Beam Guardrail

For bi-directional transition panel and end shoe details.
(See manufacturer's product manual)

LOW MAINTENANCE

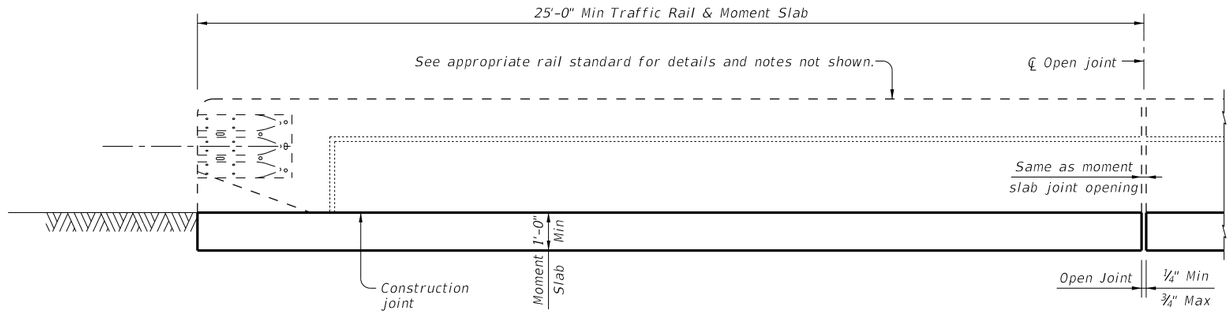
Texas Department of Transportation — Design Division Standard

LTS-BARRIER SYSTEMS CRASH CUSHION (R-WIDE)

TAU-II-R(W)-16

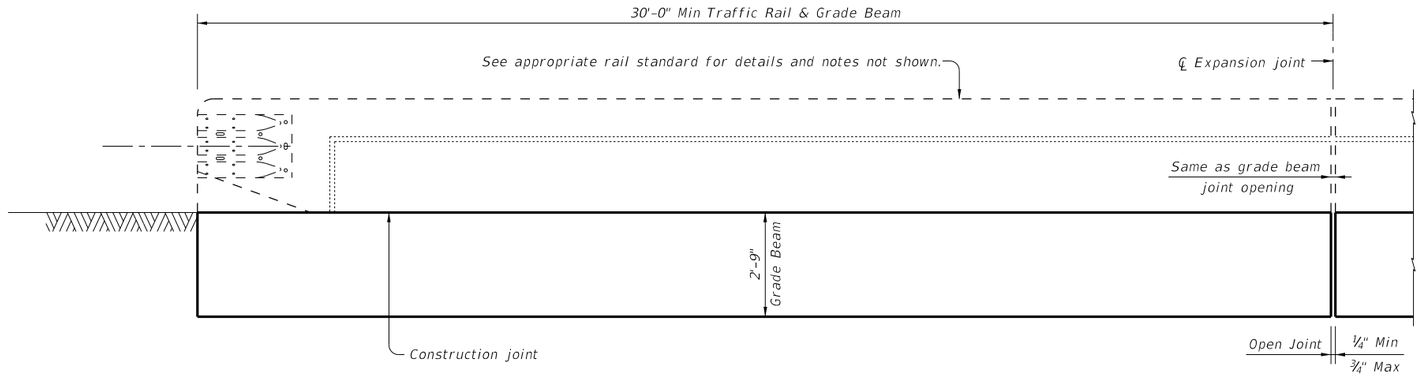
FILE: tauiirw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
REVISED 06,2013 (VP) REVISED 02,2016 (VP)	DIST		COUNTY	SHEET NO.
	FTW		TARRANT	87

DATE: 1/18/2023 1:28:34 PM
FILE: ...\Long Ave\894r1std027-20.dgn



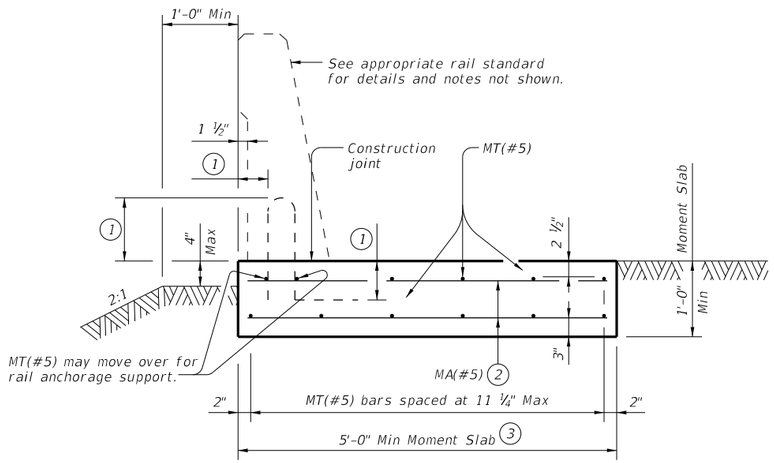
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



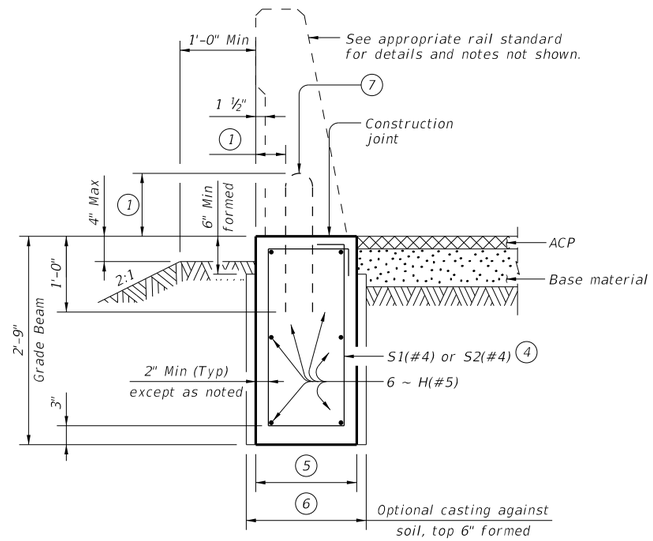
ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar.)



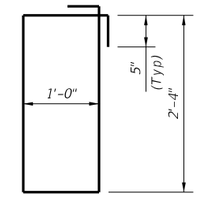
SECTION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar.)

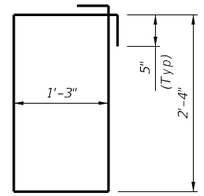
1. See applicable bridge rail standard.
2. MA(#5) space longitudinally along moment slab at 12" Max. (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.19 CY/LF and reinforcement = 22.4 LB/LF.
4. S1(#4) or S2(#4) spaced longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).
5. Use bar S1(#4) with 1'-4" grade beam width and bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.
   Approximate grade beam concrete = 0.14 CY/LF and reinforcement = 13.8 LB/LF.

   Use bar S2(#4) with 1'-7" grade beam width and bridge rail types: T66 and C66.
   Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.
6. 1'-6" for bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.

   1'-9" bridge rail types: T66 and C66.
7. Modify reinforcing on standard bridge rail anchorage if necessary by extending rail anchorage 12" Min, vertically into traffic rail



BARS S1(#4)



BARS S2(#4)

CONSTRUCTION NOTES:

Align moment slab (TRF-MS) or grade beam (TRF-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF-MS) or grade beam (TRF-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

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 required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for bars S1(#4), S2(#4) and H(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF-MS) or grade beam (TRF-GB) foundation that is acceptable for traffic rails which are MASH TL-2, TL-3, or TL-4 compliant.

See elsewhere in the plans for selected options between moment slab (TRF-MS) and/or grade beam (TRF-GB).

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modified as necessary to apply to specific installations required on the project.

Payment for moment slab (TRF-MS) and/or grade beam (TRF-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

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

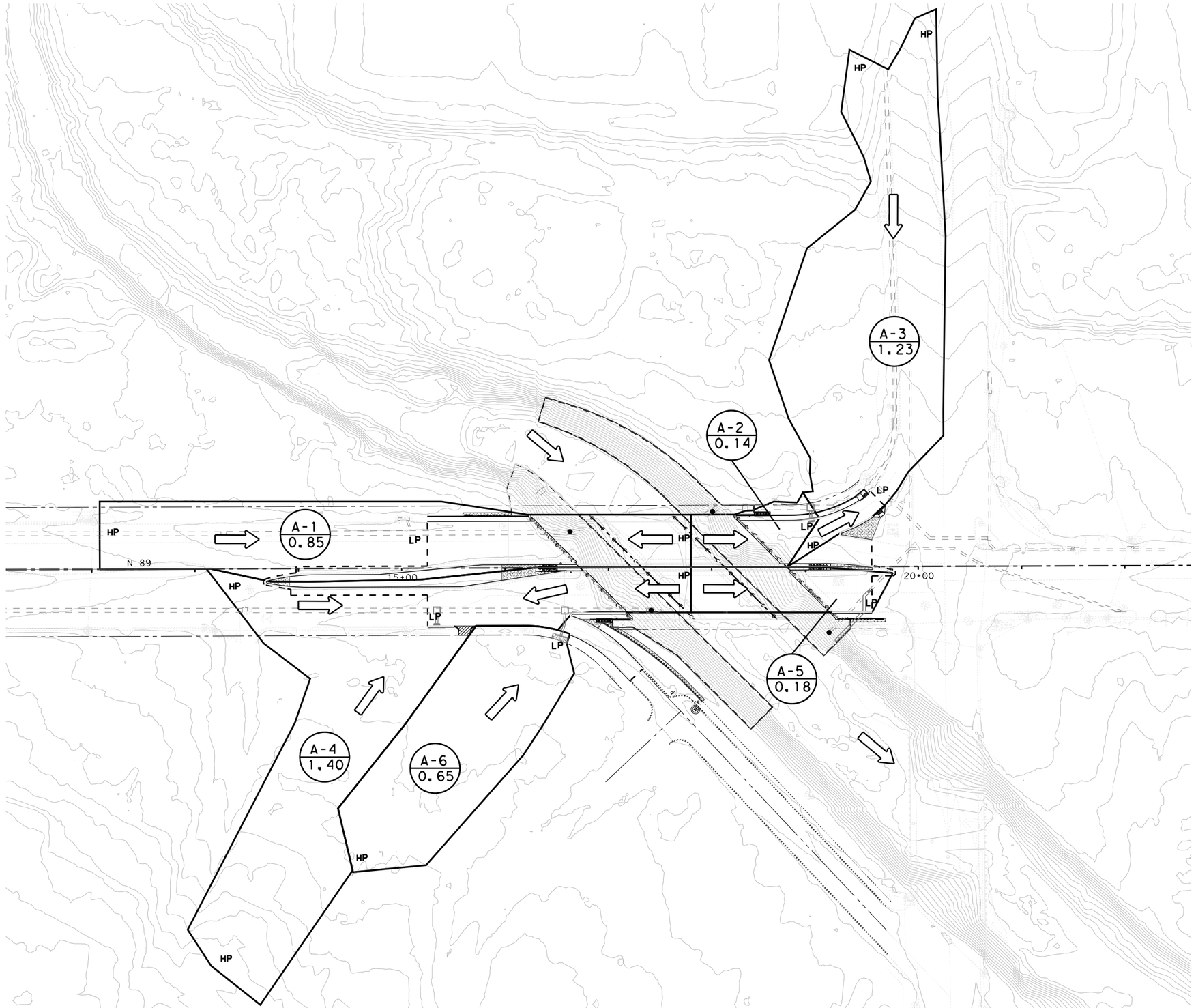
TRAFFIC RAIL FOUNDATIONS

FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

TRF

FILE: r1std027-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07-20: Added moment slab with rail foundation lengths.	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		88

TIME: 1:29:10 PM
DATE: 1/18/2023



0 50 100
SCALE IN FEET

— N —

LEGEND

XX / XXX	AREA NUMBER / AREA IN ACRES
▬▬	DRAINAGE AREA
⇨	DRAINAGE FLOW DIRECTION
●	SYSTEM OUTFALL
HP	HIGH POINT
LP	LOW POINT
——- -	EXIST R.O.W.

Jacobs Engineering Group
STATE OF TEXAS
ALEC J. PAGAN
134772
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/6/2023

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

Texas Department of Transportation

E. LONG AVENUE

ONSITE DRAINAGE AREA MAP

SCALE: 1' = 100' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
OLH	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
AJP	TEXAS	FTW	TARRANT	89
GRAPHICS	CONTROL	SECTION	JOB	
OLH	0902	48	894	
CHECK				
AJP				

FILE: ...\DR\Shr\894DAM.shr

TIME: 1:29:31 PM
DATE: 1/18/2023

RUNOFF COMPUTATIONS														
DRAINAGE AREA DESIGNATION	TOTAL AREA (ACRE)	PAVEMENT (ACRE) C=0.90	SF RESIDENTIAL (ACRE) C=0.50	GRASS (ACRE) C=0.35	Cw	Tc USED (MIN)	I10 (IN/HR)	Q10 (CFS)	I25 (IN/HR)	Q25 (CFS)	I50 (IN/HR)	Q50 (CFS)	I100 (IN/HR)	Q100 (CFS)
A-1	0.85	0.65	0.00	0.20	0.77	10.00	6.55	4.29	7.80	5.11	8.77	5.74	9.74	6.37
A-2	0.14	0.11	0.00	0.03	0.78	10.00	6.55	0.72	7.80	0.85	8.77	0.96	9.74	1.06
A-3	1.23	0.49	0.07	0.67	0.58	10.00	6.55	4.67	7.80	5.56	8.77	6.26	9.74	6.95
A-4	1.40	0.54	0.86	0.00	0.65	10.00	6.55	5.96	7.80	7.10	8.77	7.98	9.74	8.86
A-5	0.18	0.18	0.00	0.00	0.90	10.00	6.55	1.06	7.80	1.26	8.77	1.42	9.74	1.58
A-6	0.65	0.00	0.65	0.00	0.50	10.00	6.55	2.13	7.80	2.54	8.77	2.85	9.74	3.17

NOTES:
1. RUNOFF COMPUTATIONS HAVE BEEN PERFORMED ACCORDING TO TXDOT HYDRAULIC DESIGN MANUAL DATED SEPTEMBER 2019.
2. ACCORDING TO TXDOT HYDRAULIC DESIGN MANUAL (2019), INLETS FOR DEPRESSED ROADWAYS WERE DESIGNED FOR 25-YR STORM EVENT. ON-GRADE INLETS, DRAIN PIPES, AND ROADSIDE DITCHES WERE DESIGNED FOR 10-YR STORM. ADDITIONAL 50-YR AND 100-YR VALUES WERE PROVIDED AS A CHECK.

INLET COMPUTATIONS (10-YR)																	
INLET ID	INLET TYPE	REFERENCE ALIGNMENT	STATION	OFFSET (FT)	DISCHARGE (CFS)	INLET BYPASS (CFS)	BYPASS TO	INLET CURB LENGTH	MAXIMUM PONDED WIDTH (FT)	COMPUTED PONDED WIDTH (FT)	COMPUTED PONDED DEPTH (FT)	MAXIMUM PONDED DEPTH (FT)	INLET PROFILE TYPE	GRATE PERIMETER	GRATE AREA	LONGITUDINAL SLOPE (%)	PAVEMENT CROSS SLOPE (%)
E-01	PCU15-5x5	CL LONG AVE	18+96.44	-45.55	0.72	0	EXIST CURB INLET	14	9	7.43	0.09	0.50	ON GRADE	15	12.50	1.60	1.20
W-01	PCU15-5x5	CL LONG AVE	15+33.78	56.00	5.96	N/A	N/A	14	26	10.78	0.23	0.50	SAG	15	12.50	N/A	2.02

INLET COMPUTATIONS (25-YR)																	
INLET ID	INLET TYPE	REFERENCE ALIGNMENT	STATION	OFFSET (FT)	DISCHARGE (CFS)	INLET BYPASS (CFS)	BYPASS TO	INLET CURB LENGTH	MAXIMUM PONDED WIDTH (FT)	COMPUTED PONDED WIDTH (FT)	COMPUTED PONDED DEPTH (FT)	MAXIMUM PONDED DEPTH (FT)	INLET PROFILE TYPE	GRATE PERIMETER	GRATE AREA	LONGITUDINAL SLOPE	PAVEMENT CROSS SLOPE (%)
E-01	PCU15-5x5	CL LONG AVE	18+96.44	-45.55	0.85	0	EXIST CURB INLET	14	9	7.91	0.09	0.50	ON GRADE	15	12.50	1.60	1.20
W-01	PCU15-5x5	CL LONG AVE	15+33.78	56.00	7.10	N/A	N/A	14	26	12.09	0.25	0.50	SAG	15	12.50	N/A	2.02

INLET COMPUTATIONS (50-YR)																	
INLET ID	INLET TYPE	REFERENCE ALIGNMENT	STATION	OFFSET (FT)	DISCHARGE (CFS)	INLET BYPASS (CFS)	BYPASS TO	INLET CURB LENGTH	MAXIMUM PONDED WIDTH (FT)	COMPUTED PONDED WIDTH (FT)	COMPUTED PONDED DEPTH (FT)	MAXIMUM PONDED DEPTH (FT)	INLET PROFILE TYPE	GRATE PERIMETER	GRATE AREA	LONGITUDINAL SLOPE	PAVEMENT CROSS SLOPE (%)
E-01	PCU15-5x5	CL LONG AVE	18+96.44	-45.55	0.96	0	EXIST CURB INLET	14	9	8.28	0.10	0.50	ON GRADE	15	12.50	1.60	1.20
W-01	PCU15-5x5	CL LONG AVE	15+33.78	56.00	7.98	N/A	N/A	14	26	13.05	0.27	0.50	SAG	15	12.50	N/A	2.02

INLET COMPUTATIONS (100-YR)																	
INLET ID	INLET TYPE	REFERENCE ALIGNMENT	STATION	OFFSET (FT)	DISCHARGE (CFS)	INLET BYPASS (CFS)	BYPASS TO	INLET CURB LENGTH	MAXIMUM PONDED WIDTH (FT)	COMPUTED PONDED WIDTH (FT)	COMPUTED PONDED DEPTH (FT)	MAXIMUM PONDED DEPTH (FT)	INLET PROFILE TYPE	GRATE PERIMETER	GRATE AREA	LONGITUDINAL SLOPE	PAVEMENT CROSS SLOPE (%)
E-01	PCU15-5x5	CL LONG AVE	18+96.44	-45.55	1.06	0	EXIST CURB INLET	14	9	8.59	0.10	0.50	ON GRADE	15	12.50	1.60	1.20
W-01	PCU15-5x5	CL LONG AVE	15+33.78	56.00	8.86	N/A	N/A	14	26	13.98	0.29	0.50	SAG	15	12.50	N/A	2.02

PIPE COMPUTATIONS (10-YR)													
LINK ID	START NODE	STOP NODE	DISCHARGE (CFS)	CAPACITY (CFS)	LENGTH (FT)	PIPE SIZE	INVERT UPSTREAM (FT)	INVERT DOWNSTREAM (FT)	PIPE SLOPE (%)	DOWNSTREAM DEPTH (FT)	HGL UPSTREAM (FT)	HGL DOWNSTREAM (FT)	VELOCITY (FPS)
LINE E-01	INLET E-01	MH E-01	0.72	43.36	8.13	24" DIA. CIRCULAR	557.22	557.00	2.70	0.19	557.68	557.19	4.63
LINE E-02	EXIST 27" RCP	27" SET OUTFALL	43.70	60.51	62	27" DIA. CIRCULAR	553.64	551.90	2.81	2.25	559.94	553.62	11.80 *
LINE W-01	INLET W-01	MH W-01	5.96	34.77	13.86	24" DIA. CIRCULAR	555.10	554.86	1.74	0.67	556.34	555.53	6.45
LINE W-02	HW W-02	MH W-02	2.13	17.32	24.71	18" DIA. CIRCULAR	557.38	556.89	2.00	0.40	557.73	557.29	5.55

PIPE COMPUTATIONS (25-YR)													
LINK ID	START NODE	STOP NODE	DISCHARGE (CFS)	CAPACITY (CFS)	LENGTH (FT)	PIPE SIZE	INVERT UPSTREAM (FT)	INVERT DOWNSTREAM (FT)	PIPE SLOPE (%)	DOWNSTREAM DEPTH (FT)	HGL UPSTREAM (FT)	HGL DOWNSTREAM (FT)	VELOCITY (FPS)
LINE E-01	INLET E-01	MH E-01	0.85	43.36	8.13	24" DIA. CIRCULAR	557.22	557.00	2.70	0.21	557.71	557.21	4.78
LINE W-01	INLET W-01	MH W-01	7.10	34.77	13.86	24" DIA. CIRCULAR	555.10	554.86	1.74	1.43	556.48	556.29	6.99
LINE W-02	HW W-02	MH W-02	2.54	17.32	24.71	18" DIA. CIRCULAR	557.38	556.89	2.00	0.45	558.24	557.33	5.75

PIPE COMPUTATIONS (50-YR)													
LINK ID	START NODE	STOP NODE	DISCHARGE (CFS)	CAPACITY (CFS)	LENGTH (FT)	PIPE SIZE	INVERT UPSTREAM (FT)	INVERT DOWNSTREAM (FT)	PIPE SLOPE (%)	DOWNSTREAM DEPTH (FT)	HGL UPSTREAM (FT)	HGL DOWNSTREAM (FT)	VELOCITY (FPS)
LINE E-01	INLET E-01	MH E-01	0.96	43.36	8.13	24" DIA. CIRCULAR	557.22	557.00	2.70	0.23	557.73	557.23	4.93
LINE W-01	INLET W-01	MH W-01	7.98	34.77	13.86	24" DIA. CIRCULAR	555.10	554.86	1.74	1.54	556.59	556.40	7.26
LINE W-02	HW W-02	MH W-02	2.85	17.32	24.71	18" DIA. CIRCULAR	557.38	556.89	2.00	0.48	558.30	557.36	5.90

PIPE COMPUTATIONS (100-YR)													
LINK ID	START NODE	STOP NODE	DISCHARGE (CFS)	CAPACITY (CFS)	LENGTH (FT)	PIPE SIZE	INVERT UPSTREAM (FT)	INVERT DOWNSTREAM (FT)	PIPE SLOPE (%)	DOWNSTREAM DEPTH (FT)	HGL UPSTREAM (FT)	HGL DOWNSTREAM (FT)	VELOCITY (FPS)
LINE E-01	INLET E-01	MH E-01	1.06	43.36	8.13	24" DIA. CIRCULAR	557.22	557.00	2.70	0.24	557.76	557.24	5.03
LINE W-01	INLET W-01	MH W-01	8.86	34.77	13.86	24" DIA. CIRCULAR	555.10	554.86	1.74	0.90	556.86	555.76	7.46
LINE W-02	HW W-02	MH W-02	3.17	17.32	24.71	18" DIA. CIRCULAR	557.38	556.89	2.00	0.52	558.36	557.39	6.05

* PIPE COMPUTATIONS WERE EVALUATED USING DATA FROM AS-BUILT FOR THE EXISTING STORM SEWER SYSTEM

Alec Pagan
Jacobs Engineering Group
STATE OF TEXAS
ALEC J. PAGAN
134772
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/6/2023

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

Texas Department of Transportation

E. LONG AVENUE

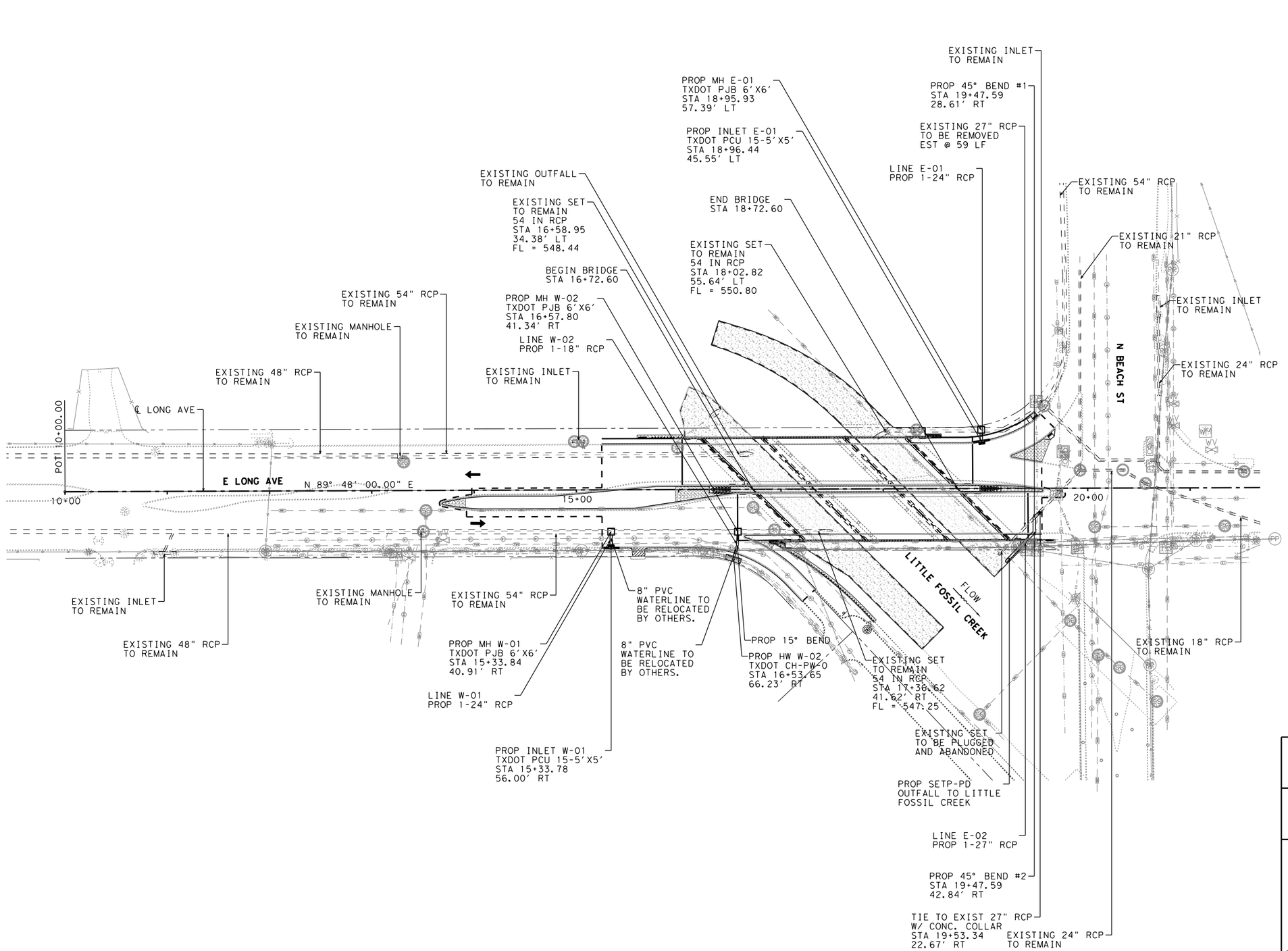
DRAINAGE COMPUTATIONS

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

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
OLH	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
AJP	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	90
OLH	0902	48	894	
CHECK				
AJP				

FILE: ...\DR\Sht\894DRCOMP.sht

TIME: 1:29:52 PM
DATE: 1/18/2023



NOTES:

1. PIPE LENGTHS SHOWN ARE PAY LENGTHS. PIPE SLOPES ARE BASED ON CENTER-TO-CENTER LENGTHS WHICH ARE SHOWN ON THE COMPUTATION SHEETS.
2. PIPES ARE CLASS III, UNLESS NOTED ON THE PROFILE.
3. UTILITIES INFORMATION PROVIDED BY OTHERS. CONTRACTOR TO DETERMINE/VERIFY LOCATION AND ELEVATION OF EXISTING UTILITIES.
4. OFFSET FOR CURB INLETS IS TO FACE OF CURB. OFFSET FOR RAIL & GRATE INLETS IS TO FACE OF BARRIER. OFFSET FOR GRATE INLETS AND MANHOLES ARE TO CENTER OF STRUCTURE.
5. ALL STATIONS AND OFFSETS REFER TO ℄ LONG AVE UNLESS NOTED OTHERWISE.

Jacobs Engineering Group
STATE OF TEXAS
ALEC J. PAGAN
134772
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/6/2023

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

Texas Department of Transportation

E. LONG AVENUE

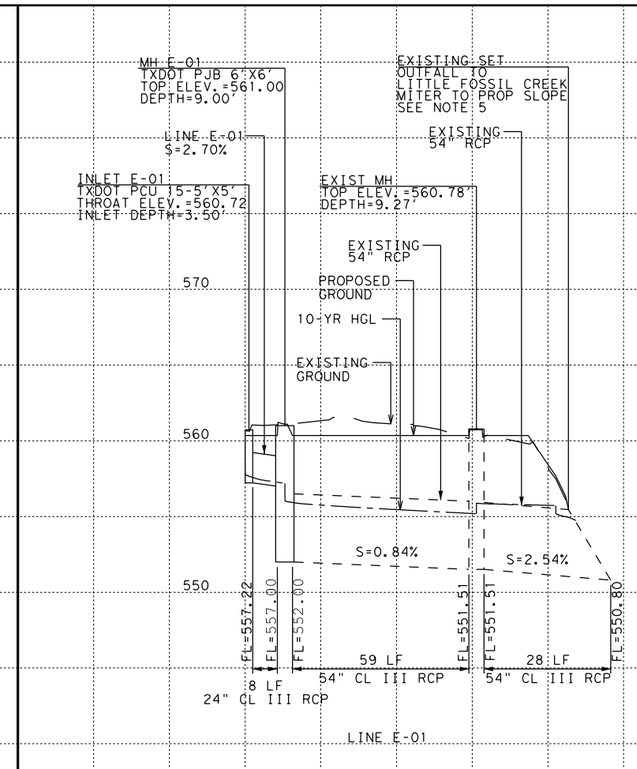
DRAINAGE PLAN

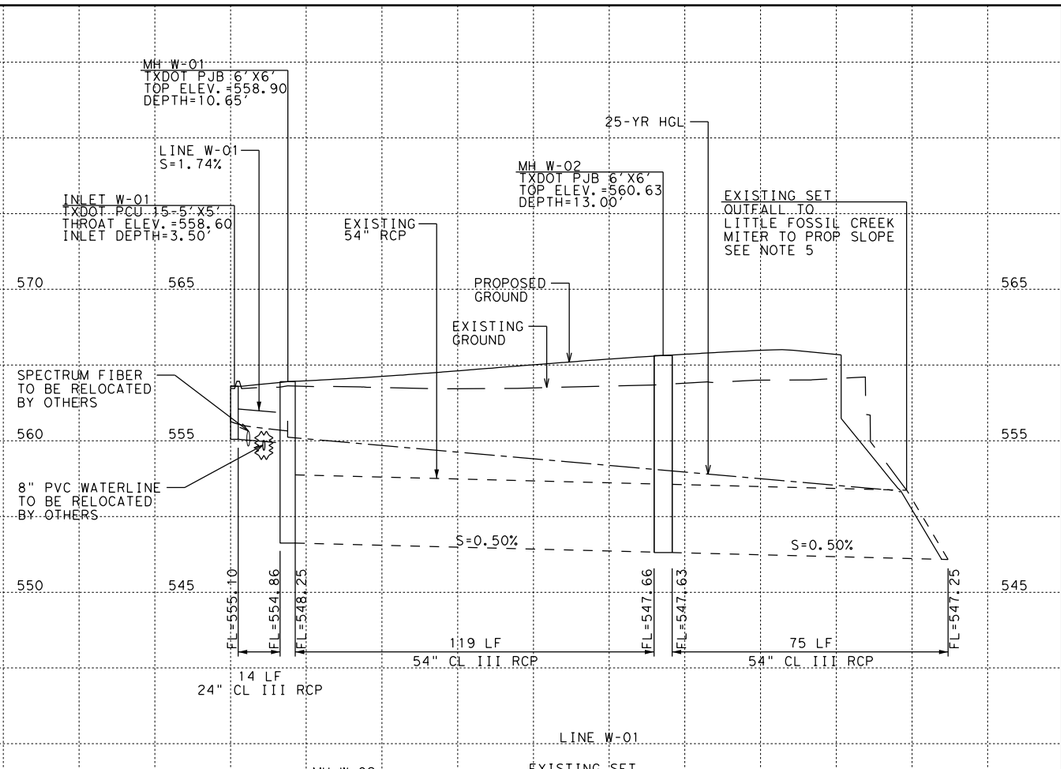
SCALE: 1" = 100' SHEET 1 OF 1

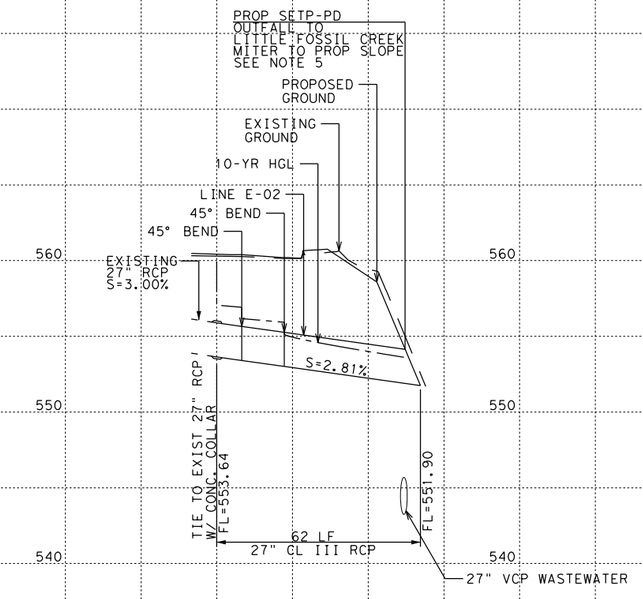
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
OLH	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
AJP	TEXAS	FTW	TARRANT	91
GRAPHICS	CONTROL	SECTION	JOB	
OLH	0902	48	894	
CHECK				
AJP				

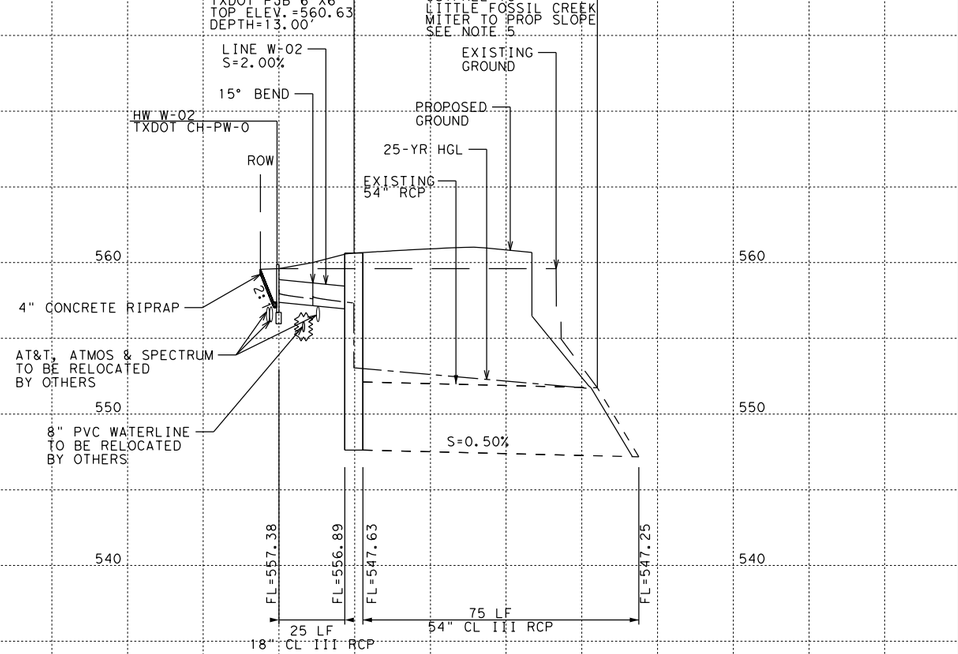
FILE: ...\DR\Sht\894DRPLAN.sht

TIME: 5:17:54 AM
DATE: 2/15/2023









0 25 50 (H)
0 5 10 (V)

NOTES:

1. PIPE LENGTHS SHOWN ARE PAY LENGTHS. PIPE SLOPES ARE BASED ON CENTER-TO-CENTER LENGTHS WHICH ARE SHOWN ON THE COMPUTATION SHEETS.
2. PIPES ARE CLASS III, UNLESS NOTED ON THE PROFILE.
3. UTILITIES INFORMATION OBTAINED FROM SUE. SEE EXISTING UTILITY LAYOUTS FOR MORE INFO. CONTRACTOR TO DETERMINE/VERIFY LOCATION AND ELEVATION OF EXISTING UTILITIES.
4. TOP ELEVATION FOR PCU INLETS IS THE GUTTER ELEVATION.
5. ALL PIPE CONNECTIONS AND SLOPE MITER ARE SUBSIDIARY TO PAY ITEM 464 6006. NO FURTHER COMPENSATION PROVIDED FOR LABOR, MATERIALS, OR EQUIPMENT REQUIRED.

02/15/2023

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

Texas Department of Transportation

E. LONG AVENUE

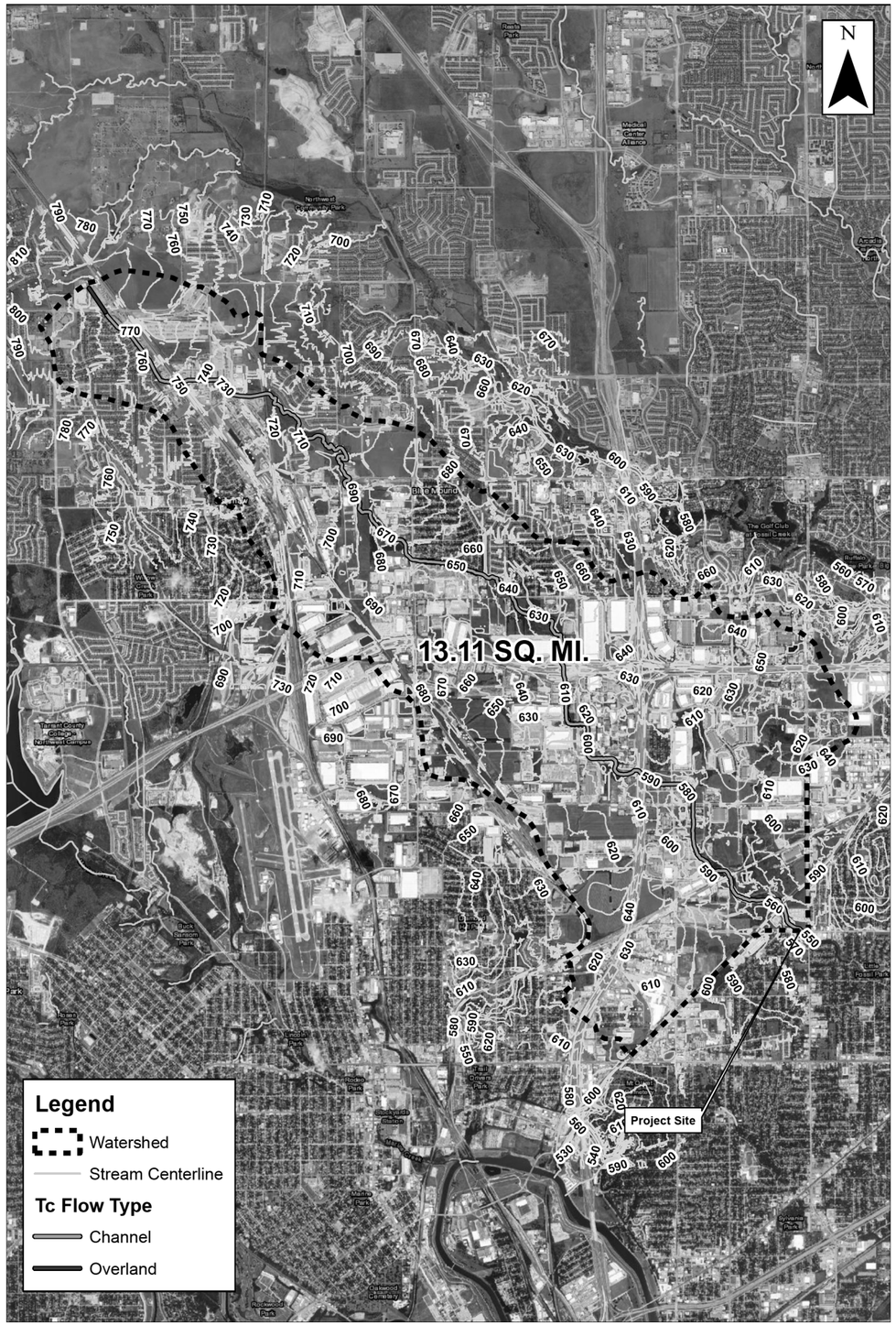
DRAINAGE PROFILE

SCALE: 1"=50' (H), 1"=10' (V) SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
OLH	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
AJP	TEXAS	FTW	TARRANT	92
GRAPHICS	CONTROL	SECTION	JOB	
OLH	0902	48	894	
CHECK				
AJP				

FILE: ...\DR\Shr\894DPROF.shr

TIME: 1:30:29 PM
DATE: 1/18/2023



DRAINAGE AREA MAP

HYDROLOGIC COMPUTATIONS

WATERSHED NAME	SOURCE	AREA (SQ MI)	TC (MIN)	LAG TIME (MIN)	CN	Q2	Q5	Q10	Q25	Q50	Q100	Q500
LITTLE FOSSIL CREEK (DA-01)	SCS 24-HR FLOWS	13.11	275	165	89	4119	5818	7129	8903	10268	11697	15353
	CURRENT FEMA EFFECTIVE FLOWS*	12.16	-	-	-	6007	8209	9750	12077	13680	15800	19070

*2-, 5-, 25-YEAR INTERPOLATED

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

NOTES:

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

REFERENCES:

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

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

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

Texas Department of Transportation

E. LONG AVENUE

BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JC	TEXAS	FTW	TARRANT	93
GRAPHICS	CONTROL	SECTION	JOB	
RS	0902	48	894	
CHECK				
JC				

FILE: ...\DR\Shr\894DHD01.shr

TIME: 1:31:00 PM
DATE: 1/18/2023

NOTES:

1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.

2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.

3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0195L. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.

4) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

5) THE DOWNSTREAM BOUNDARY CONDITIONS ARE ESTABLISHED USING KNOWN WSEL'S FROM THE EXISTING MODEL PROVIDED BY FEMA.

6) FEMA EFFECTIVE FLOWS WERE UTILIZED FOR THE DESIGN ANALYSIS. PROPOSED BRIDGE WAS DESIGNED TO MATCH EXISTING FLOW CONDITIONS OR BETTER.

NOTES CONTINUED:

7) FEMA EFFECTIVE 100-YR FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY WERE USED IN THIS STUDY TO VERIFY THAT THE FEMA CRITERIA WAS MET.

8) REFER TO THE H&H REPORT "HYDRAULIC REPORT FOR LITTLE FOSSIL CREEK" FOR ADDITIONAL INFORMATION.

9) THE CITY OF FORT WORTH FPA (CLAIR DAVIS) WILL BE PROVIDED A COPY OF THE FINAL DRAINAGE REPORT.

REFERENCES:

1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)

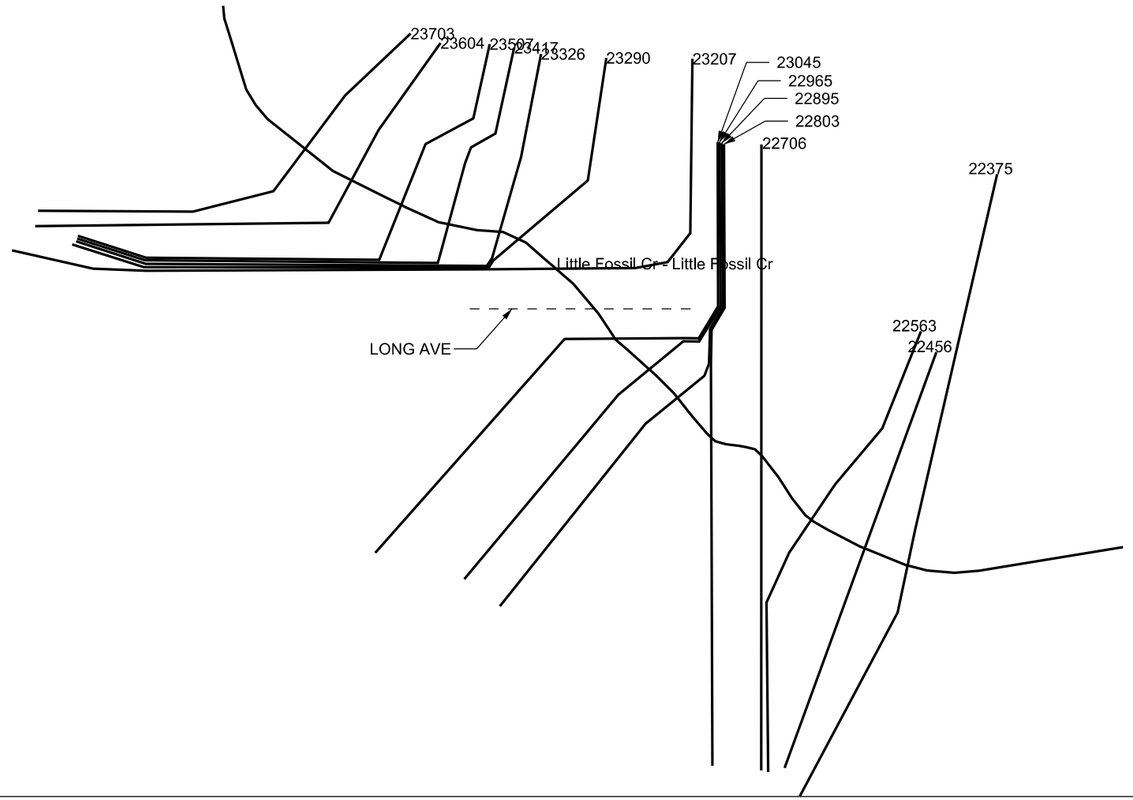
2) TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)

TIE-IN WSELS @ RS 22375

STORM FREQUENCY (YR)	2	5	10	25	50	100	500
KNOWN D/S/ WSEL (FT)*	555.04	555.80	556.16	557.13	557.89	558.54	559.38

*2-, 5-, 25-YEAR INTERPOLATED

CROSS-SECTION LOCATION KEY MAP



HYDRAULIC COMPUTATIONS

HEC-RAS RIVER STA	DESIGN FREQUENCY 10-YR						CHECK FREQUENCY 100-YR					
	FLOWS (CFS)	COMPUTED WATER SURFACE ELEVATION (FT)			VELOCITIES (FPS)		FLOWS (CFS)	COMPUTED WATER SURFACE ELEVATION (FT)			VELOCITIES (FPS)	
		CORR EFF	PROP	RISE	CORR EFF	PROP		CORR EFF	PROP	RISE	CORR EFF	PROP
23703	9750	562.12	562.12	0.00	11.61	11.61	15800	564.02	564.02	0.00	11.23	11.24
23604	9750	561.84	561.84	0.00	9.94	9.94	15800	563.85	563.85	0.00	9.49	9.50
23507	9750	560.77	560.77	0.00	10.79	10.78	15800	563.35	563.35	0.00	9.62	9.63
23417	9750	557.88	557.29	-0.59	13.04	14.15	15800	561.64	561.63	-0.01	12.70	12.73
23326	9750	558.70	558.37	-0.33	9.16	9.47	15800	562.12	562.11	-0.01	10.32	10.34
23290	9750	558.86	558.41	-0.45	8.25	9.12	15800	562.36	562.23	-0.13	9.01	9.61
23207 ROW	9750	559.09	558.79	-0.30	6.37	6.29	15800	562.50	562.52	0.02	7.60	7.22
23132	E LONG AVE BRIDGE											
23045 ROW	9750	558.12	558.08	-0.04	6.94	7.26	15800	560.85	560.79	-0.06	8.71	9.09
22965	9750	558.13	558.10	-0.03	6.59	6.84	15800	560.87	560.81	-0.06	8.36	8.67
22895	9750	558.17	558.17	0.00	6.08	6.08	15800	561.04	561.04	0.00	7.23	7.23
22803	9750	558.08	558.08	0.00	5.71	5.71	15800	560.97	560.97	0.00	6.68	6.68
22758	N BEACH ST BRIDGE											
22706	9750	556.66	556.66	0.00	6.79	6.79	15800	559.06	559.06	0.00	8.73	8.73
22563	9750	556.38	556.38	0.00	6.74	6.74	15800	558.90	558.90	0.00	7.78	7.78
22456	9750	556.18	556.18	0.00	6.69	6.69	15800	558.67	558.67	0.00	7.85	7.85
22375	9750	556.16	556.16	0.00	5.89	5.89	15800	558.54	558.54	0.00	7.50	7.50

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

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

Texas Department of Transportation

E. LONG AVENUE

BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S.

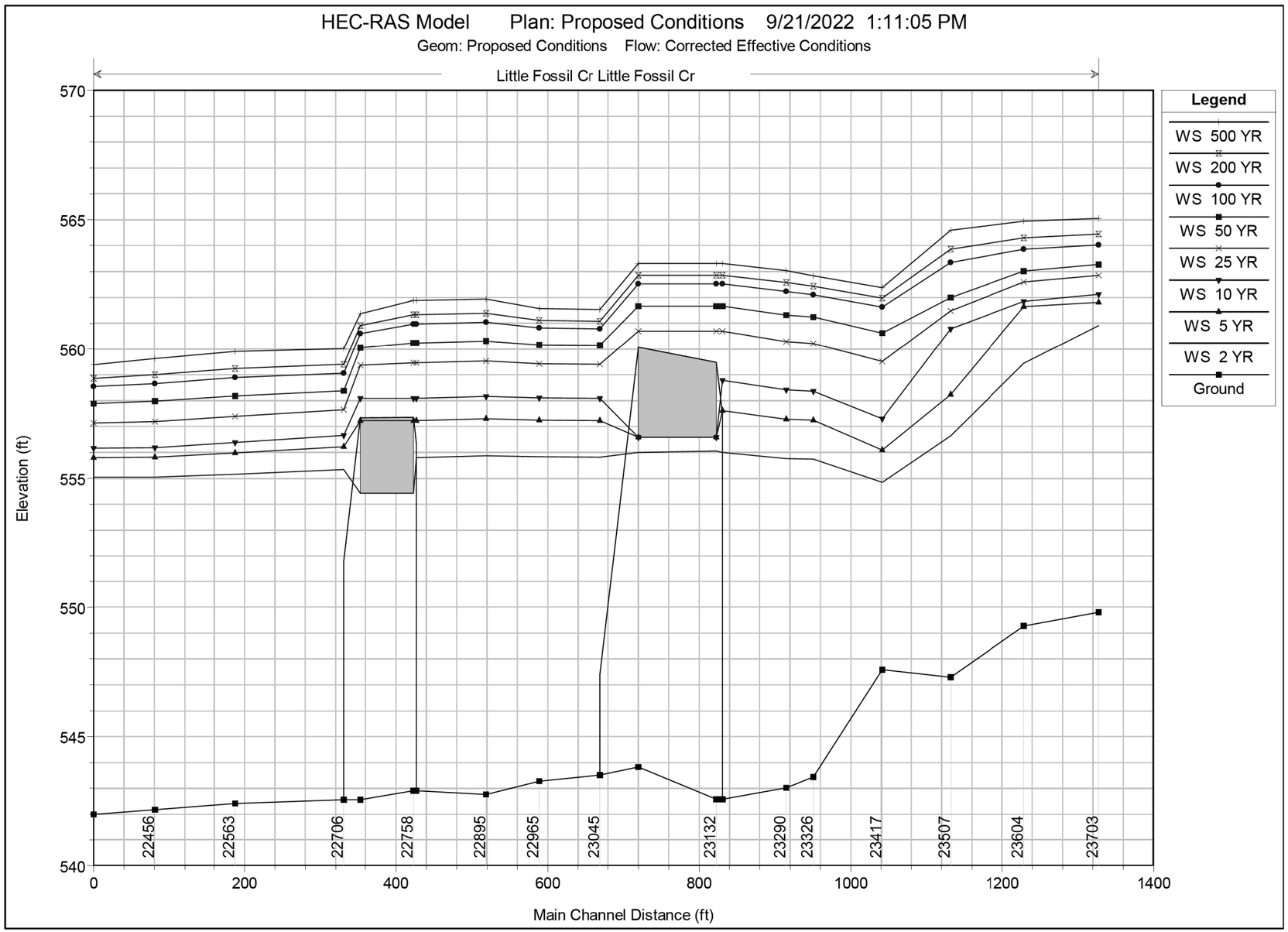
SHEET 2 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JC	TEXAS	FTW	TARRANT	94
GRAPHICS	CONTROL	SECTION	JOB	
RS	0902	48	894	
CHECK				
JC				

FILE: ...\DR\Shr\894DHD02.sht

TIME: 1:31:16 PM
DATE: 1/18/2023

PROPOSED DESIGN PROFILE LITTLE FOSSIL CREEK



REFERENCES:

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

NOTES:

1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.
3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0195L. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.
4) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
5) THE DOWNSTREAM BOUNDARY CONDITIONS ARE ESTABLISHED USING KNOWN WSEL'S FROM THE EXISTING MODEL PROVIDED BY FEMA.
6) FEMA EFFECTIVE FLOWS WERE UTILIZED FOR THE DESIGN ANALYSIS. PROPOSED BRIDGE WAS DESIGNED TO MATCH EXISTING FLOW CONDITIONS OR BETTER.
7) FEMA EFFECTIVE 100-YR FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY WERE USED IN THIS STUDY TO VERIFY THAT THE FEMA CRITERIA WAS MET.
8) REFER TO THE H&H REPORT "HYDRAULIC REPORT FOR LITTLE FOSSIL CREEK" FOR ADDITIONAL INFORMATION.
9) THE CITY OF FORT WORTH FPA (CLAIR DAVIS) WILL BE PROVIDED A COPY OF THE FINAL DRAINAGE REPORT.

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

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

Texas Department of Transportation

E. LONG AVENUE

BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 3 OF 6

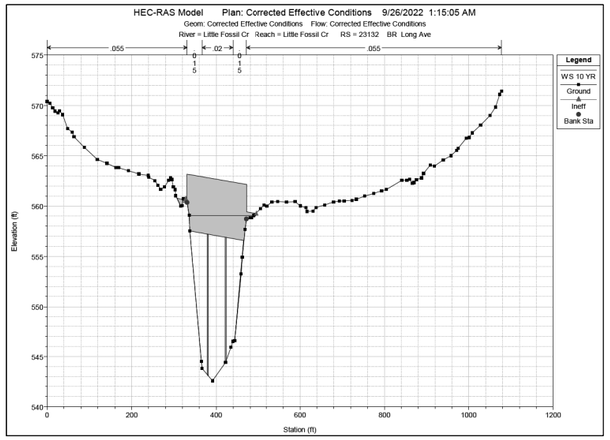
DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JC	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	95
RS				
CHECK	0902	48	894	
JC				

FILE: ...\DR\Shr\894DHD03.shr

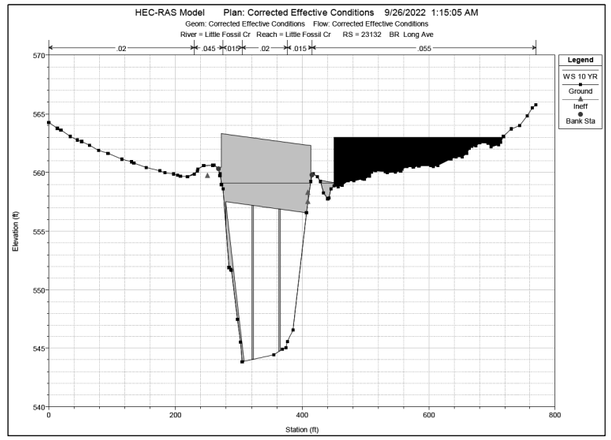
TIME: 1:31:42 PM
DATE: 1/18/2023

EXISTING DESIGN STREAM CROSS-SECTION LITTLE FOSSIL CREEK

HEC-RAS SECTION STA 23132 BR UPSTREAM



HEC-RAS SECTION STA 23132 BR DOWNSTREAM



REFERENCES:

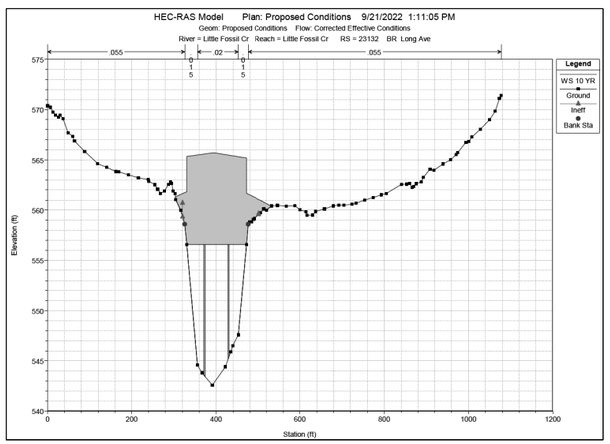
1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
2) TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)

NOTES:

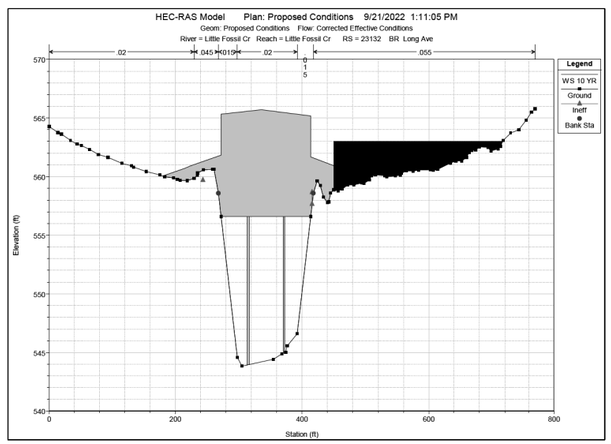
1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.
3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0195L. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.
4) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
5) THE DOWNSTREAM BOUNDARY CONDITIONS ARE ESTABLISHED USING KNOWN WSEL'S FROM THE EXISTING MODEL PROVIDED BY FEMA.
6) FEMA EFFECTIVE FLOWS WERE UTILIZED FOR THE DESIGN ANALYSIS. PROPOSED BRIDGE WAS DESIGNED TO MATCH EXISTING FLOW CONDITIONS OR BETTER.
7) FEMA EFFECTIVE 100-YR FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY WERE USED IN THIS STUDY TO VERIFY THAT THE FEMA CRITERIA WAS MET.
8) REFER TO THE H&H REPORT "HYDRAULIC REPORT FOR LITTLE FOSSIL CREEK" FOR ADDITIONAL INFORMATION.
9) THE CITY OF FORT WORTH FPA (CLAIR DAVIS) WILL BE PROVIDED A COPY OF THE FINAL DRAINAGE REPORT.

PROPOSED DESIGN STREAM CROSS-SECTION LITTLE FOSSIL CREEK

HEC-RAS SECTION STA 23132 BR UPSTREAM



HEC-RAS SECTION STA 23132 BR DOWNSTREAM



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

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

Texas Department of Transportation

E. LONG AVENUE

BRIDGE HYDRAULIC DATA SHEET

SCALE: N.T.S. SHEET 4 OF 6

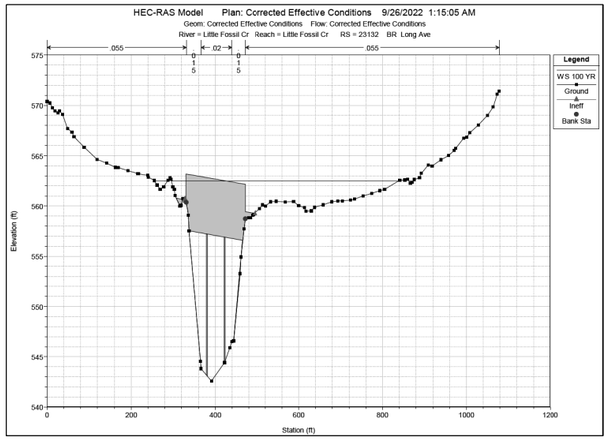
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JC	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	96
RS				
CHECK	0902	48	894	
JC				

FILE: ...\DR\Sht\894DHD04.sht

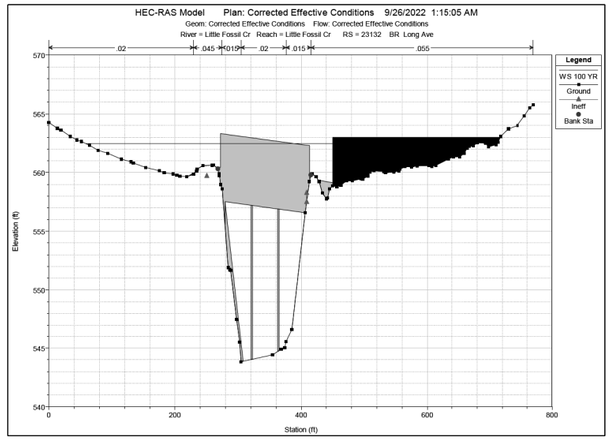
TIME: 1:32:02 PM
DATE: 1/18/2023

EXISTING CHECK STREAM CROSS-SECTION LITTLE FOSSIL CREEK

HEC-RAS SECTION STA 23132 BR UPSTREAM



HEC-RAS SECTION STA 23132 BR DOWNSTREAM



REFERENCES:

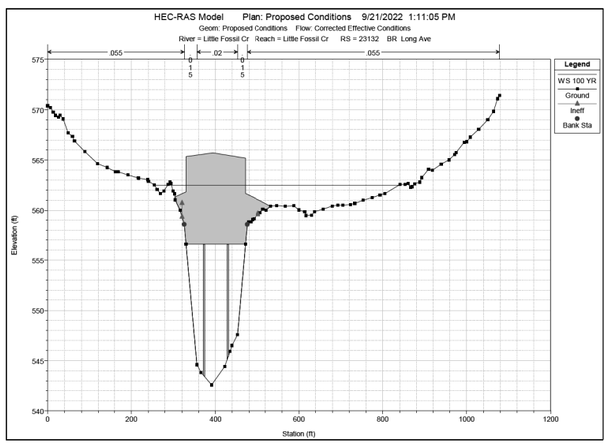
1) TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)
2) TOPOGRAPHIC DATA SOURCES (TNRIS & SURVEY SITE TOPO)

NOTES:

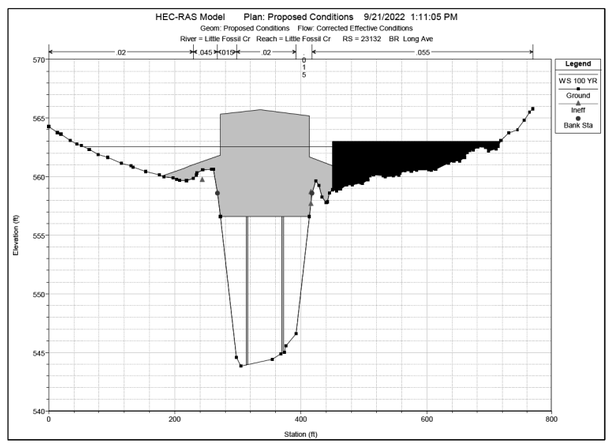
1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.
3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0195L. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.
4) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
5) THE DOWNSTREAM BOUNDARY CONDITIONS ARE ESTABLISHED USING KNOWN WSEL'S FROM THE EXISTING MODEL PROVIDED BY FEMA.
6) FEMA EFFECTIVE FLOWS WERE UTILIZED FOR THE DESIGN ANALYSIS. PROPOSED BRIDGE WAS DESIGNED TO MATCH EXISTING FLOW CONDITIONS OR BETTER.
7) FEMA EFFECTIVE 100-YR FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY WERE USED IN THIS STUDY TO VERIFY THAT THE FEMA CRITERIA WAS MET.
8) REFER TO THE H&H REPORT "HYDRAULIC REPORT FOR LITTLE FOSSIL CREEK" FOR ADDITIONAL INFORMATION.
9) THE CITY OF FORT WORTH FPA (CLAIR DAVIS) WILL BE PROVIDED A COPY OF THE FINAL DRAINAGE REPORT.

PROPOSED CHECK STREAM CROSS-SECTION LITTLE FOSSIL CREEK

HEC-RAS SECTION STA 23132 BR UPSTREAM



HEC-RAS SECTION STA 23132 BR DOWNSTREAM



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

E. LONG AVENUE

BRIDGE HYDRAULIC DATA SHEET

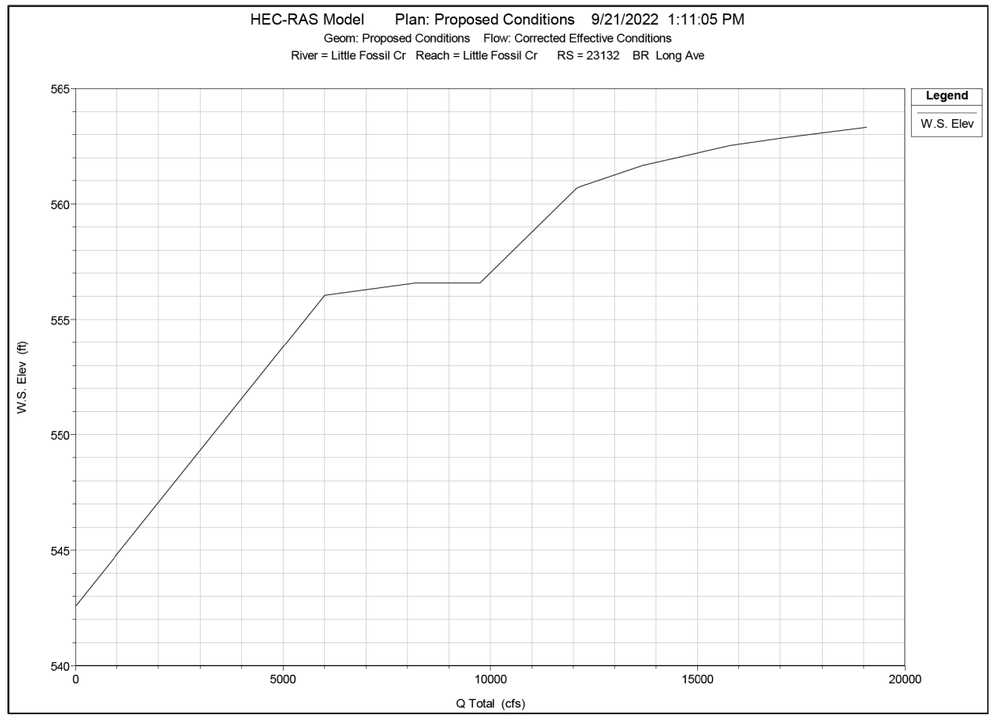
SCALE: N.T.S. SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JC	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	97
RS				
CHECK	0902	48	894	
JC				

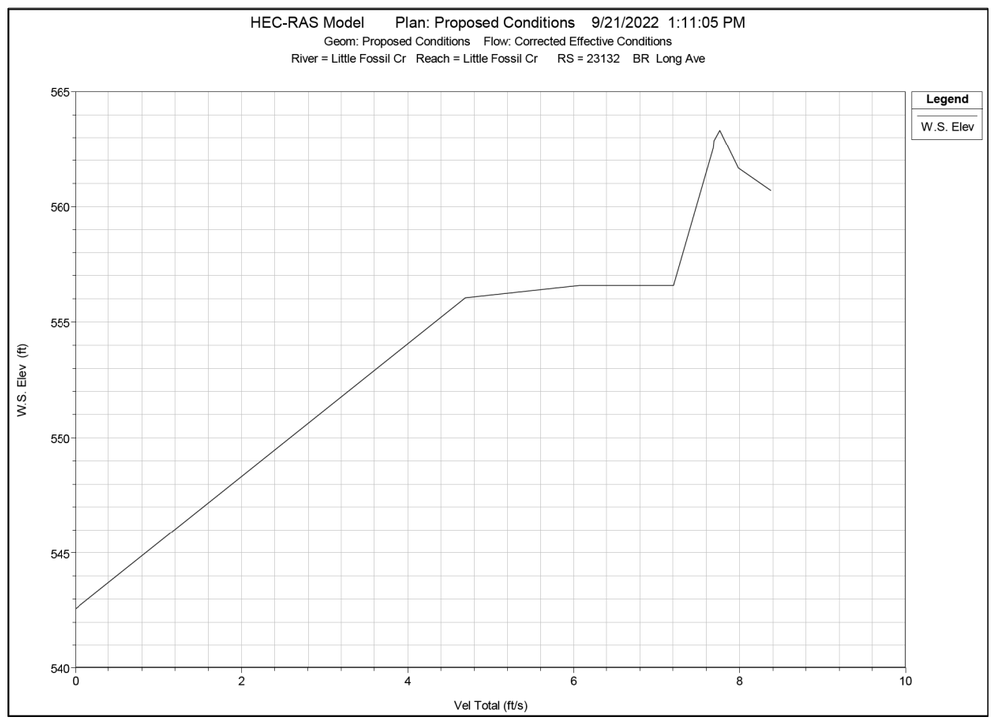
FILE: ...\DR\Sht\894DHD05.sht

TIME: 1:32:23 PM
DATE: 1/18/2023

CONVEYANCE CURVE @ RS 23132



VELOCITY CURVE @ RS 23132



REFERENCES:

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

NOTES:

1) USACE HEC-RAS VERSION 5.0.7 UTILIZED FOR THE ANALYSIS.
2) HEC-RAS MODELS WERE DEVELOPED FROM EXISTING MODELS PROVIDED BY FEMA AND WERE SUPPLEMENTED WITH PROJECT SURVEY DATA AS NEEDED.
3) THIS SITE IS DESIGNATED AS A ZONE "AE" AND FLOODWAY AS SHOWN IN PANELS 48439C0195L. 100-YEAR FLOODPLAIN WIDTHS ARE COMPARABLE.
4) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
5) THE DOWNSTREAM BOUNDARY CONDITIONS ARE ESTABLISHED USING KNOWN WSEL'S FROM THE EXISTING MODEL PROVIDED BY FEMA.
6) FEMA EFFECTIVE FLOWS WERE UTILIZED FOR THE DESIGN ANALYSIS. PROPOSED BRIDGE WAS DESIGNED TO MATCH EXISTING FLOW CONDITIONS OR BETTER.
7) FEMA EFFECTIVE 100-YR FLOWS FROM THE FEMA FIS 48439CV001B OF TARRANT COUNTY WERE USED IN THIS STUDY TO VERIFY THAT THE FEMA CRITERIA WAS MET.
8) REFER TO THE H&H REPORT "HYDRAULIC REPORT FOR LITTLE FOSSIL CREEK" FOR ADDITIONAL INFORMATION.
9) THE CITY OF FORT WORTH FPA (CLAIR DAVIS) WILL BE PROVIDED A COPY OF THE FINAL DRAINAGE REPORT.

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

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

Texas Department of Transportation

E. LONG AVENUE

BRIDGE HYDRAULIC DATA SHEET

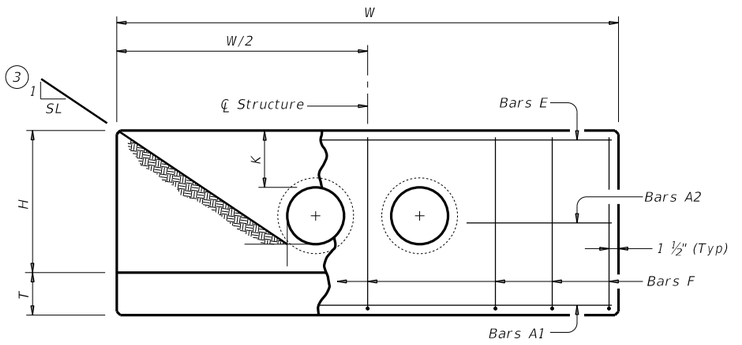
SCALE: N.T.S. SHEET 6 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
GD	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JC	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	98
RS				
CHECK	0902	48	894	
JC				

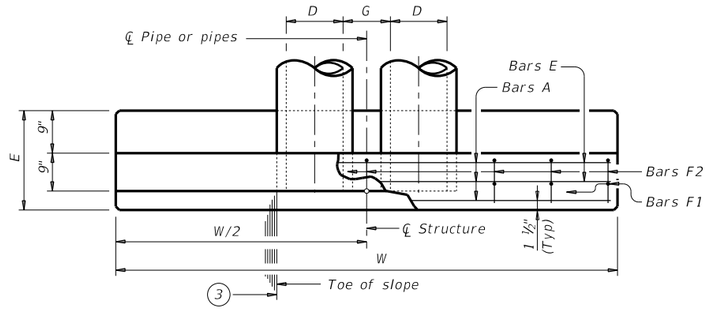
FILE: ...\DR\Sht\894DHD06.sht

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

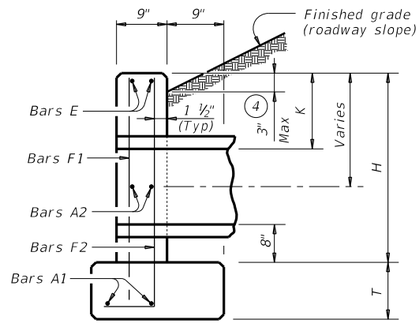
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	24"	14' – 0"	217	2.1	3' – 7"	34	0.4
	27"	15' – 3"	254	2.4	3' – 11"	37	0.5
	30"	16' – 6"	272	2.7	4' – 4"	40	0.6
	33"	17' – 9"	314	3.1	4' – 8"	43	0.6
	36"	19' – 0"	371	3.9	5' – 1"	46	0.8
	42"	21' – 6"	442	4.9	5' – 10"	52	1.0
	48"	25' – 0"	569	6.4	6' – 7"	59	1.3
	54"	27' – 6"	701	7.5	7' – 6"	82	1.6
	60"	30' – 0"	794	8.8	8' – 3"	90	1.8
	66"	32' – 6"	894	10.2	8' – 9"	96	2.0
	72"	35' – 0"	1,055	11.7	9' – 4"	103	2.3
3:1	12"	13' – 0"	175	1.6	1' – 9"	14	0.2
	15"	14' – 9"	193	1.9	2' – 2"	17	0.2
	18"	16' – 6"	228	2.2	2' – 8"	19	0.3
	21"	18' – 3"	299	2.6	3' – 1"	31	0.4
	24"	20' – 0"	323	3.0	3' – 7"	33	0.4
	27"	21' – 9"	371	3.5	3' – 11"	37	0.5
	30"	23' – 6"	415	4.0	4' – 4"	40	0.5
	33"	25' – 3"	469	4.6	4' – 8"	43	0.6
	36"	27' – 0"	556	5.7	5' – 1"	46	0.8
	42"	30' – 6"	675	7.1	5' – 10"	52	1.0
	48"	35' – 6"	837	9.2	6' – 7"	59	1.3
	54"	39' – 0"	1,015	11.0	7' – 6"	84	1.6
	60"	42' – 6"	1,171	12.9	8' – 3"	91	1.8
	66"	46' – 0"	1,298	14.9	8' – 9"	98	2.0
	72"	49' – 6"	1,561	17.1	9' – 4"	103	2.3
4:1	12"	17' – 0"	229	2.0	1' – 9"	15	0.2
	15"	19' – 3"	266	2.4	2' – 2"	17	0.2
	18"	21' – 6"	308	2.9	2' – 8"	19	0.3
	21"	23' – 9"	382	3.5	3' – 1"	31	0.3
	24"	26' – 0"	430	3.9	3' – 7"	34	0.4
	27"	28' – 3"	486	4.7	3' – 11"	37	0.5
	30"	30' – 6"	539	5.2	4' – 4"	40	0.6
	33"	32' – 9"	603	6.0	4' – 8"	42	0.6
	36"	35' – 0"	738	7.5	5' – 1"	47	0.8
	42"	39' – 6"	881	9.3	5' – 10"	52	1.0
	48"	46' – 0"	1,102	12.1	6' – 7"	61	1.3
	54"	50' – 6"	1,364	14.4	7' – 6"	84	1.6
	60"	55' – 0"	1,547	16.9	8' – 3"	91	1.8
	66"	59' – 6"	1,741	19.5	8' – 9"	98	2.0
	72"	64' – 0"	2,077	22.4	9' – 4"	102	2.3
6:1	12"	25' – 0"	336	3.0	1' – 9"	14	0.2
	15"	28' – 3"	384	3.6	2' – 2"	17	0.2
	18"	31' – 6"	452	4.2	2' – 8"	19	0.3
	21"	34' – 9"	581	5.1	3' – 1"	31	0.4
	24"	38' – 0"	644	5.8	3' – 7"	34	0.4
	27"	41' – 3"	737	6.9	3' – 11"	37	0.5
	30"	44' – 6"	807	7.7	4' – 4"	39	0.6
	33"	47' – 9"	912	8.9	4' – 8"	44	0.6
	36"	51' – 0"	1,108	11.0	5' – 1"	48	0.8
	42"	57' – 6"	1,318	13.7	5' – 10"	54	1.0
	48"	67' – 0"	1,682	17.9	6' – 7"	59	1.3
	54"	73' – 6"	2,072	21.3	7' – 6"	83	1.6
	60"	80' – 0"	2,351	24.9	8' – 3"	89	1.8
	66"	86' – 6"	2,643	28.9	8' – 9"	96	2.0
	72"	93' – 0"	3,121	33.1	9' – 4"	101	2.3



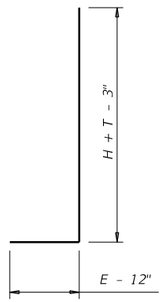
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

(1) Total quantities include one 3'-1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' – 9"	1' – 0"	2' – 8"	0' – 9"	1' – 9"
15"	0' – 11"	1' – 0"	2' – 11"	0' – 9"	1' – 9"
18"	1' – 2"	1' – 0"	3' – 2"	0' – 9"	1' – 9"
21"	1' – 4"	1' – 0"	3' – 5"	0' – 9"	2' – 0"
24"	1' – 7"	1' – 0"	3' – 8"	0' – 9"	2' – 0"
27"	1' – 8"	1' – 0"	3' – 11"	0' – 9"	2' – 3"
30"	1' – 10"	1' – 0"	4' – 2"	0' – 9"	2' – 3"
33"	1' – 11"	1' – 0"	4' – 5"	0' – 9"	2' – 6"
36"	2' – 1"	1' – 0"	4' – 8"	1' – 0"	2' – 6"
42"	2' – 4"	1' – 0"	5' – 2"	1' – 0"	2' – 9"
48"	2' – 7"	1' – 3"	5' – 11"	1' – 0"	3' – 0"
54"	3' – 0"	1' – 3"	6' – 5"	1' – 0"	3' – 3"
60"	3' – 3"	1' – 3"	6' – 11"	1' – 0"	3' – 6"
66"	3' – 3"	1' – 3"	7' – 5"	1' – 0"	3' – 9"
72"	3' – 4"	1' – 3"	7' – 11"	1' – 0"	4' – 0"

TABLE OF REINFORCING STEEL (6)

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

DATE: 1/18/2023 1:32:56 PM
FILE: ...\Long Ave\chpw0ste-20.dgn

Texas Department of Transportation

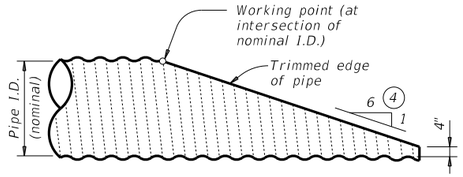
Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		99

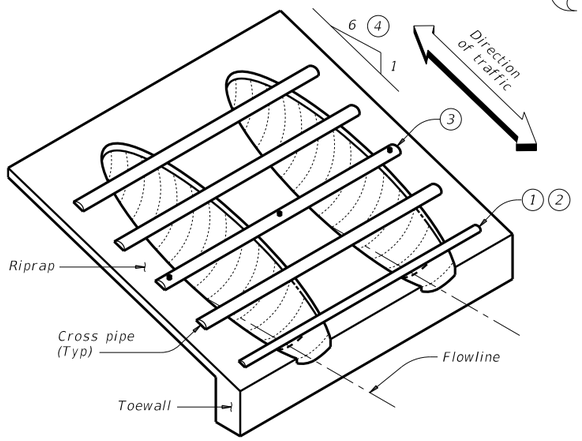
DATE: 1/18/2023 1:33:18 PM
FILE: ...\Long Ave\setppdse-20.dgn



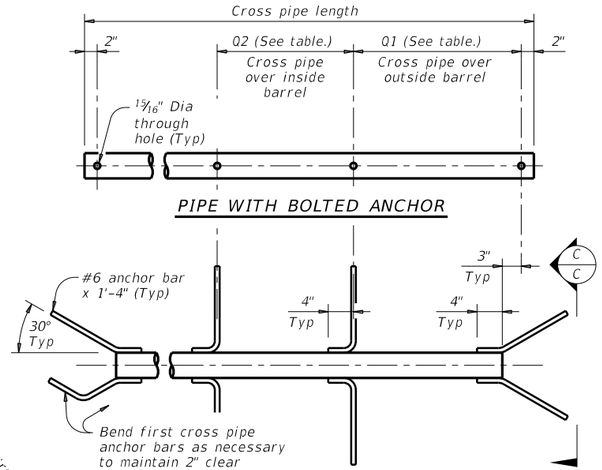
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)

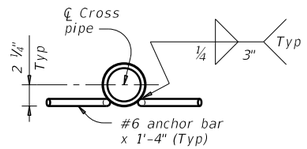


ISOMETRIC VIEW OF TYPICAL INSTALLATION



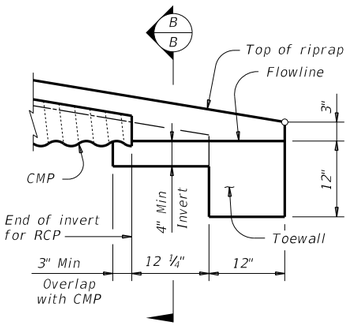
PIPE WITH BOLTED ANCHOR

PIPE WITH ANCHOR BARS



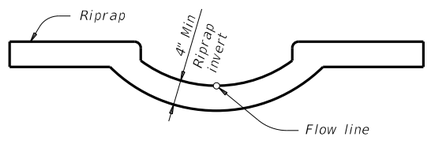
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

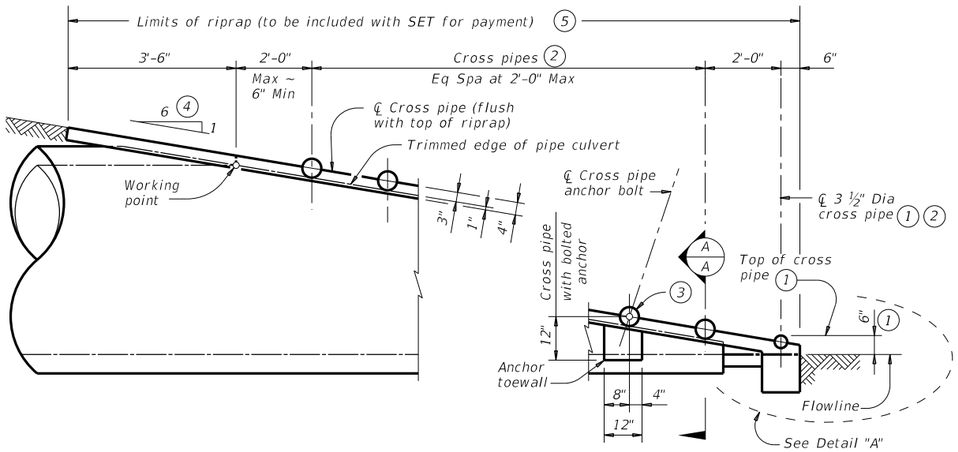
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

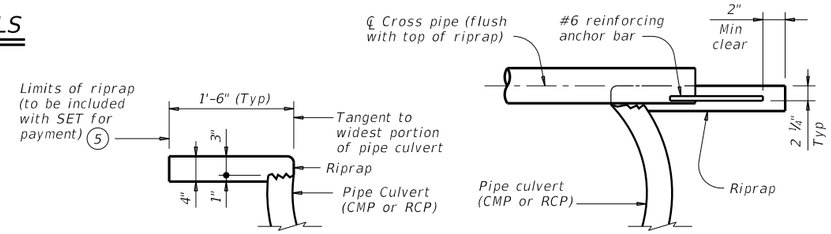
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

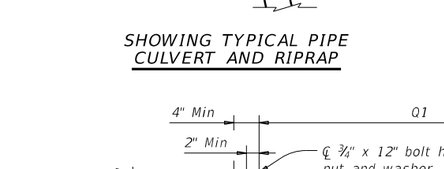


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

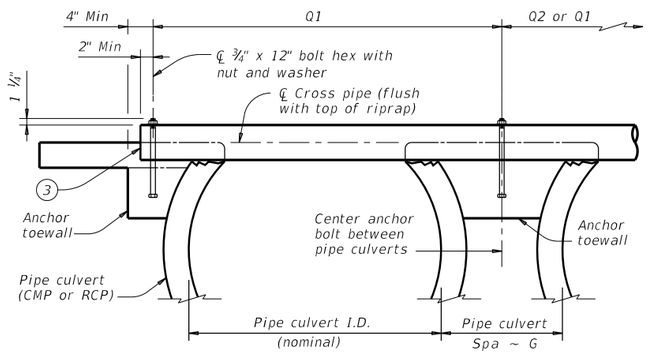
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

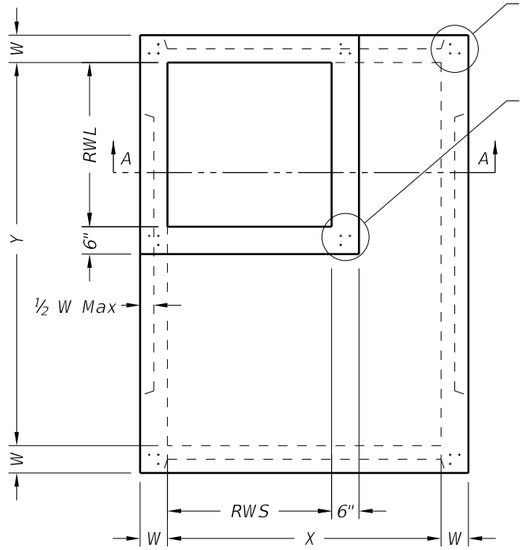
Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

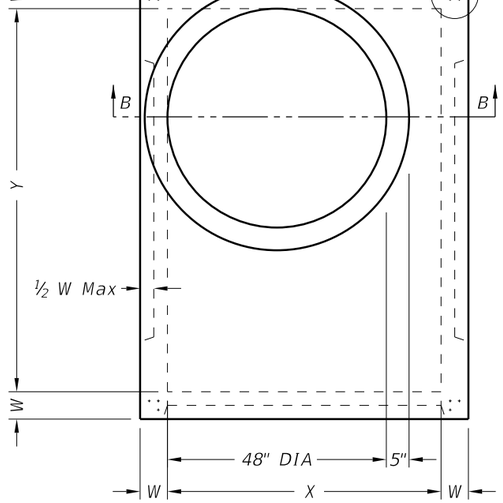
SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		100



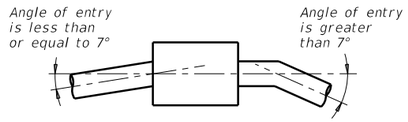
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



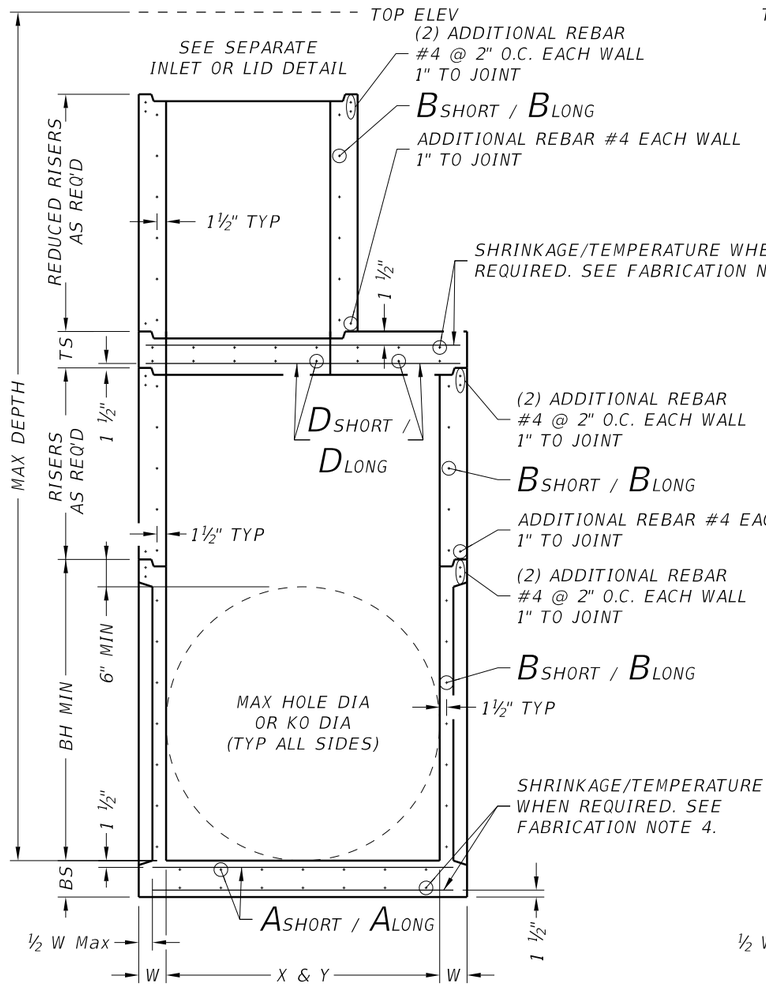
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



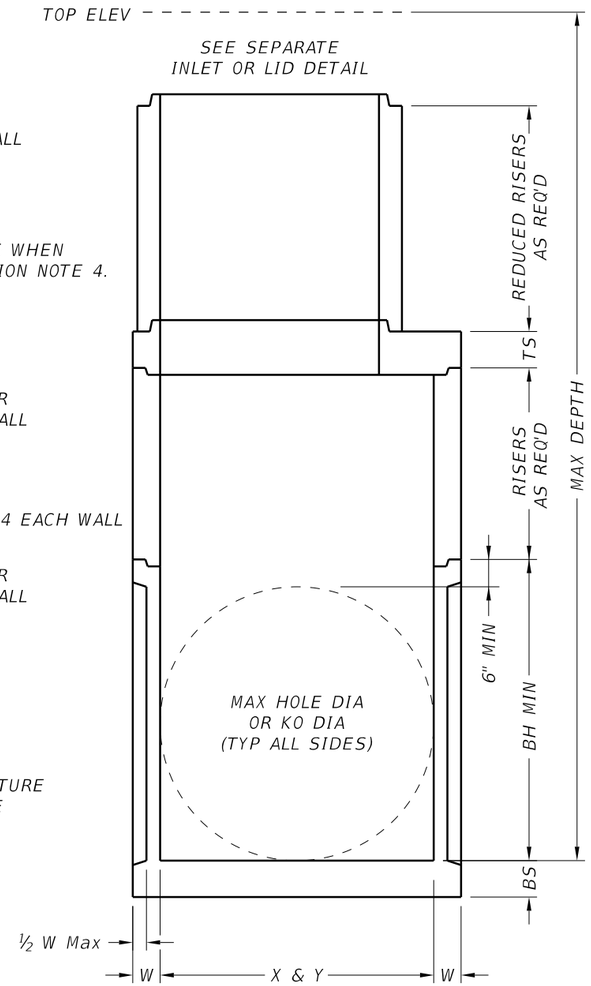
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved
approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

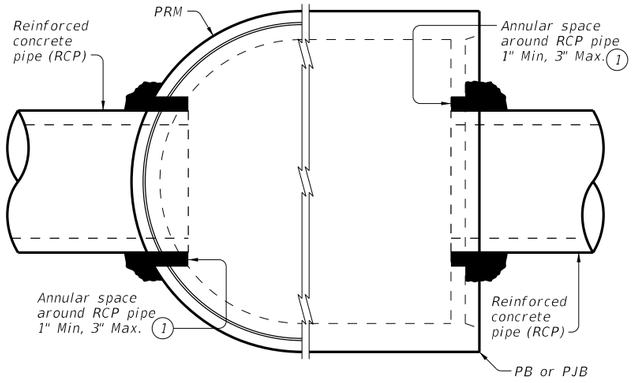
PRECAST BASE

PB

FILE: prestd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		101

DATE: 1/18/2023 1:33:39 PM
FILE: ...\Long Ave\prestd01-20.dgn

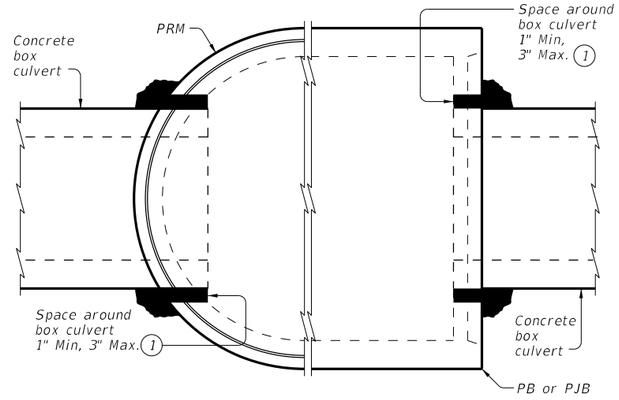
DATE: 1/18/2023 1:34:00 PM
FILE: ...\Long Ave\pbgcstd1-20.dgn



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

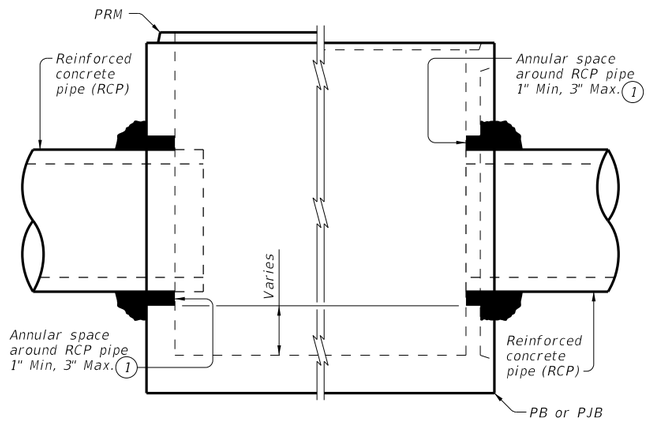
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

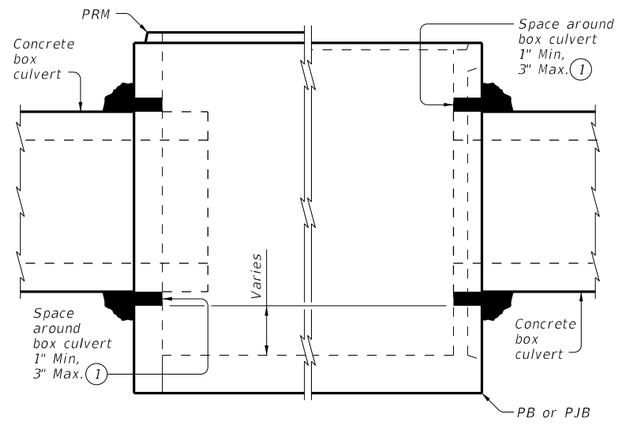
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

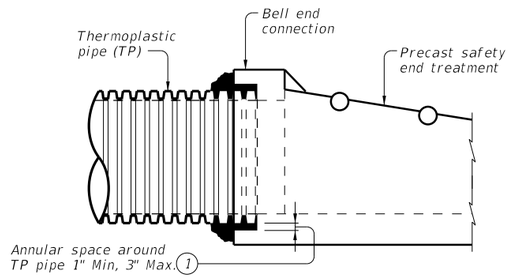
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

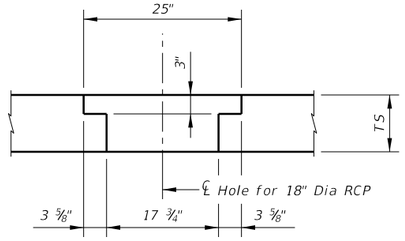
Texas Department of Transportation

Bridge Division Standard

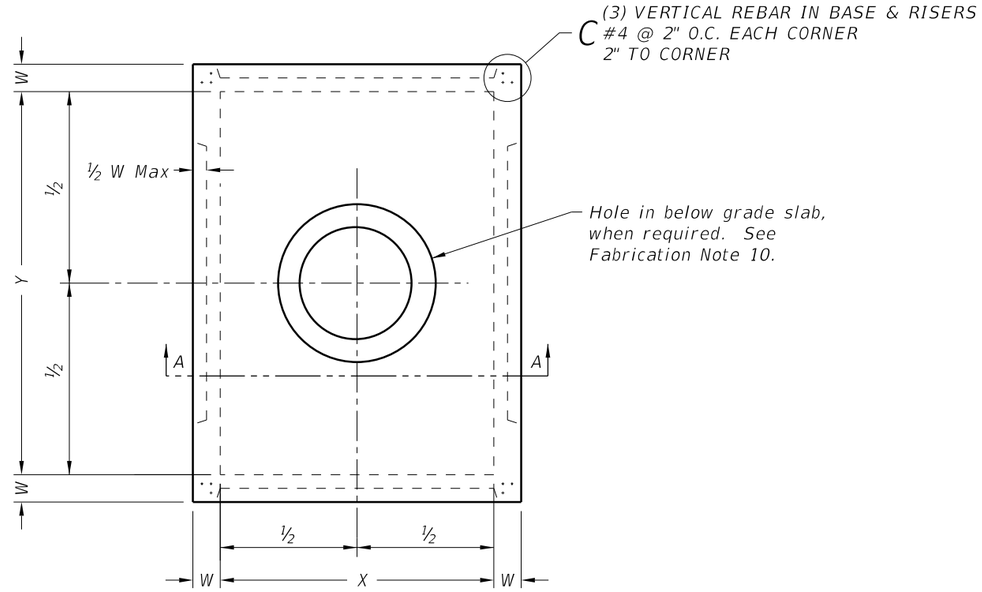
PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

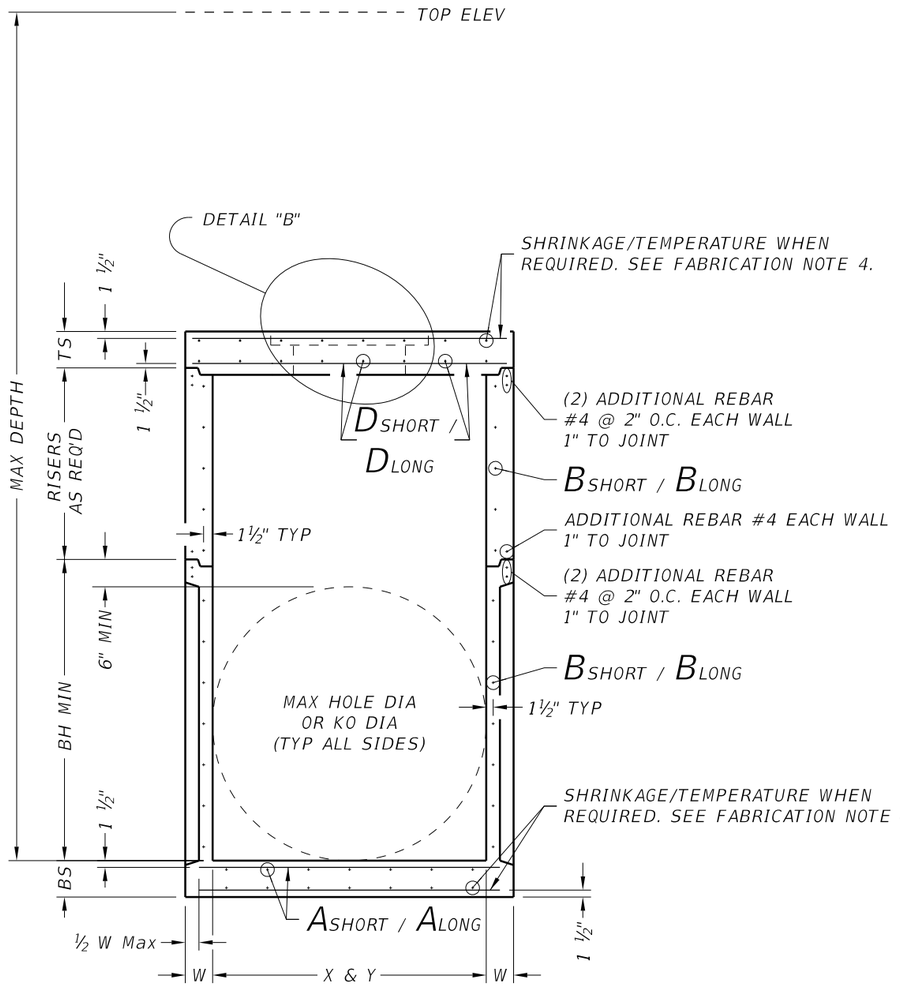
FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		102



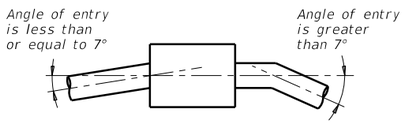
DETAIL "B"



PLAN VIEW



SECTION A-A



PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PJB wall. If necessary, use pipe elbow or curved approach alignment to stay within this limit.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.
10. Provide hole in below grade slab only when PJB is installed with inlet type POD.

INSTALLATION NOTES:

1. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to junction box.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for junction box is per Item 465 "Junction Boxes, Manholes, and Inlets" by type and size.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST JUNCTION BOX

PJB

FILE: prestd09-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		103

DATE: 1/18/2023 1:34:21 PM
FILE: ...\Long Ave\prestd09-20.dgn

	Size	MAX DEPTH = 15 ft. to top of BASE SLAB										MAX DEPTH = 25 ft. to top of BASE SLAB										Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
		Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)						
		Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness			
	X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA
	ft.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	ft.	in.	in.
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72

** Unless otherwise indicated.

FABRICATION NOTES:
1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

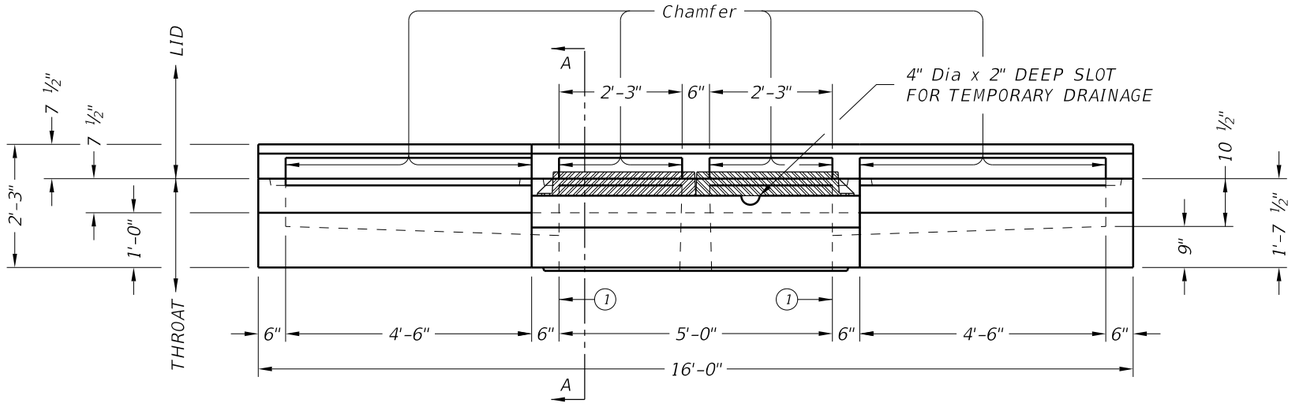
Texas Department of Transportation | Bridge Division Standard

DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX

PDD

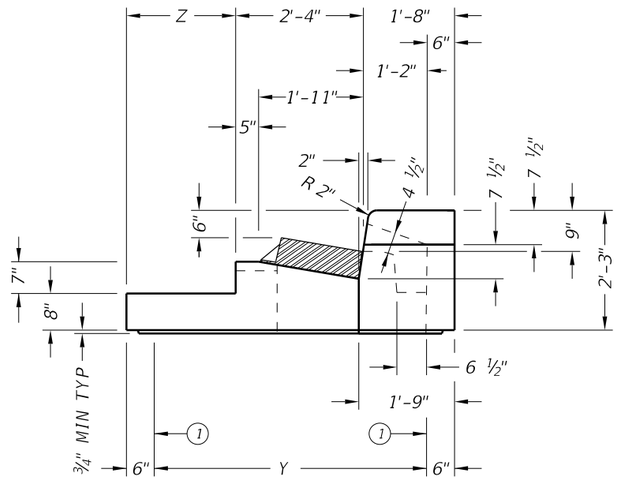
FILE: prestd10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		104

DATE: 1/18/2023 1:34:40 PM
FILE: ...\Long Ave\prestd10-20.dgn

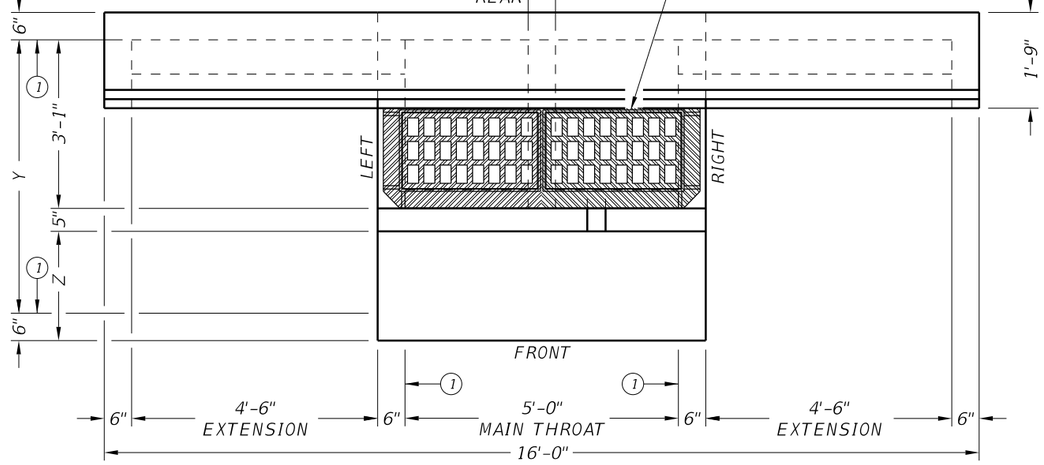


FRONT VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)



SECTION A-A



PLAN VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)

(1) Matches inside face of wall of precast base or riser below inlet.

HS20 LOADING SHEET 1 OF 2

Texas Department of Transportation

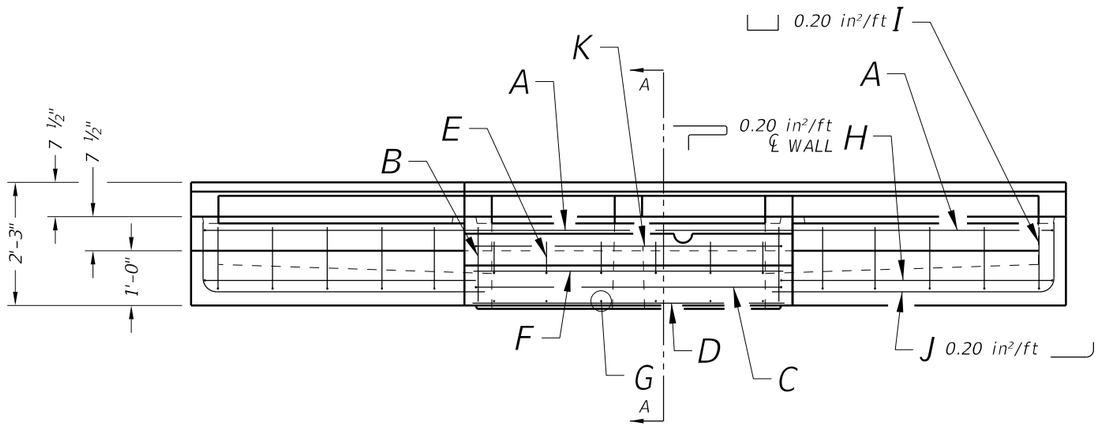
Bridge Division Standard

PRECAST CURB INLET UNDER ROADWAY

PCU

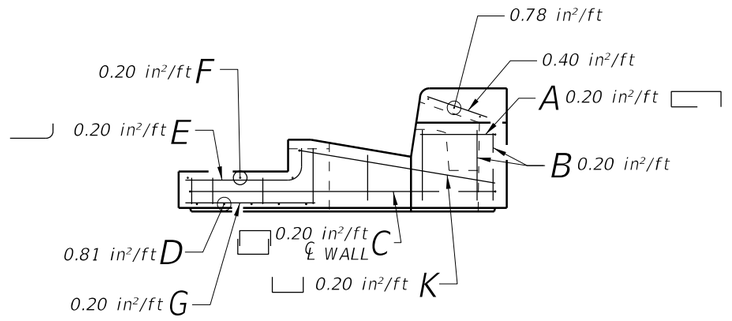
FILE: prestd04-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		105

DATE: 1/18/2023 1:35:01 PM
FILE: ...\Long Ave\prestd04-20.dgn

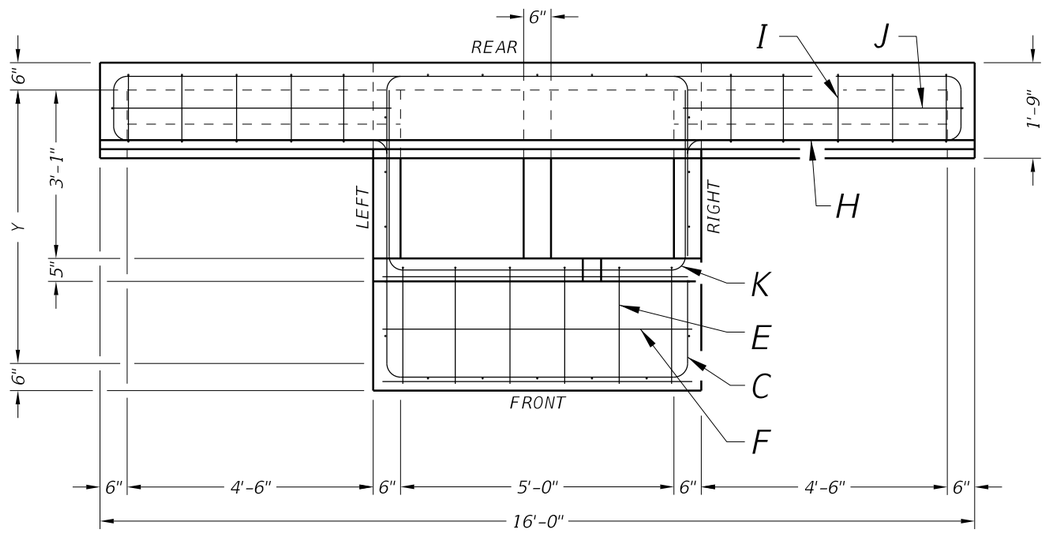


FRONT VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)



SECTION A-A



PLAN VIEW

(SHOWING LEFT AND RIGHT EXTENSIONS)

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel from surface of concrete or lower outside shoulder.
4. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in plans.
5. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾". Top slab may employ a butt joint with dowels at the Contractor's option.
6. Provide lifting devices in conformance with Manufacturer's recommendations.
7. Chamfer vertical edges on inlet lid ¾" as shown in Front View, sheet 1.

INSTALLATION NOTES:

1. Inlet throat is placed under roadway and intended for direct traffic. Inlet lid is not for direct traffic. Do not place Inlet lid in roadway.
2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Open area of main throat = 324 sq in. Open area of one extension throat = 324 sq in.
3. Payment for inlet is per Item 465, "Junction Boxes, Manholes and Inlets" by type, size and extension placement. Extensions are subsidiary to inlet.

SIZE(Y)	Z
3'	0'
4'	1'
5'	2'
6'	3'

HS20 LOADING SHEET 2 OF 2

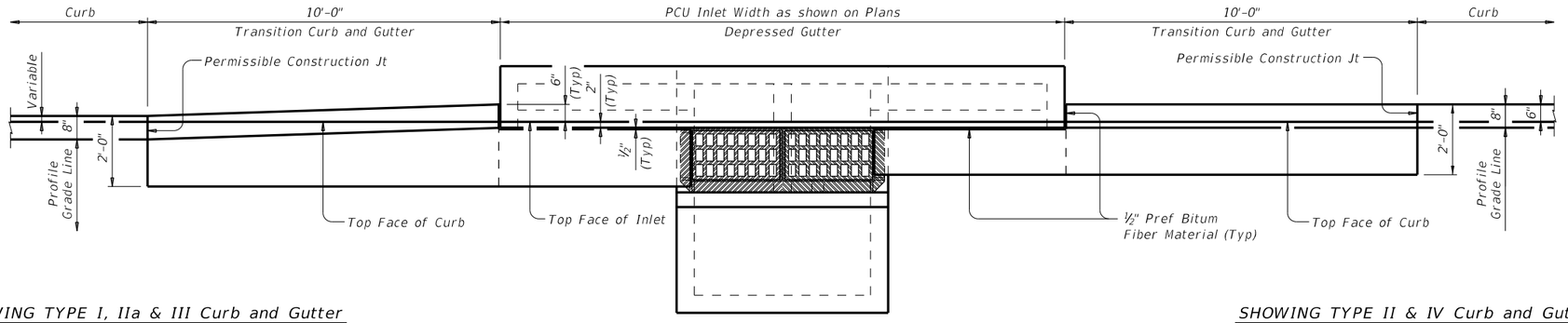
Texas Department of Transportation — Bridge Division Standard

PRECAST CURB INLET UNDER ROADWAY

PCU

FILE: prestd04-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		106

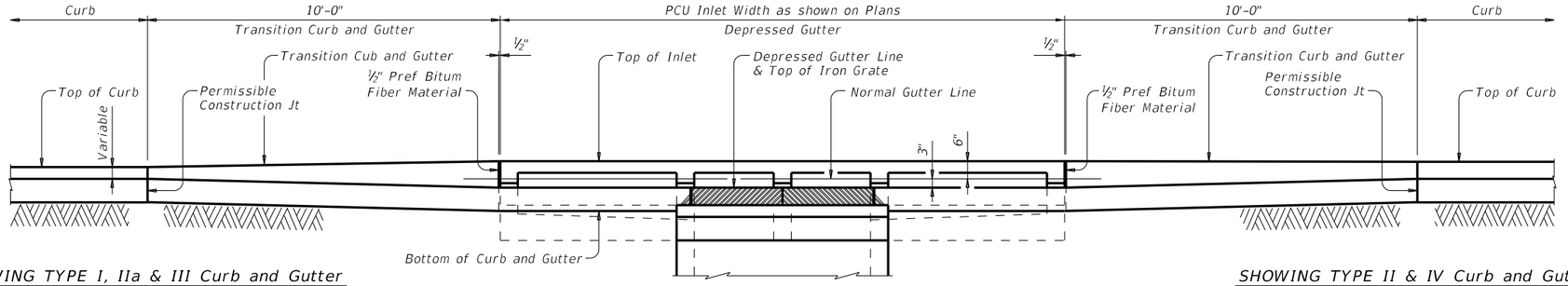
DATE: 1/18/2023 1:35:02 PM
FILE: ...\Long Ave\prestd04-20.dgn



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

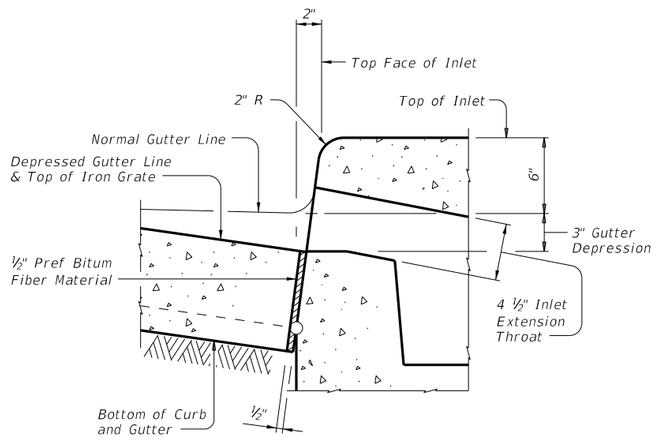
PLAN



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

ELEVATION



SECTION AT GUTTER AND INLET

Reinforcing steel not shown for clarity.

CONSTRUCTION NOTES:
Align top face of curb with PCU Inlet as shown.

MATERIAL NOTES:
Provide ½" Preformed Bituminous Fiber Material.

GENERAL NOTES:
See Precast Curb Inlet Under Roadway standard PCU for details and notes not shown.
See Concrete Curb and Curb and Gutter standard CCCG-12 for details and notes not shown.
Curb and Gutter Transitions is paid for and in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
Preformed Bituminous Fiber Material is subsidiary to PCU Inlet.

Texas Department of Transportation

Bridge Division Standard

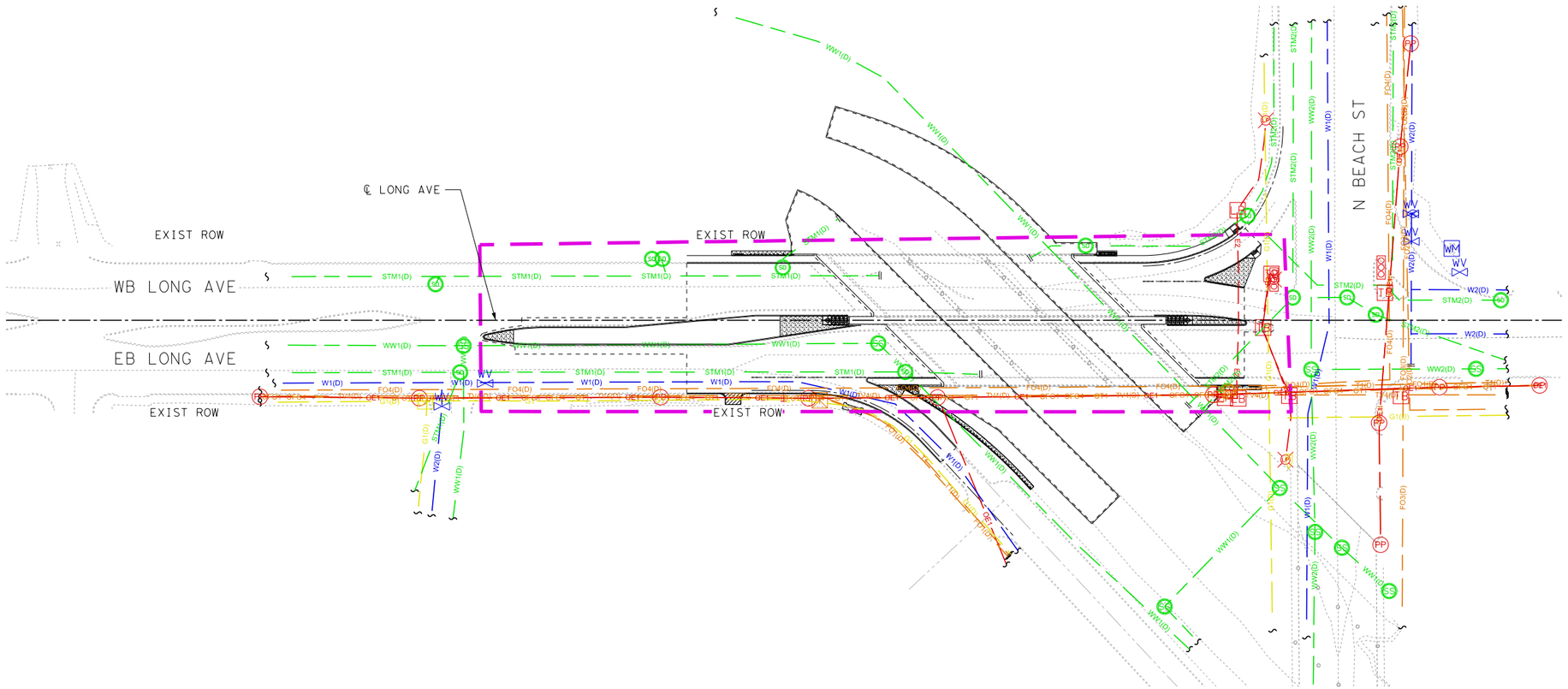
CURB AND GUTTER TRANSITION DETAILS FOR PCU INLET

CGT-PCU

FILE: prestd14-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		107

DATE: 1/18/2023 1:35:19 PM
FILE: ...\Long Ave\prestd14-20.dgn

TIME: 7:25:50 PM
DATE: 2/3/2023



N

0 50 100
SCALE IN FEET

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST
- LIMITS OF INVESTIGATION

COMMUNICATIONS
- CATV - SPECTRUM (QL-D) — TV4(D)
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - UPN (QL-D) — FO2(D)
- FIBER - CONTERRA (QL-D) — FO3(D)
- OH FIBER - SPECTRUM — OFO4
- FIBER - SPECTRUM (QL-D) — FO4(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- OH ELECTRIC - ONCOR — OE1
- ELECTRIC - COFW (QL-B) — E2
- ELECTRIC - HALTOM CITY (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)

STORM
- STORM SEWER - COFW (QL-D) — STM1(D)
- STORM SEWER - HALTOM CITY(QL-D) — STM2(D)

SANITARY SEWER
- SAN. SEWER - COFW (QL-D) — WW1(D)
- SAN. SEWER - HALTOM CITY(QL-D) — WW2(D)

WATER
- WATER - COFW (QL-D) — W1(D)
- WATER - HALTOM CITY(QL-D) — W2(D)

STATE OF TEXAS
DAKOTA W. SMITH
133272
LICENSED
PROFESSIONAL ENGINEER
02/03/2023

LAMB-STAR ENGINEERING, L.L.C.
3801 PARKWOOD BOULEVARD, SUITE 550
FRISCO, TEXAS 75034 (214)440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

E. LONG AVE

EXISTING UTILITY LAYOUTS

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER			HIGHWAY NO.
BWG	6	(See Title Sheet)			CR
CHECK	STATE	DISTRICT	COUNTY		SHEET NO.
DWS	TEXAS	FW	TARRANT		108
GRAPHICS	CONTROL	SECTION	JOB		
BWG					
CHECK	0902	90	894, ETC.		
DWS					

FILE: 894UEUTL02.dgn

TIME: 7:25:55 PM
DATE: 2/3/2023

UTILITY QUALITY LEVELS

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

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

GENERAL NOTES

1. THE UTILITIES DEPICTED WERE INVESTIGATED BY LAMB-STAR ENGINEERING, ALL OTHER PLAN INFORMATION, NOTABLY THE BACKGROUND INFORMATION WAS PROVIDED BY OTHERS AND LAMB-STAR ENGINEERING DISCLAIMS RESPONSIBILITY FOR ITS ACCURACY.
2. EXISTING SUBSURFACE UTILITY INVESTIGATIONS WERE COMPLETED ON 10/20/2021. LAMB-STAR ENGINEERING EXPRESSLY DISCLAIMS ANY AND ALL RESPONSIBILITY FOR SUE DATA PROVIDED BY OTHERS AND NEW UTILITY INSTALLATIONS OR MODIFICATIONS, AND ADJUSTMENTS TO EXISTING UTILITIES AFTER THE COMPLETION DATE.
3. UTILITY LOCATIONS ON THESE DRAWINGS ARE INTENDED FOR DESIGN PURPOSES AND NOT CONSTRUCTION. THEY REFLECT SUBSURFACE UTILITIES AT THE TIME SURVEYED. CALL TEXAS 811 FOR UTILITY LOCATIONS 48-HOURS PRIOR TO ANY WORK.
4. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL D INFORMATION IS SHOWN AS NOTED IN THE LEGEND.
5. UTILITIES ON THESE DRAWINGS HAVE BEEN IDENTIFIED TO ASCE STANDARD 38-02. QUALITY LEVEL C INFORMATION IS SHOWN AS NOTED IN THE LEGEND.
6. UTILITY LINES WERE DESIGNATED WHERE POSSIBLE. HOWEVER, SOME SERVICE LINES ARE CONSTRUCTED OF NON-CONDUCTIVE MATERIAL AND UTILITY COMPANY DRAWINGS DO NOT SHOW SERVICE LINE LOCATIONS. THEREFORE, NOT ALL SERVICE LINES MAY BE SHOWN.
7. UTILITIES SHOWN OUTSIDE OF LIMITS OF INVESTIGATION ARE FOR REFERENCE ONLY. THESE UTILITIES ARE SHOWN FOR GENERAL INFORMATION USE DURING UTILITY COORDINATION, BUT THEY HAVE NOT BEEN VERIFIED AS BEING COMPLETE OR ACCURATE.

LEGEND OF UTILITY SYMBOLS

COMMUNICATIONS
- FIBER MANHOLE (F)
- TELEPHONE CROSS BOX
- TELEPHONE PEDESTAL (T)

ELECTRIC
- GUY WIRE
- LIGHT POLE (LP)
- ELECTRIC METER (EM)
- POWER POLE (PP)
- STREET LIGHT PULL BOX (LB)
- SIGNAL PULL BOX (TB)
- TRAFFIC LIGHT POLE

GAS
- UNDERGROUND GAS MARKER
- GAS METER (GM)

STORM SEWER
- STORM MANHOLE (SD)

WASTEWATER
- WASTEWATER MANHOLE (SS)

WATER
- FIRE HYDRANT
- WATER METER (WM)
- WATER VALVE (WV)

LEGEND OF UTILITY TYPES

GENERAL
- UTILITY CONTINUES
- UTILITY TERMINATES
- QL-B SIGNAL LOST
- LIMITS OF INVESTIGATION

COMMUNICATIONS
- CATV - SPECTRUM (QL-D) — TV4(D)
- FIBER - AT&T (QL-B) — FO1
- OH FIBER - AT&T — OFO1
- FIBER - AT&T (QL-D) — FO1(D)
- FIBER - UPN (QL-D) — FO2(D)
- FIBER - CONTERRA (QL-D) — FO3(D)
- OH FIBER - SPECTRUM — OFO4
- FIBER - SPECTRUM (QL-D) — FO4(D)
- TELEPHONE - AT&T (QL-B) — T1
- OH TELEPHONE - AT&T — OT1
- TELEPHONE - AT&T (QL-D) — T1(D)

ELECTRIC
- OH ELECTRIC - ONCOR — OE1
- ELECTRIC - COFW (QL-B) — E2
- ELECTRIC - HALTOM CITY (QL-B) — E3

GAS
- GAS - ATMOS (QL-B) — G1
- GAS - ATMOS (QL-D) — G1(D)

STORM
- STORM SEWER - COFW (QL-D) — STM1(D)
- STORM SEWER - HALTOM CITY(QL-D) — STM2(D)

SANITARY SEWER
- SAN. SEWER - COFW (QL-D) — WW1(D)
- SAN. SEWER - HALTOM CITY(QL-D) — WW2(D)

WATER
- WATER - COFW (QL-D) — W1(D)
- WATER - HALTOM CITY(QL-D) — W2(D)

STATE OF TEXAS
DAKOTA W. SMITH
133272
LICENSED
PROFESSIONAL ENGINEER
02/03/2023

LAMB-STAR ENGINEERING, L.L.C.
3801 PARKWOOD BOULEVARD, SUITE 550
FRISCO, TEXAS 75034 (214)440-3600
TEXAS REGISTERED ENGINEERING FIRM F-9073

Texas Department of Transportation

E. LONG AVE

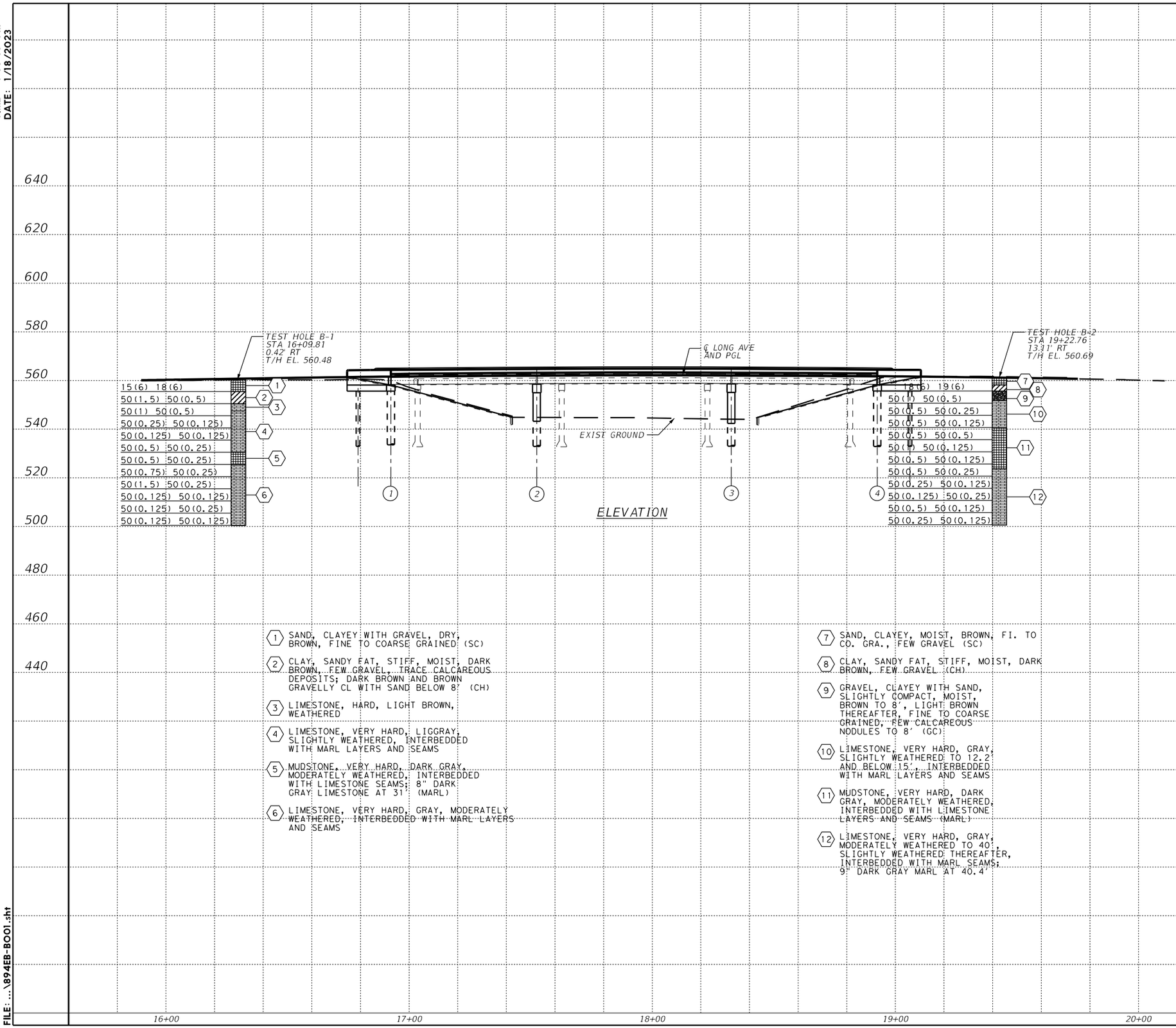
EXISTING UTILITY LEGEND AND NOTES

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BWG	6	(See Title Sheet)		CR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
DWS	TEXAS	FW	TARRANT	109
GRAPHICS	CONTROL	SECTION	JOB	
BWG	0902	90	894, ETC.	
CHECK				
DWS				

FILE: 894UEUTL01.dgn

TIME: 1:36:39 PM
DATE: 1/18/2023



0 10 20 40 (H)
0 20 40 (V)

1. SAND, CLAYEY WITH GRAVEL, DRY, BROWN, FINE TO COARSE GRAINED (SC)
2. CLAY, SANDY FAT, STIFF, MOIST, DARK BROWN, FEW GRAVEL, TRACE CALCAREOUS DEPOSITS; DARK BROWN AND BROWN GRAVELLY CL WITH SAND BELOW 8' (CH)
3. LIMESTONE, HARD, LIGHT BROWN, WEATHERED
4. LIMESTONE, VERY HARD, LIGGRAY, SLIGHTLY WEATHERED, INTERBEDDED WITH MARL LAYERS AND SEAMS
5. MUDSTONE, VERY HARD, DARK GRAY, MODERATELY WEATHERED, INTERBEDDED WITH LIMESTONE SEAMS; 8" DARK GRAY LIMESTONE AT 31' (MARL)
6. LIMESTONE, VERY HARD, GRAY, MODERATELY WEATHERED, INTERBEDDED WITH MARL LAYERS AND SEAMS
7. SAND, CLAYEY, MOIST, BROWN, FI. TO CO. GRA., FEW GRAVEL (SC)
8. CLAY, SANDY FAT, STIFF, MOIST, DARK BROWN, FEW GRAVEL (CH)
9. GRAVEL, CLAYEY WITH SAND, SLIGHTLY COMPACT, MOIST, BROWN TO 8', LIGHT BROWN THEREAFTER, FINE TO COARSE GRAINED, FEW CALCAREOUS NODULES TO 8' (GC)
10. LIMESTONE, VERY HARD, GRAY, SLIGHTLY WEATHERED TO 12.2 AND BELOW 15', INTERBEDDED WITH MARL LAYERS AND SEAMS
11. MUDSTONE, VERY HARD, DARK GRAY, MODERATELY WEATHERED, INTERBEDDED WITH LIMESTONE LAYERS AND SEAMS (MARL)
12. LIMESTONE, VERY HARD, GRAY, MODERATELY WEATHERED TO 40', SLIGHTLY WEATHERED THEREAFTER, INTERBEDDED WITH MARL SEAMS; 9" DARK GRAY MARL AT 40.4'

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

Texas Department of Transportation

BORINGS

LONG AVE AT LITTLE FOSSIL CREEK

SCALE: 1"=40' (H) 1"=40' (V) SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BWB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	110
GRAPHICS	CONTROL	SECTION	JOB	
KC	0902	48	894	
CHECK				
LVA				

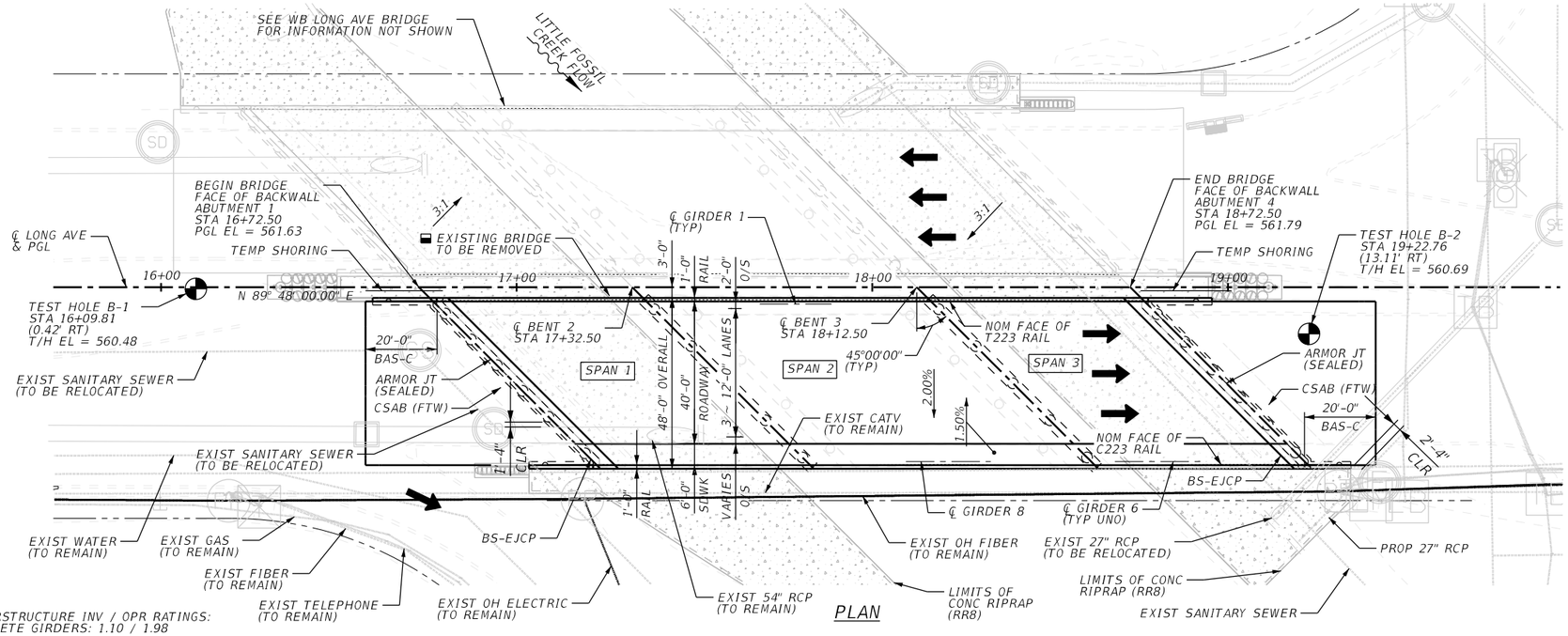
FILE: ...\894EB-BOO1.sht

TIME: 10:20:48 AM
DATE: 3/31/2023

ALL BENTS AND ABUTMENTS ARE ALONG BEARING N 45°12'00.00" W

0 10 20 40 (H)
0 20 40 (V)

N



PLAN

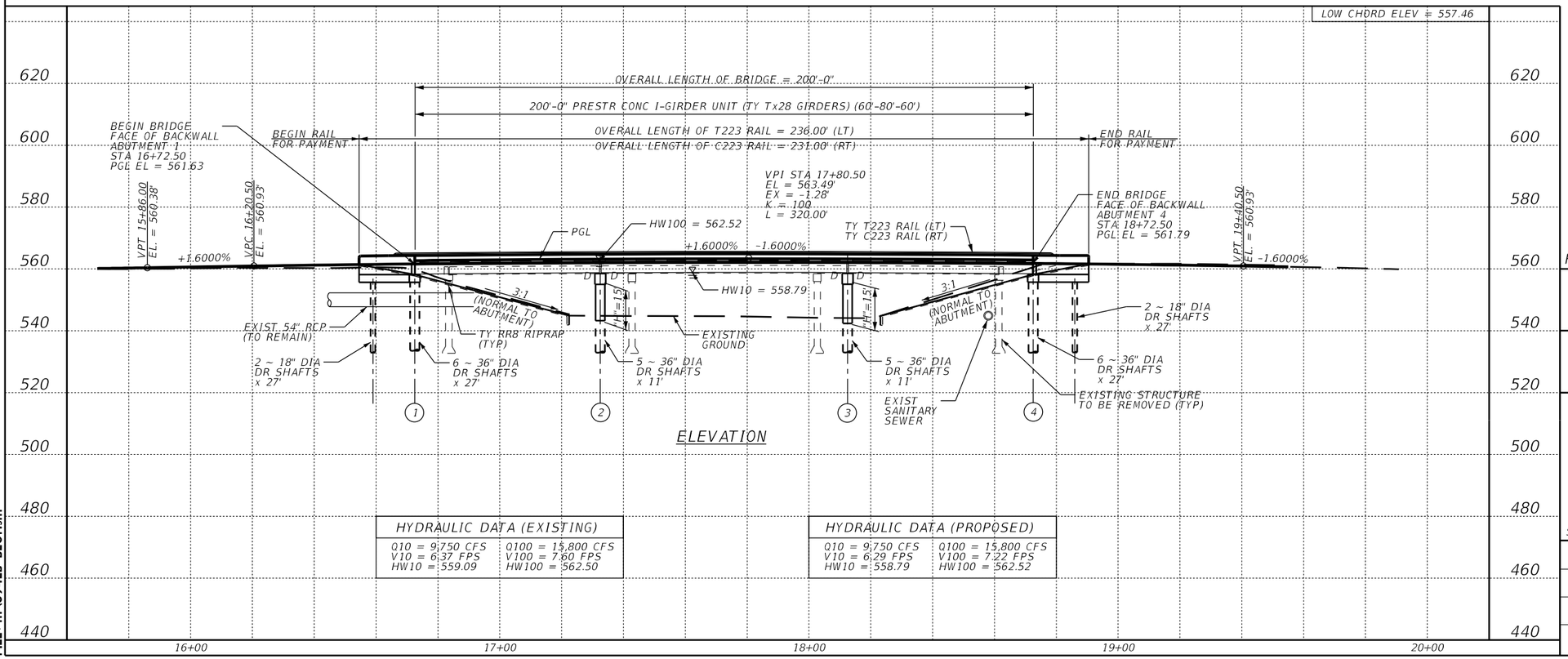
SUPERSTRUCTURE INV / OPR RATINGS:
CONCRETE GIRDERS: 1.10 / 1.98

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS AND INTERIM REVISIONS THERETO FOR HL 93 LOADING, 9TH EDITION.
2. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDER MATERIALS AND NOTIFY ENGINEERS IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
3. SEE BRIDGE TYPICAL SECTION SHEET FOR ADDITIONAL INFORMATION.
4. RIPRAP SLOPES SHOWN. CONTRACTOR SHALL FIELD VERIFY.
5. SEE CSAB (FTW) STANDARD FOR CEMENT STABILIZED ABUTMENT BACKFILL DETAILS.
6. ◓ DENOTES APPROXIMATE SOIL BORING LOCATION. SEE BORING LOG SHEETS FOR GEOTECHNICAL INFORMATION.
7. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON ACTUAL FIELD CONDITIONS.
8. REFER TO ROADWAY GRADING LAYOUT SHEET FOR RIPRAP LIMITS.
9. BORING CONDITIONS: D = DOWEL; BLANK = NO DOWEL.
10. HYDRAULIC DATA AND HEADWATER ELEVATIONS DETERMINED AT UPSTREAM BOUNDING CROSS SECTION 23207.

FUNCT. CLASS = MINOR ARTERIAL (URBAN)
DESIGN SPEED = 40 MPH
EXIST ADT (2019) = 6,143
PROPOSED ADT (2040) = 8,600
EXIST NBI NO. = 02-220-0-ZL67-85-003
NEW NBI NO. = 02-220-ZL67-85-005

◓ 3 - 60' PRESTRESSED CONCRETE BOX BEAM SPANS.



ELEVATION

HYDRAULIC DATA (EXISTING)	
Q10 = 9,750 CFS	Q100 = 15,800 CFS
V10 = 6.37 FPS	V100 = 7.60 FPS
HW10 = 559.09	HW100 = 562.50

HYDRAULIC DATA (PROPOSED)	
Q10 = 9,750 CFS	Q100 = 15,800 CFS
V10 = 6.29 FPS	V100 = 7.22 FPS
HW10 = 558.79	HW100 = 562.52

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
03/31/2023

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

Texas Department of Transportation

BRIDGE LAYOUT

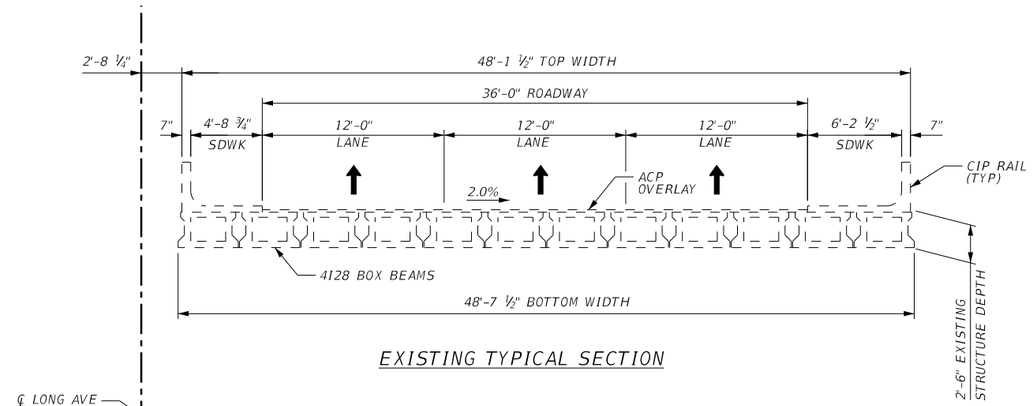
EB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: 1"=40' (H) 1"=40' (V) SHEET 1 OF 1

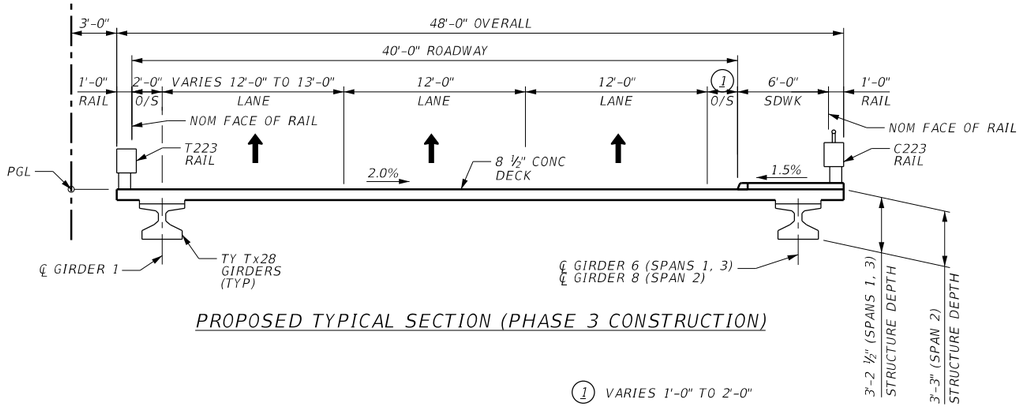
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BWB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	111
GRAPHICS	CONTROL	SECTION	JOB	
VH	0902	48	894	
CHECK				
LVA				

FILE: ...\894EB-BLOI.sht

TIME: 1:37:08 PM
DATE: 1/18/2023



EXISTING TYPICAL SECTION



PROPOSED TYPICAL SECTION (PHASE 3 CONSTRUCTION)

(1) VARIES 1'-0" TO 2'-0"

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

Lauren VanAndel

HL93 LOADING

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

Texas Department of Transportation

TYPICAL TRANSVERSE SECTIONS

EB LONG AVE AT LITTLE FOSSIL CREEK

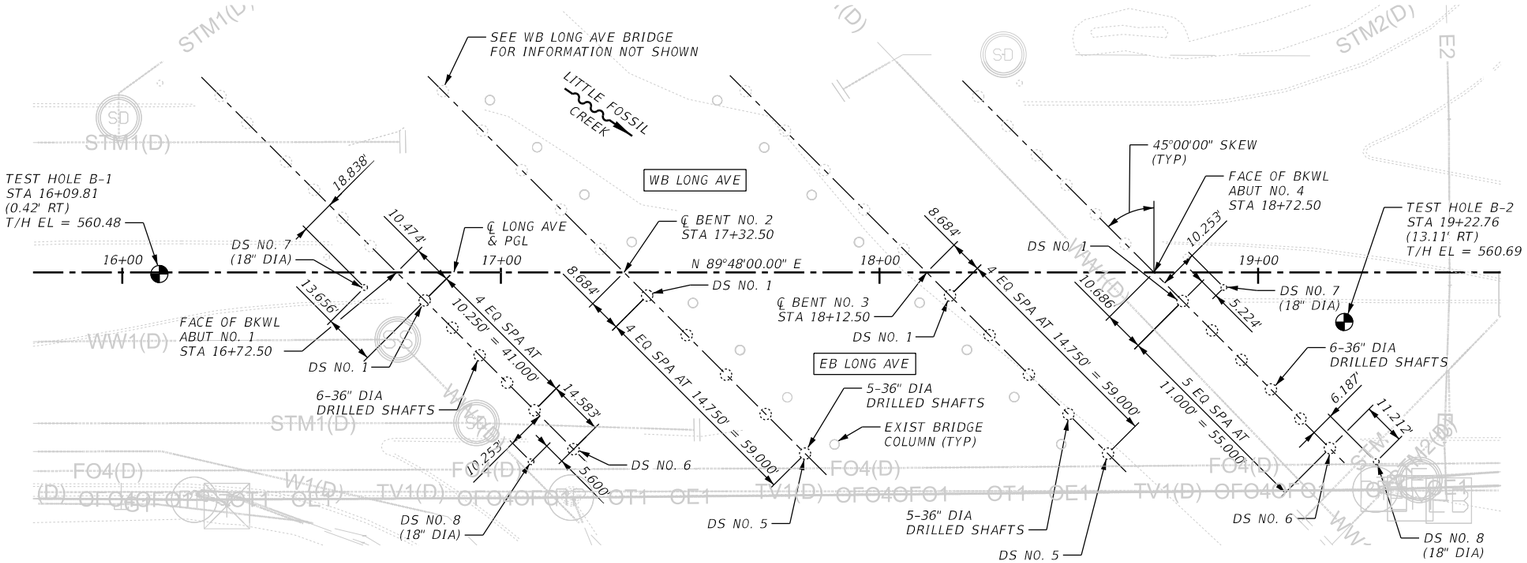
SCALE: N.T.S.

SHEET 10F 1

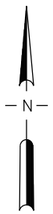
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BWB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	
GRAPHICS				
VH	CONTROL	SECTION	JOB	112
CHECK				
LVA	0902	48	894	

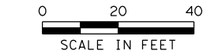
FILE: ...\894EB-BTYPOI.sht

TIME: 1:37:22 PM
DATE: 1/18/2023



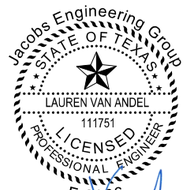
PLAN





NOTES:

1. SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS.
2. SEE BRIDGE BORING LOG SHEETS FOR TEST HOLE INFORMATION.
3. CONTRACTOR TO FIELD VERIFY LOCATION AND STATUS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO CONSTRUCTION.
4. THE CENTERLINE OF ALL BENTS AND ABUTMENTS ARE ON THE BEARING N 45°12'00.00" W.
5. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR FOUNDATION DETAILS NOT SHOWN.



HL93 LOADING

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

Texas Department of Transportation

FOUNDATION LAYOUT

EB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: 1"=40' SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	113
CHECK LVA	CONTROL 0902	SECTION 48	JOB 894	

FILE: ...\894EB-FLOI.sht

TIME: 1:37:37 PM
DATE: 1/18/2023

SUMMARY OF ESTIMATED QUANTITIES

ITEM / DESCRIPTION	400	416		420			422			425	442	450		454	496
	6005	6001	6004	6014	6030	6038	6002	6014	6016	6035	6007	6007	6033	6004	6010
	CEM STABIL BKFL	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT) (HPC) (1)	CL C CONC (CAP) (HPC) (1)	CL C CONC (COLUMN) (HPC)	REINF CONC SLAB (HPC)	BRIDGE SIDEWALK (HPC)	APPROACH SLAB (HPC)	PRESTR CONC GIRDER (TX28)	STR STL (MISC NON-BRIDGE)	RAIL (TY T223) (HPC)	RAIL (TY C223) (HPC)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 100-499 FT LENGTH)
	CY	LF	LF	CY	CY	CY	SF	SF	CY	LF	LB	LF	LF	LF	EA
2 ~ ABUTMENTS	294	108	324	75.8				442	169.2						
2 ~ INTERIOR BENTS			110		62.2	39.4									
1 ~ 200.00' PRESTR CONC GIRDER UNIT							9,600	1,400		1,348.80	160	236.0	231.0	112	
BRIDGE TOTAL	294	108	434	75.8	62.2	39.4	9,600	1,842	169.2	1,348.80	160	236.0	231.0	112	1

(1) QUANTITY INCLUDES SHEAR KEY.

BEARING SEAT ELEVATIONS

ABUT	1 (FWD)	GIRDER 1 558.148	GIRDER 2 558.061	GIRDER 3 557.966	GIRDER 4 557.865	GIRDER 5 557.757	GIRDER 6 557.642		
BENT	2 (FWD)	GIRDER 1 558.561	GIRDER 2 558.425	GIRDER 3 558.283	GIRDER 4 558.133	GIRDER 5 557.977	GIRDER 6 557.813	GIRDER 7 557.890	GIRDER 8 557.772
	(BK)	558.528	558.430	558.330	558.225	558.117	558.006		
BENT	3 (FWD)	GIRDER 1 558.543	GIRDER 2 558.399	GIRDER 3 558.252	GIRDER 4 558.101	GIRDER 5 557.946	GIRDER 6 557.787	GIRDER 7 557.625	GIRDER 8 557.460
	(BK)	558.577	558.373	558.162	557.943	557.718	557.486		
ABUT	4 (FWD)	GIRDER 1 558.187	GIRDER 2 557.935	GIRDER 3 557.675	GIRDER 4 557.408	GIRDER 5 557.135	GIRDER 6 556.854		

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

Texas Department of Transportation

ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS

EB LONG AVE AT LITTLE FOSSIL CREEK

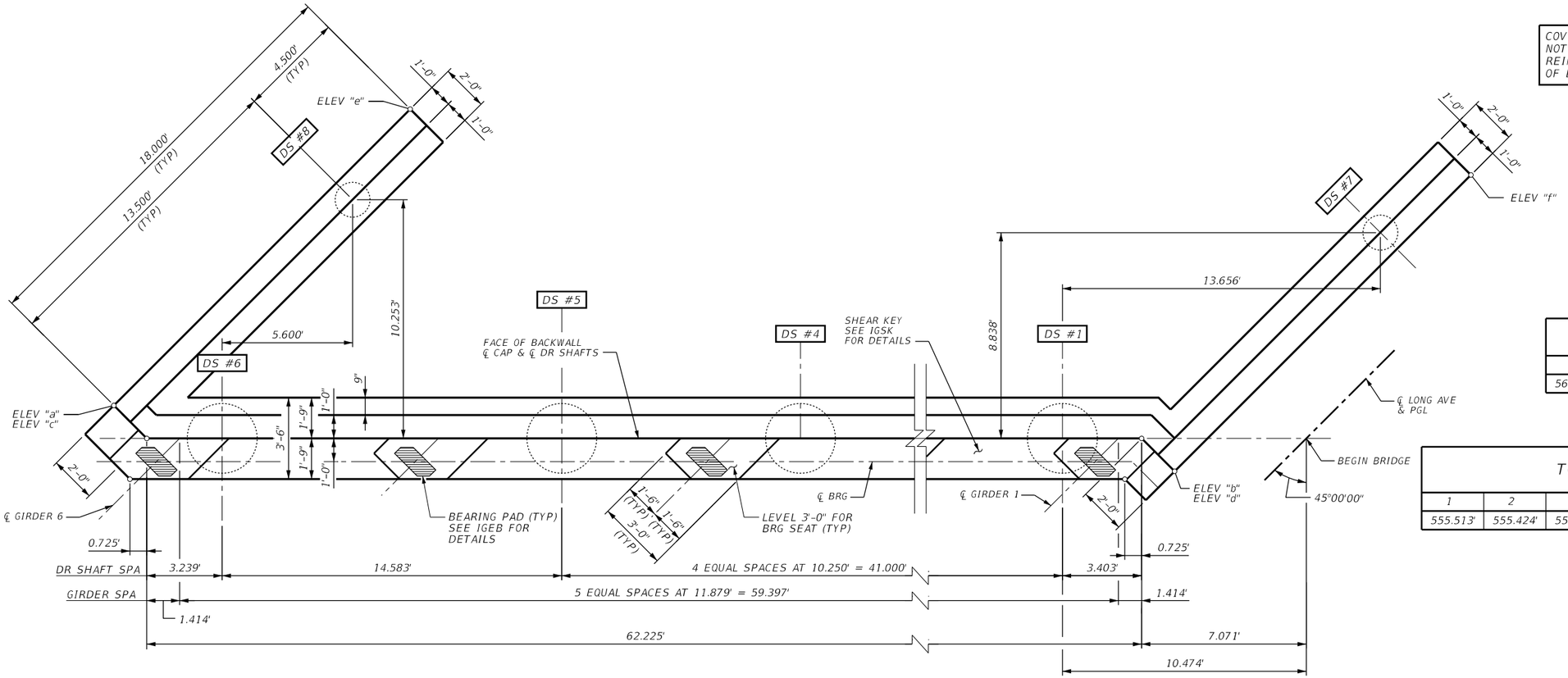
SCALE: N.T.S. SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	114
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894EB-QSOI.sht

TIME: 1:37:49 PM
DATE: 1/18/2023

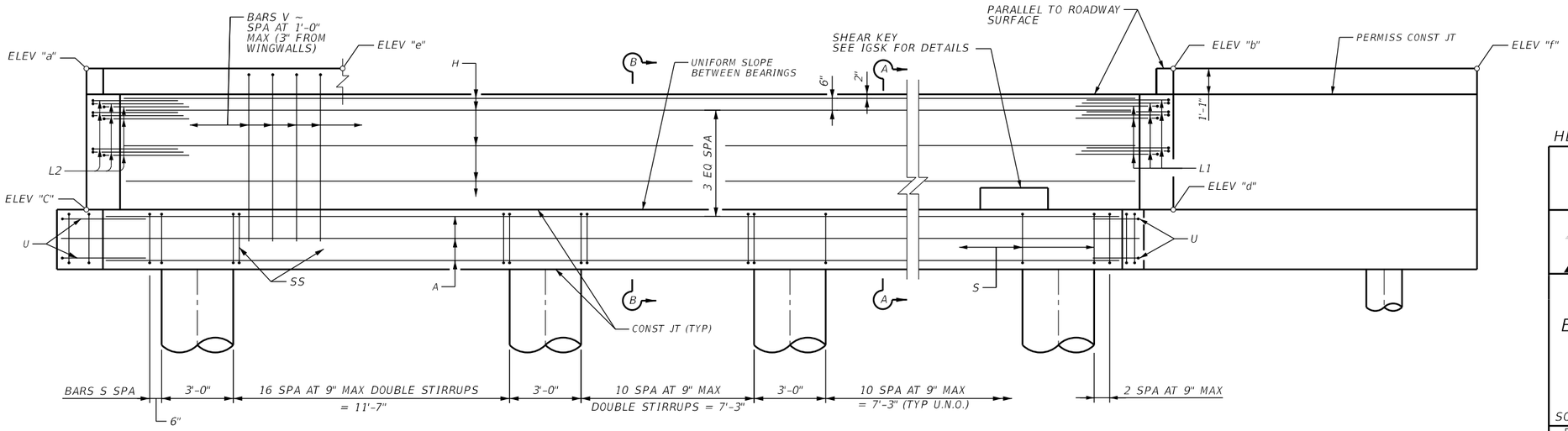
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.



PLAN

CONTROL ELEVATIONS					
"a"	"b"	"c"	"d"	"e"	"f"
561.016'	561.620'	557.477'	558.067'	560.894'	561.418'

TOP OF SHAFT ELEVATIONS							
1	2	3	4	5	6	7	8
555.513'	555.424'	555.335'	555.246'	555.157'	555.030'	555.389'	554.885'



ELEVATION

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

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

Texas Department of Transportation

ABUTMENT 1

EB LONG AVE AT LITTLE FOSSIL CREEK

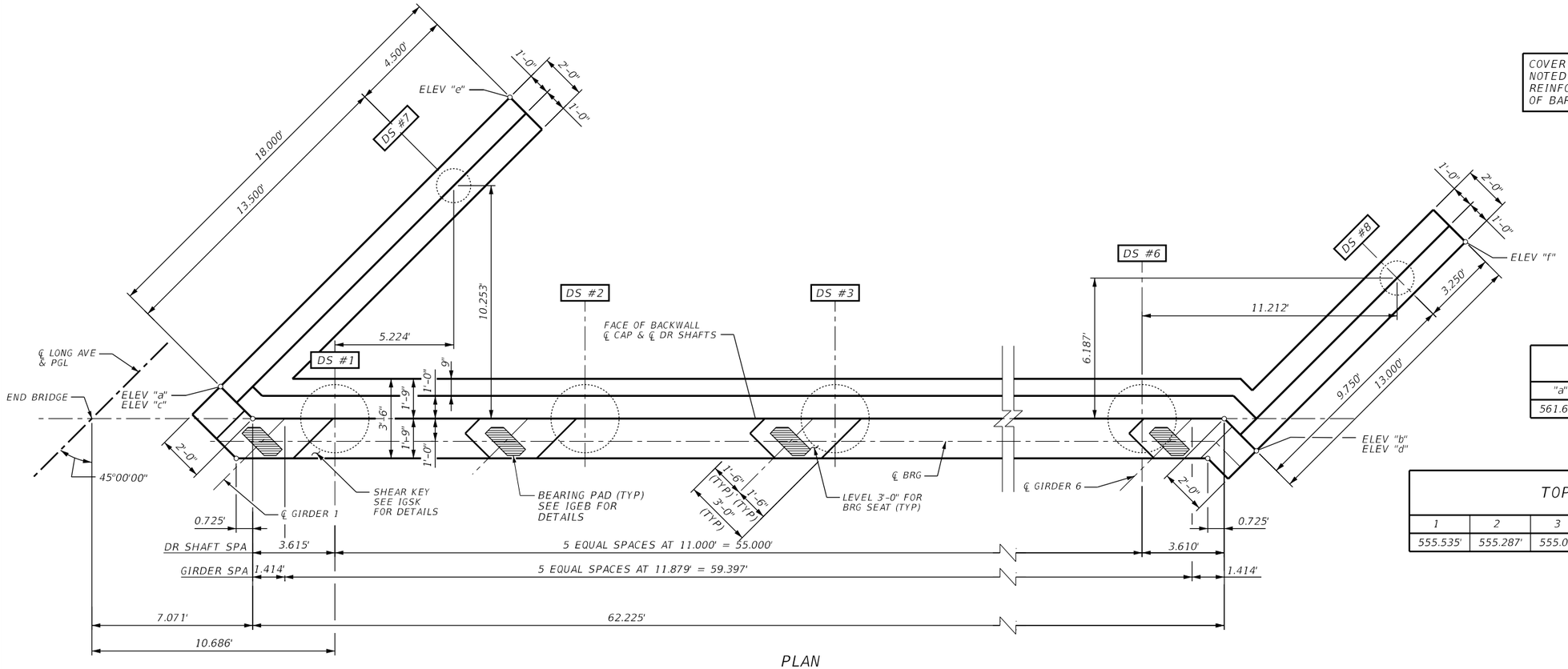
SCALE: NTS

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	115
KC	0902	48	894	
CHECK				
LVA				

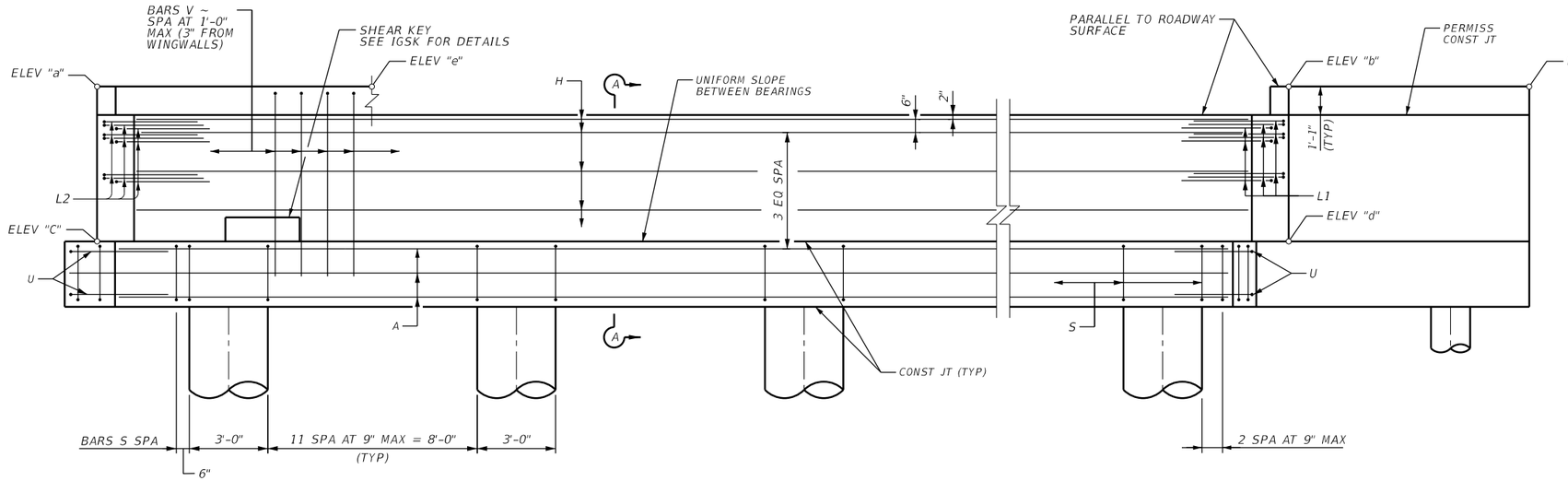
FILE: ...\894EB-ABO1.sht

TIME: 1:38:02 PM
DATE: 1/18/2023

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



PLAN



ELEVATION

CONTROL ELEVATIONS					
"a"	"b"	"c"	"d"	"e"	"f"
561.680'	560.196'	558.180'	556.653'	561.489'	560.004'

TOP OF SHAFT ELEVATIONS							
1	2	3	4	5	6	7	8
555.535'	555.287'	555.040'	554.792'	554.545'	554.297'	555.457'	554.011'

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

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

Texas Department of Transportation

ABUTMENT 4

EB LONG AVE AT LITTLE FOSSIL CREEK

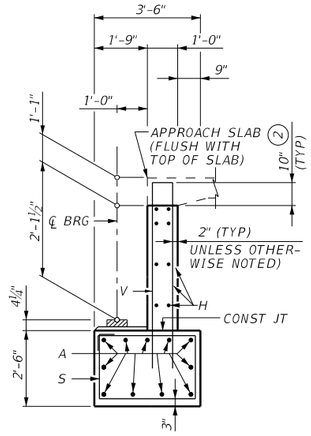
SCALE: N.T.S

SHEET 2 OF 3

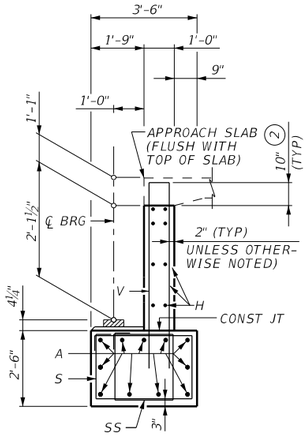
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	116
KC				
CHECK	0902	48	894	
LVA				

FILE: ...\894EB-AB02.sht

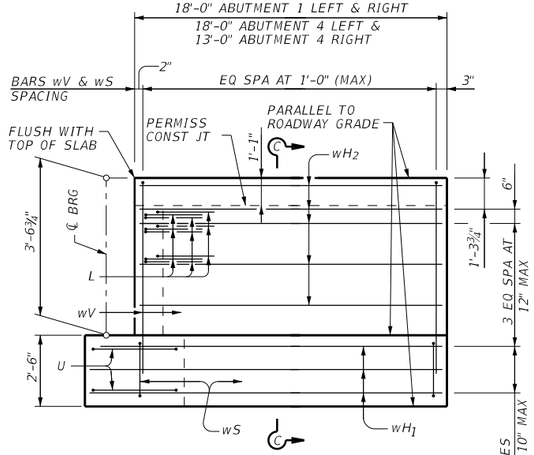
TIME: 1:38:15 PM
DATE: 1/18/2023



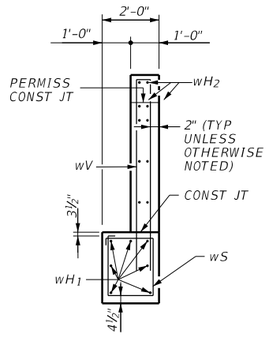
SECTION A-A



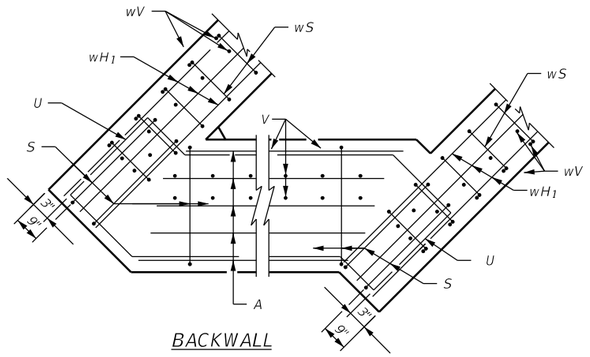
SECTION B-B



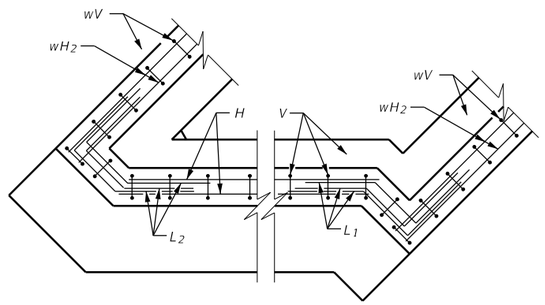
WINGWALL ELEVATION



SECTION C-C

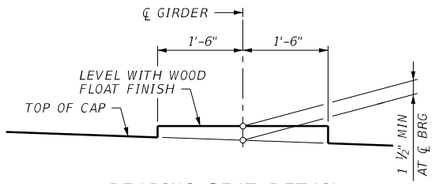


BACKWALL



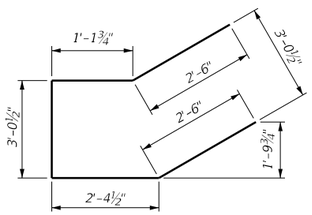
CAP

CORNER DETAILS

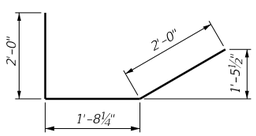


BEARING SEAT DETAIL

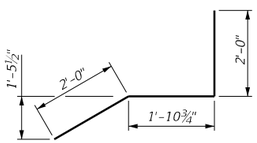
(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD)



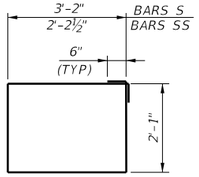
BARS U



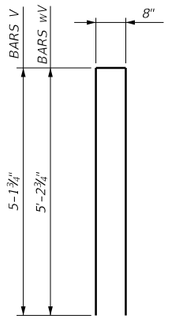
BARS L2



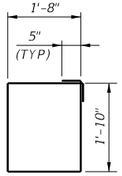
BARS L1



BARS S & SS



BARS V & wV



BARS wS

TABLE OF ESTIMATED QUANTITIES ABUTMENT 1

BAR	NO.	SIZE	LENGTH	WEIGHT
A	11	#11	62'-2"	3,633
H	8	#6	62'-2"	747
L_1	9	#6	5'-11"	80
L_2	9	#6	5'-8"	77
S	71	#5	11'-6"	852
SS	28	#5	9'-7"	280
U	4	#6	11'-7"	69
V	65	#5	11'-0"	754
wH_1	14	#6	19'-5"	408
wH_2	20	#6	17'-8"	531
wS	38	#4	7'-10"	199
wV	38	#5	11'-2"	441
REINFORCING STEEL (1)			LB	8,071
CLASS "C" CONC (ABUT) (HPC) (3)			CY	38.7

TABLE OF ESTIMATED QUANTITIES ABUTMENT 4

BAR	NO.	SIZE	LENGTH	WEIGHT
A	11	#11	62'-2"	3,633
H	8	#6	62'-2"	747
L_1	9	#6	5'-11"	80
L_2	9	#6	5'-8"	77
S	70	#5	11'-6"	840
U	4	#6	11'-7"	69
V	65	#5	11'-0"	754
wH_{1L}	7	#6	19'-5"	204
wH_{1R}	7	#6	14'-5"	152
wH_{2L}	10	#6	17'-8"	265
wH_{2R}	10	#6	12'-8"	190
wS_L	19	#4	7'-10"	99
wS_R	14	#4	7'-10"	73
wV_L	19	#5	11'-2"	221
wV_R	14	#5	11'-2"	163
REINFORCING STEEL (1)			LB	7,567
CLASS "C" CONC (ABUT) (HPC) (3)			CY	37.1

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

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, (2020), AS MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL (NOV 2021) AND BRIDGE DETAILING GUIDE (APR 2022).
2. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROSS SLOPE AND/OR SUPERELEVATIONS.
3. SEE BRIDGE LAYOUT FOR DRILLED SHAFT SIZES AND LENGTHS.
4. CALCULATED FOUNDATION SERVICE LOADS:
   ABUTMENT 1 ~ 104 TONS/SHAFT
   ABUTMENT 4 ~ 100 TONS/SHAFT.
5. SEE IGEB STANDARD FOR BEARING PAD DETAILS.
6. GIRDER & DRILLED SHAFT SPACINGS ARE MEASURED ALONG ℄ ABUT.
7. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR 18" & 36" DIA. DRILLED SHAFT DETAILS AND NOTES.
8. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS AND NOTES.
9. SEE T223 & C223 RAILS DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
10. SEE IGSK STANDARD FOR SHEAR KEY DETAILS.
11. INTENTIONALLY ROUGHEN CONSTRUCTION JOINTS PER TXDOT STANDARD SPECIFICATIONS ITEM 420.4.7.7.

MATERIAL NOTES:

CONCRETE STRENGTH SHALL BE CLASS "C" CONC (ABUT) (HPC), f'c = 3,600 PSI.

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

ABUTMENT DETAILS

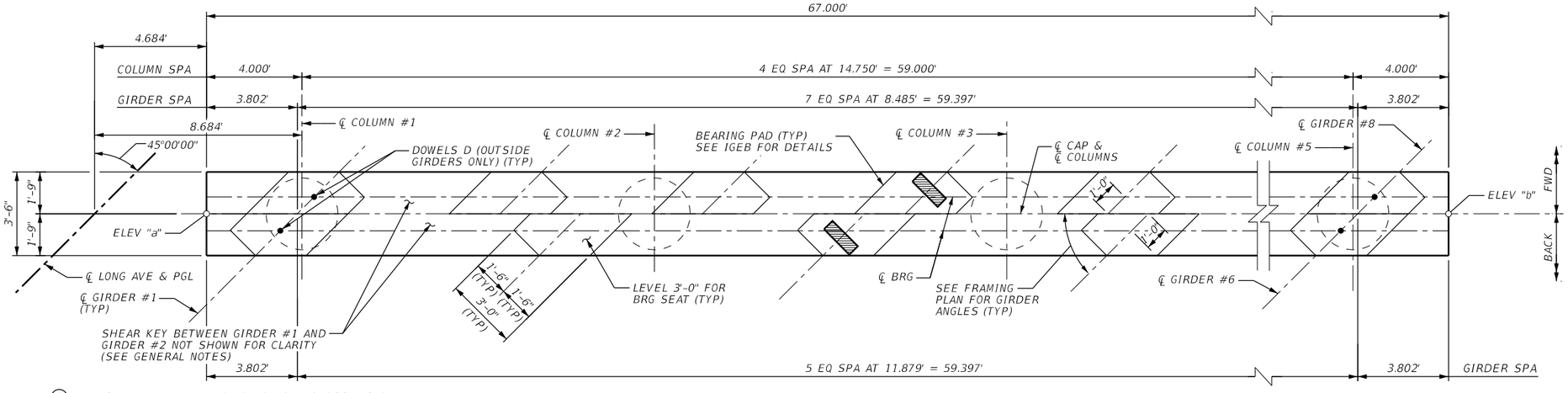
EB LONG AVE AT LITTLE FOSSIL CREEK

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	117
AG				
CHECK	0902	48	894	
LVA				

FILE: ...\894EB-ABO3.sht

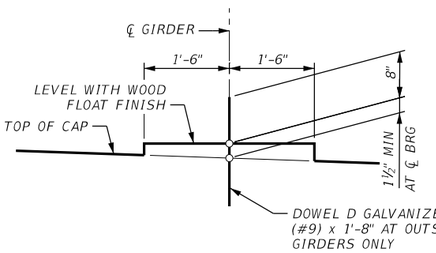
TIME: 1:38:27 PM
DATE: 1/18/2023



(1) MEASURED PARALLEL TO TOP OF CAP CROSS - SLOPE

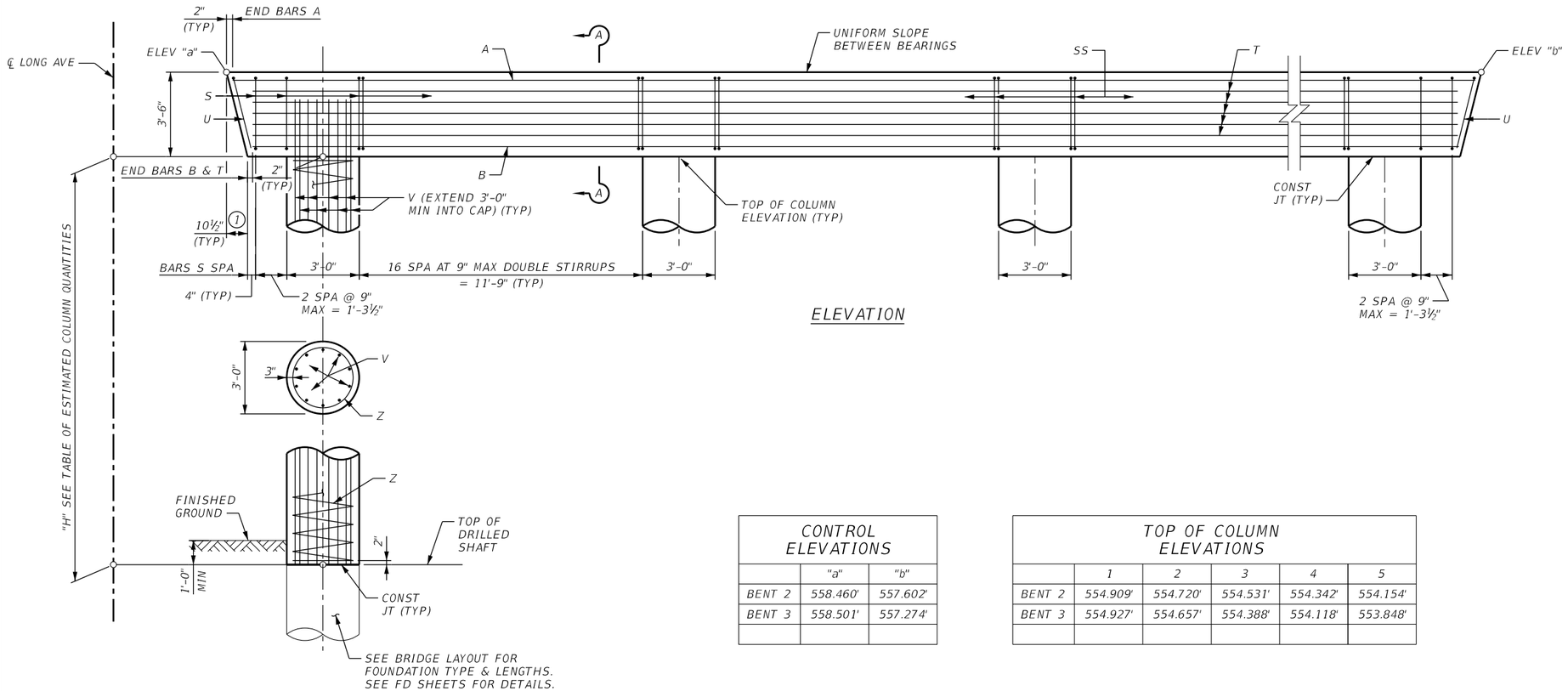
PLAN

(SHOWING BENT 2, BENT 3 IS SYMMETRIC)

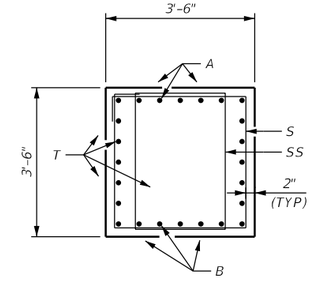


BEARING SEAT DETAIL

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



ELEVATION



SECTION A-A

CONTROL ELEVATIONS		
	"a"	"b"
BENT 2	558.460'	557.602'
BENT 3	558.501'	557.274'

TOP OF COLUMN ELEVATIONS					
	1	2	3	4	5
BENT 2	554.909'	554.720'	554.531'	554.342'	554.154'
BENT 3	554.927'	554.657'	554.388'	554.118'	553.848'

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED PROFESSIONAL ENGINEER
F-2966

02/08/2023

Lauren VanAndel

HL93 LOADING

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

Texas Department of Transportation

BENT 2 & 3

EB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: N.T.S.

SHEET 1OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS KC	TEXAS	FTW	TARRANT	118
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894EB-BE01.sht

TIME: 1:38:41 PM
DATE: 1/18/2023

TABLE OF ESTIMATED (7) COLUMN QUANTITIES

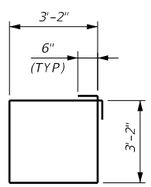
BENT NO.	COL NO.	"H" HEIGHT (FT)	BARS V 10 ~ #9 EA COL		BARS Z #4 EA COL		REINF (2) STEEL	CLASS "C" CONC (COL) (HPC)
			LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
2	1	15	18'-0"	612	494'-10"	331	943	3.94
	2	15	18'-0"	612	494'-10"	331	943	3.94
	3	15	18'-0"	612	494'-10"	331	943	3.94
	4	15	18'-0"	612	494'-10"	331	943	3.94
	5	15	18'-0"	612	494'-10"	331	943	3.94
3	1	15	18'-0"	612	494'-10"	331	943	3.94
	2	15	18'-0"	612	494'-10"	331	943	3.94
	3	15	18'-0"	612	494'-10"	331	943	3.94
	4	15	18'-0"	612	494'-10"	331	943	3.94
	5	15	18'-0"	612	494'-10"	331	943	3.94
						TOTALS	9,430	39.4

(7) QUANTITIES SHOWN ARE BASED ON "H" VALUE GIVEN IN TABLE OF COLUMN QUANTITIES. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE OF A COLUMN, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 31'-5"
REINFORCING STEEL, 63 LB
CLASS "C" CONC (HPC) (COL), 0.26 CY

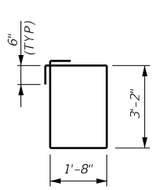
TABLE OF ESTIMATED (3) BENT CAP QUANTITIES

	BAR	NO.	SIZE	LENGTH	WEIGHT
(4)	A	7	#11	66'-6"	2,474
(5)	B	7	#11	65'-0"	2,417
	D	4	#9	1'-8"	23
	S	74	#5	13'-8"	1,055
	SS	68	#5	10'-8"	757
(6)	T	10	#5	65'-0"	678
	U	2	#5	9'-8"	20
REINFORCING STEEL (2)				LB	7,424
CLASS "C" CONC (CAP) (HPC) (8)				CY	31.1

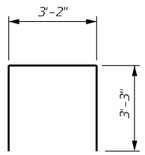
(2) FOR CONTRACTOR'S INFORMATION ONLY.
(3) QUANTITIES SHOWN FOR ONE BENT.
(4) INCLUDES ONE 6'-10" LAP.
(5) INCLUDES ONE 5'-3" LAP.
(6) INCLUDES ONE 1'-10" LA
(8) SHEAR KEY QUANTITY IS INCLUDED.



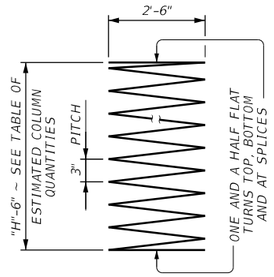
BARS S



BARS SS



BARS U



BARS Z

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, (2020), AS MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL (NOV 2021) AND BRIDGE DETAILING GUIDE (APR 2022).
2. SEE BRIDGE LAYOUT FOR DRILLED SHAFT SIZES & LENGTHS.
3. CALCULATED FOUNDATION SERVICE LOADS: 187 TONS/SHAFT.
4. SEE IGEB STANDARD FOR BEARING PAD DETAILS.
5. SEE IGSK STANDARD FOR SHEAR KEY DETAILS.
6. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROSS-SLOPE AND/OR SUPERELEVATIONS.
7. GIRDER, COLUMN & DRILLED SHAFT SPACINGS ARE MEASURED ALONG ℄ BENT.
8. INTENTIONALLY ROUGHEN CONSTRUCTION JOINTS PER TXDOT STANDARD SPECIFICATIONS ITEM 420.4.7.7.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'_c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE DOWEL BARS D.

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

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

Texas Department of Transportation

BENT 2 & 3

EB LONG AVE AT LITTLE FOSSIL CREEK

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS KC	TEXAS	FTW	TARRANT	119
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

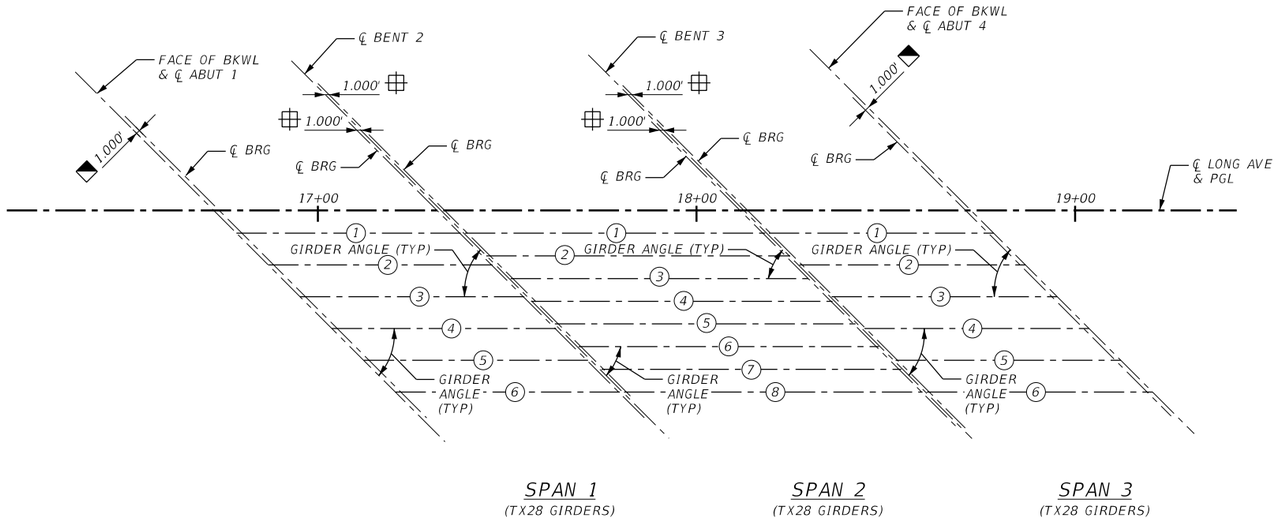
FILE: ...\894EB-BE02.sht

TIME: 1:38:56 PM
DATE: 1/18/2023

MEASURED PERPENDICULAR TO FRONT FACE OF ABUTMENT BACKWALL

MEASURED ALONG ℄ GIRDER

GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE



BENT REPORT

ABUT NO. 1 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 8.485 R

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 1	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			

BENT NO. 2 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 8.485 R

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 1	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			
SPAN 2	GIRDER 1	0.000	45	0	0
	GIRDER 2	8.485	45	0	0
	GIRDER 3	8.485	45	0	0
	GIRDER 4	8.485	45	0	0
	GIRDER 5	8.485	45	0	0
	GIRDER 6	8.485	45	0	0
	GIRDER 7	8.485	45	0	0
	GIRDER 8	8.485	45	0	0
	TOTAL	59.397			

BENT NO. 3 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 8.485 R

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 2	GIRDER 1	0.000	45	0	0
	GIRDER 2	8.485	45	0	0
	GIRDER 3	8.485	45	0	0
	GIRDER 4	8.485	45	0	0
	GIRDER 5	8.485	45	0	0
	GIRDER 6	8.485	45	0	0
	GIRDER 7	8.485	45	0	0
	GIRDER 8	8.485	45	0	0
	TOTAL	59.397			
SPAN 3	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			

ABUT NO. 4 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 8.485 R

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 3	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			

GIRDER REPORT

GIRDER REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GR. FLG.	GIRDER SLOPE
GIRDER 1	60.000	57.586	59.40	0.0072
GIRDER 2	60.000	57.586	59.40	0.0063
GIRDER 3	60.000	57.586	59.40	0.0055
GIRDER 4	60.000	57.586	59.40	0.0047
GIRDER 5	60.000	57.586	59.40	0.0038
GIRDER 6	60.000	57.586	59.40	0.0030

GIRDER REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GR. FLG.	GIRDER SLOPE
GIRDER 1	80.000	78.000	79.50	-0.0002
GIRDER 2	80.000	78.000	79.50	-0.0004
GIRDER 3	80.000	78.000	79.50	-0.0010
GIRDER 4	80.000	78.000	79.50	-0.0016
GIRDER 5	80.000	78.000	79.50	-0.0022
GIRDER 6	80.000	78.000	79.50	-0.0028
GIRDER 7	80.000	78.000	79.50	-0.0034
GIRDER 8	80.000	78.000	79.50	-0.0040

GIRDER REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GR. FLG.	GIRDER SLOPE
GIRDER 1	60.000	57.586	59.40	-0.0068
GIRDER 2	60.000	57.586	59.40	-0.0076
GIRDER 3	60.000	57.586	59.40	-0.0085
GIRDER 4	60.000	57.586	59.40	-0.0093
GIRDER 5	60.000	57.586	59.40	-0.0101
GIRDER 6	60.000	57.586	59.40	-0.0110

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

BRIDGE FRAMING PLAN

EB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: N.T.S.

SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	
CHECK LVA	CONTROL	SECTION	JOB	120
	0902	48	894	

FILE: ...\894EB-FMOI.sht

TIME: 1:39:09 PM
DATE: 1/18/2023

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

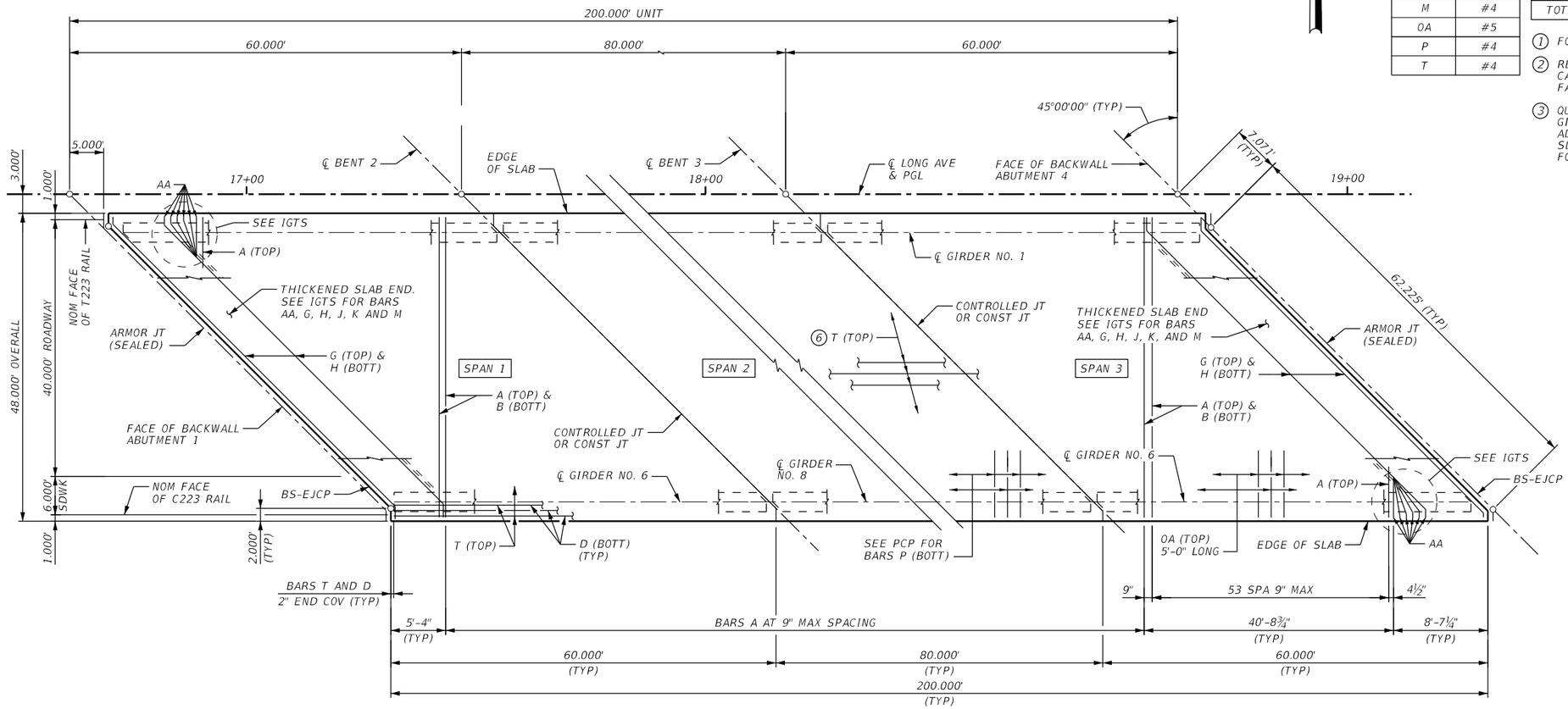
TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB (HPC)	BRIDGE SIDEWALK (HPC)	PRESTR CONCRETE GIRDERS (Tx28) (3)	REINF STEEL (1)(2)	STR STL (MISC NON-BRIDGE)
NO.	SF	SF	LF	LB	SF
1	2,880	420	356.40	6,624	80
2	3,840	560	636.00	8,832	
3	2,880	420	356.40	6,624	80
TOTAL	9,600	1400	1,348.80	22,080	160

(1) FOR CONTRACTOR'S INFORMATION ONLY.

(2) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

(3) QUANTITIES SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE. SEE FRAMING PLAN SHEET FOR GIRDER.



PLAN

HL93 LOADING

GENERAL NOTES:

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

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

SEE IGMS STANDARD FOR MISCELLANEOUS SLAB DETAILS.

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

SEE PCP(0) AND PCP(0)-FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.

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

SEE C223 AND T223 STANDARDS FOR RAIL ANCHORAGE IN SLAB.

SEE ARMOR JOINT STANDARD FOR DETAILS OF JOINT TO BE PLACED WITHIN SLAB.

CONCRETE COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE.

SEE BRSM STANDARD FOR SIDEWALK DETAILS AND ANCHORAGE INTO SLAB.

SEE BS-EJCP STANDARD FOR SIDEWALK COVER PLATE DETAILS.

MATERIAL NOTES:

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

PROVIDE GRADE 60 REINFORCING STEEL (EPOXY COATED).

BAR LAPS, WHERE REQUIRED, ARE AS FOLLOWS:
EPOXY COATED ~ #4 = 2'-5"
#5 = 3'-0"

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

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

Texas Department of Transportation

200.00' PRESTRESSED CONCRETE GIRDER UNIT

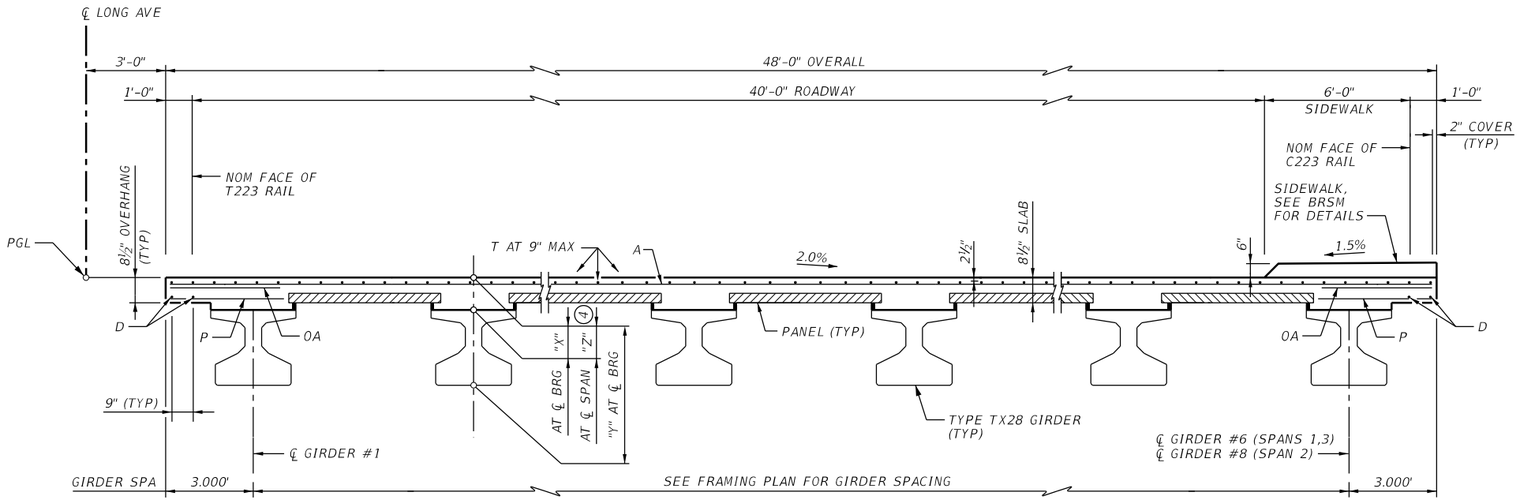
EB LONG AVE AT LITTLE FOSSIL CREEK

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	121
VH	0902	48	894	
CHECK				
LVA				

FILE: ...\894EB-SBOI.sht

TIME: 1:39:22 PM
DATE: 1/18/2023



TYPICAL TRANSVERSE SECTION

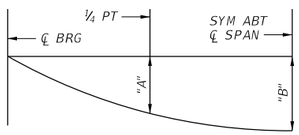
④ THEORETICAL DIMENSION

TABLE OF DEAD LOAD DEFLECTIONS

SPAN NO.	GIRDER NO.	"A"	"B"
		FT	FT
1	1,6	-0.042	-0.060
	2-5	-0.049	-0.070
2	1-8	-0.118	-0.168
3	1,6	-0.042	-0.060
	2-5	-0.049	-0.070

TABLE OF SECTION DEPTHS

SPAN NO.	GIRDER NO.	"X" AT ℄ BRG	"Y" AT ℄ BRG	"Z" AT ℄ SPAN ④
1	1,6	10½"	38½"	9⅜"
	2-5	10½"	38½"	9½"
2	1-8	11"	39"	9⅜"
3	1,6	10½"	38½"	9⅜"
	2-5	10½"	38½"	9½"



DEAD LOAD DEFLECTION DIAGRAM

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

Texas Department of Transportation

200.00' PRESTRESSED CONCRETE GIRDER UNIT

EB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: N.T.S.

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	122
CHECK LVA	CONTROL 0902	SECTION 48	JOB 894	

FILE: ...\894EB-SBO2.sht

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) f'ct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) f'cb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH f pu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
EB LONG AVENUE BRIDGE AT LITTLE FOSSIL CREEK	1 & 3	ALL	Tx28		20	0.6	270	9.88	5.88	4	24.5	4.000	7.000	2.442	-3.140	2,376	0.621	1.035	1.53	1.98	1.14
	2	ALL	Tx28		32	0.6	270	9.11	5.73	6	24.5	6.000	8.500	3.861	-4.603	3,212	0.471	0.839	1.52	2.04	1.10

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.

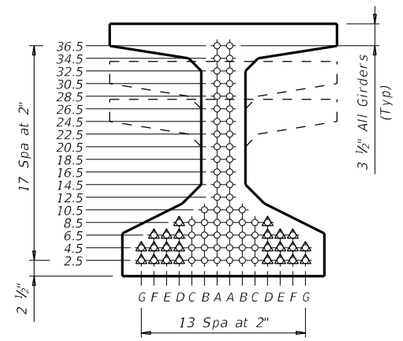
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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.

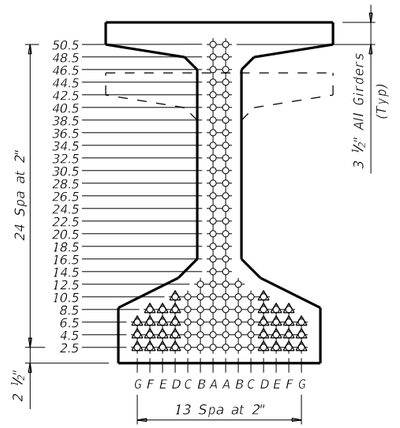
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

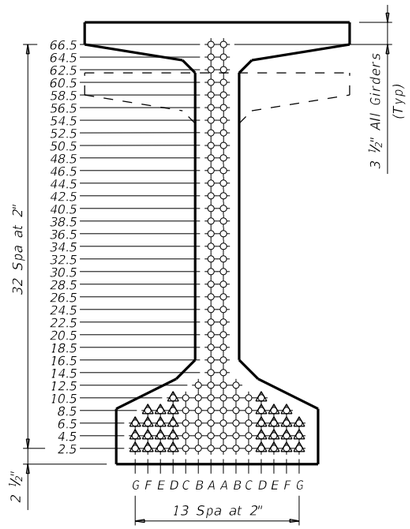
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands 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, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

Lauren VanAndel
03/31/2023

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

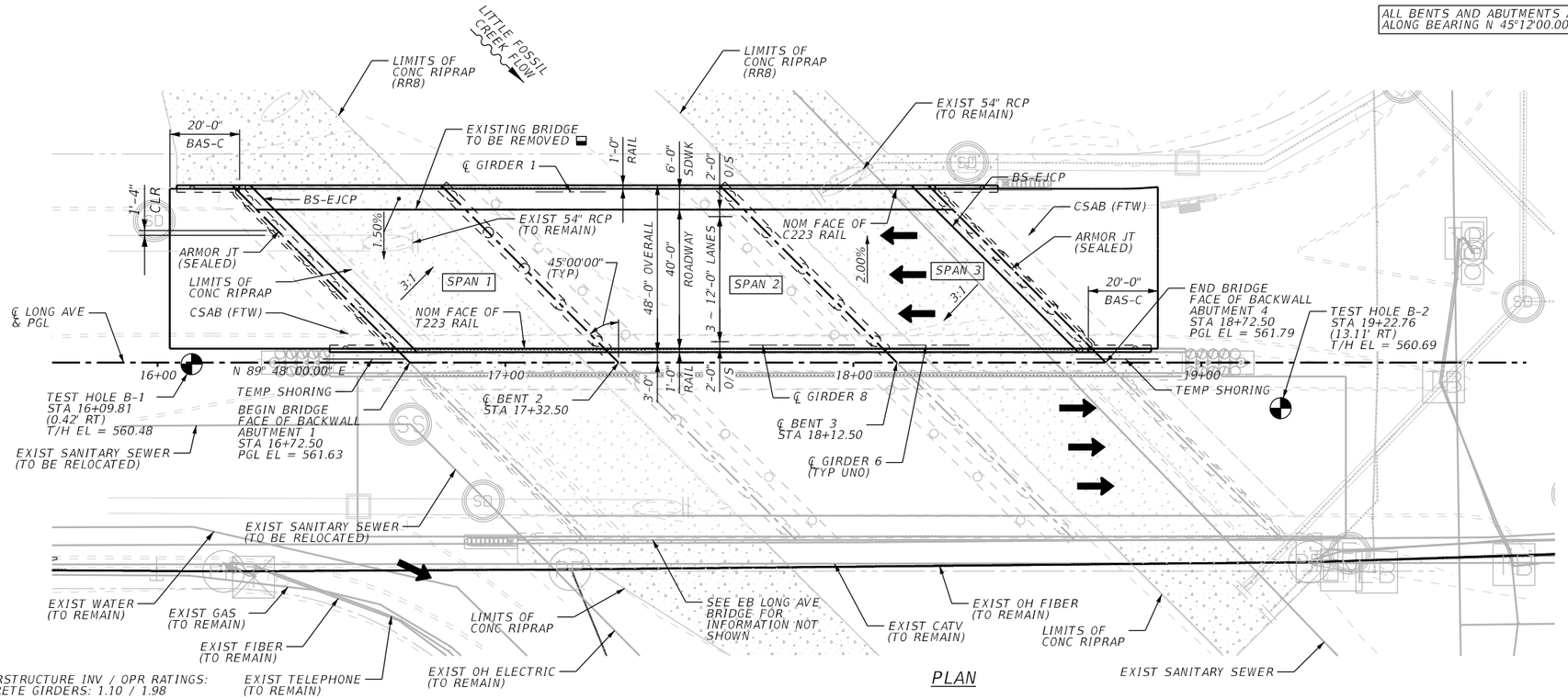
IGND

FILE: 894EB-IGND.sht	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10-19: Modified for depressed strands only.	DIST	COUNTY		SHEET NO.
3-22: Added Load Rating.	FTW	TARRANT		123

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

DATE:
FILE:

TIME: 10:23:42 AM
DATE: 3/31/2023



PLAN

ALL BENTS AND ABUTMENTS ARE ALONG BEARING N 45°12'00.00" W

SUPERSTRUCTURE INV / OPR RATINGS:
CONCRETE GIRDERS: 1.10 / 1.98

0 10 20 40 (H)
0 20 40 (V)

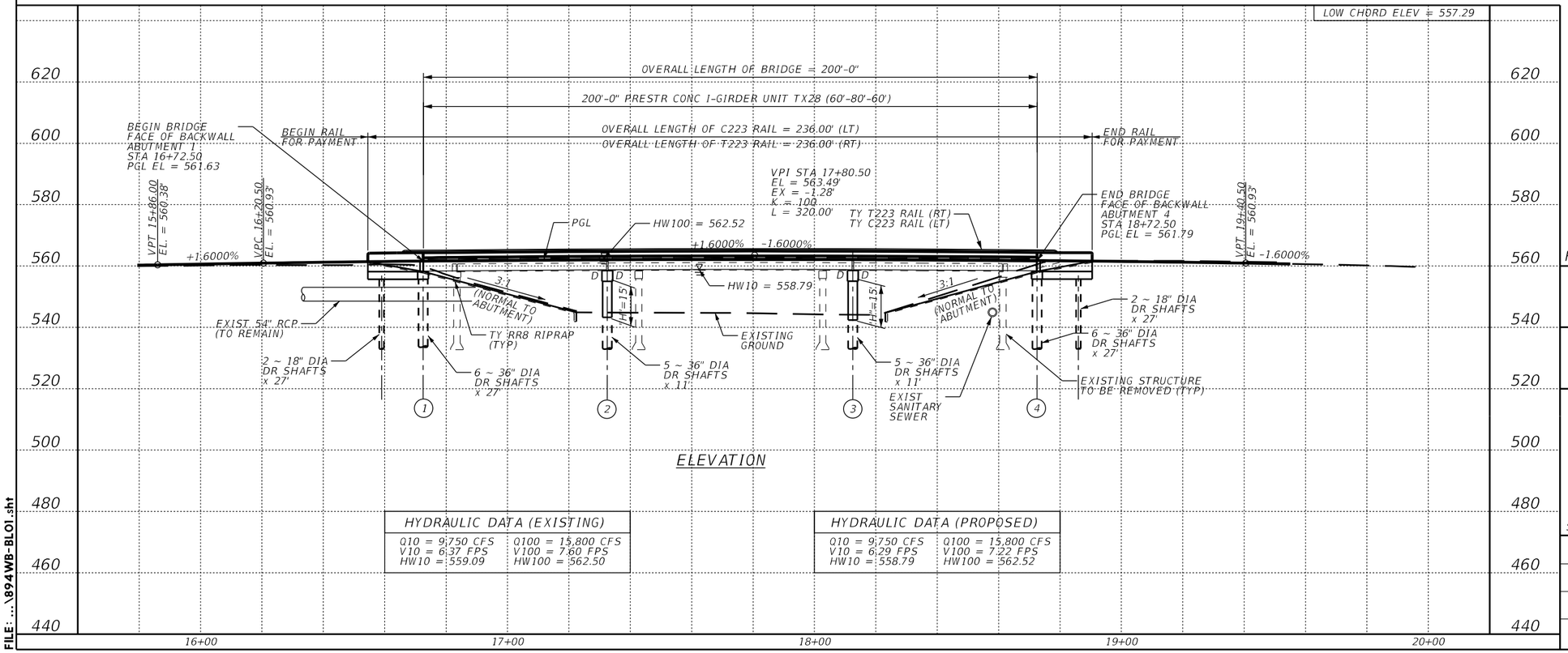
N

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD SPECIFICATIONS AND INTERIM REVISIONS THERETO FOR HL 93 LOADING, 9TH EDITION.
2. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDER MATERIALS AND NOTIFY ENGINEERS IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
3. SEE BRIDGE TYPICAL SECTION SHEET FOR ADDITIONAL INFORMATION.
4. RIPRAP SLOPES SHOWN. CONTRACTOR SHALL FIELD VERIFY.
5. SEE CSAB (FTW) STANDARD FOR CEMENT STABILIZED ABUTMENT BACKFILL DETAILS.
6. ◓ DENOTES APPROXIMATE SOIL BORING LOCATION. SEE BORING LOG SHEETS FOR GEOTECHNICAL INFORMATION.
7. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON ACTUAL FIELD CONDITIONS.
8. REFER TO ROADWAY GRADING LAYOUT SHEET FOR RIPRAP LIMITS.
9. BEARING CONDITIONS: D = DOWEL; BLANK = NO DOWEL.
10. HYDRAULIC DATA AND HEADWATER ELEVATIONS DETERMINED AT UPSTREAM BROUNDING CROSS SECTION 23207.

FUNCT. CLASS = MINOR ARTERIAL (URBAN)
DESIGN SPEED = 40 MPH
EXIST ADT (2019) = 6,143
PROPOSED ADT (2040) = 8,600
EXIST NBI NO. = 02-220-0-ZL67-85-004
NEW NBI NO. = 02-220-ZL67-85-006

◓ 3 - 60' PRESTRESSED CONCRETE BOX BEAM SPANS.



ELEVATION

HYDRAULIC DATA (EXISTING)	
Q10 = 9,750 CFS	Q100 = 15,800 CFS
V10 = 6.37 FPS	V100 = 7.60 FPS
HW10 = 559.09	HW100 = 562.50

HYDRAULIC DATA (PROPOSED)	
Q10 = 9,750 CFS	Q100 = 15,800 CFS
V10 = 6.29 FPS	V100 = 7.22 FPS
HW10 = 558.79	HW100 = 562.52

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
03/31/2023

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

Texas Department of Transportation

BRIDGE LAYOUT

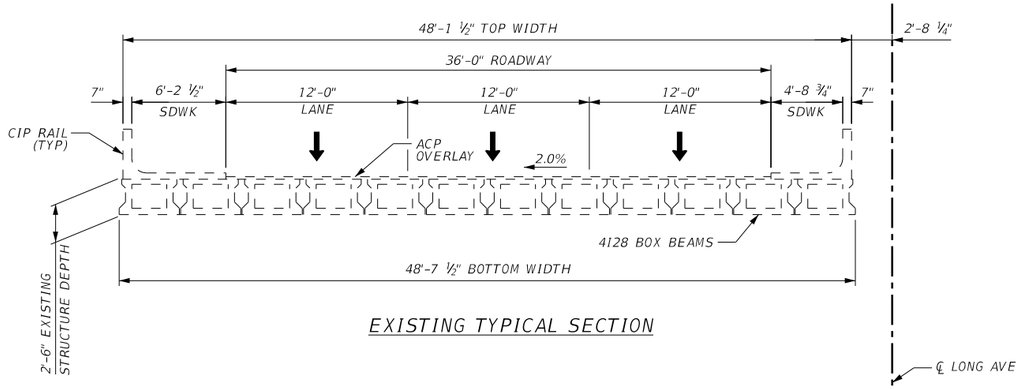
WB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: 1"=40' (H) 1"=40' (V) SHEET 1 OF 1

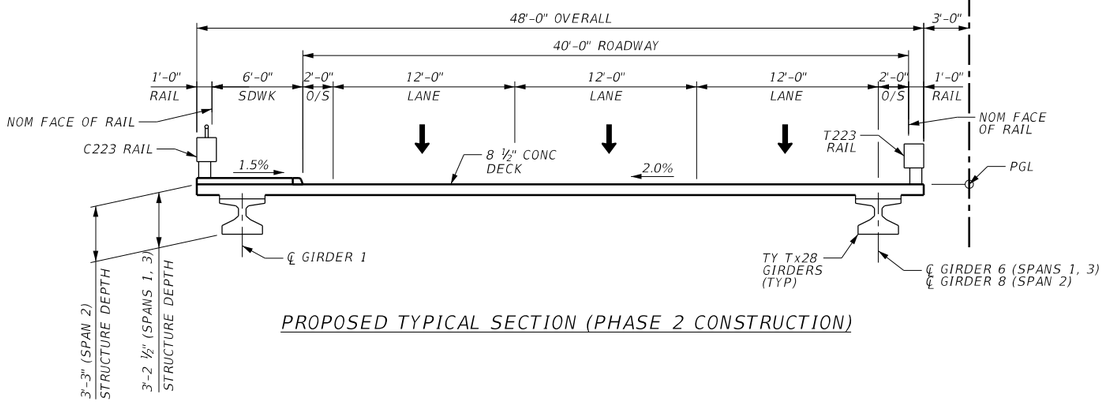
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	124
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894WB-BLOI.sht

TIME: 1:40:07 PM
DATE: 1/18/2023



EXISTING TYPICAL SECTION



PROPOSED TYPICAL SECTION (PHASE 2 CONSTRUCTION)

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

Lauren VanAndel

HL93 LOADING

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

Texas Department of Transportation

TYPICAL TRANSVERSE SECTIONS

WB LONG AVE AT LITTLE FOSSIL CREEK

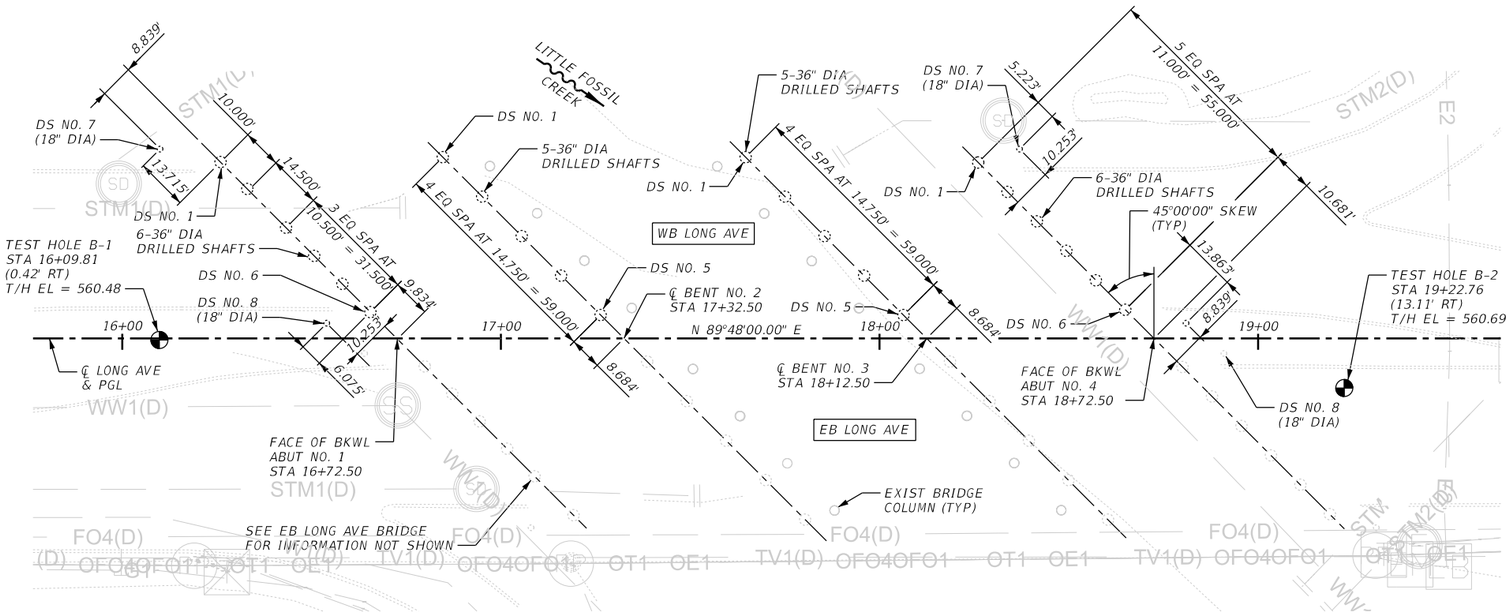
SCALE: N.T.S.

SHEET 1OF 1

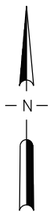
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	125
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894WB-BTYPOI.sht

TIME: 1:40:21 PM
DATE: 1/18/2023



PLAN



0 20 40
SCALE IN FEET

NOTES:

1. SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS.
2. SEE BRIDGE BORING LOG SHEETS FOR TEST HOLE INFORMATION.
3. CONTRACTOR TO FIELD VERIFY LOCATION AND STATUS OF EXISTING STRUCTURES AND UTILITIES PRIOR TO CONSTRUCTION.
4. THE CENTERLINE OF ALL BENTS AND ABUTMENTS ARE ON THE BEARING N 45°12'00.00" W.
5. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR FOUNDATION DETAILS NOT SHOWN.

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

FOUNDATION LAYOUT

WB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: 1"=40' SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	126
CHECK LVA	CONTROL 0902	SECTION 48	JOB 894	

FILE: ...\894WB-FLOI.sht

TIME: 1:40:35 PM
DATE: 1/18/2023

SUMMARY OF ESTIMATED QUANTITIES

ITEM / DESCRIPTION	400	416		420			422			425	442	450		454	496
	6005	6001	6004	6014	6030	6038	6002	6014	6016	6035	6007	6007	6033	6004	6010
	CEM STABIL BKFL	DRILL SHAFT (18 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT) (HPC) (1)	CL C CONC (CAP) (HPC) (1)	CL C CONC (COLUMN) (HPC)	REINF CONC SLAB (HPC)	BRIDGE SIDEWALK (HPC)	APPROACH SLAB (HPC)	PRESTR CONC GIRDER (TX28)	STR STL (MISC NON-BRIDGE)	RAIL (TY T223) (HPC)	RAIL (TY C223) (HPC)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 100-499 FT LENGTH)
	CY	LF	LF	CY	CY	CY	SF	SF	CY	LF	LB	LF	LF	LF	EA
2 ~ ABUTMENTS	294	108	324	77.5				504	169.4						
2 ~ INTERIOR BENTS			110		62.6	39.4									
1 ~ 200.00' PRESTR CONC GIRDER UNIT							9,600	1,400		1,348.80	160	236.0	236.0	112	
BRIDGE TOTAL	294	108	434	77.5	62.6	39.4	9,600	1,904	169.4	1,348.80	160	236.0	236.0	112	1

(1) QUANTITY INCLUDES SHEAR KEY.

BEARING SEAT ELEVATIONS

ABUT 1 (FWD)	GIRDER 1 556.619	GIRDER 2 556.913	GIRDER 3 557.200	GIRDER 4 557.481	GIRDER 5 557.754	GIRDER 6 558.020			
BENT 2 (FWD)	GIRDER 1 557.343	GIRDER 2 557.589	GIRDER 3 557.828	GIRDER 4 558.060	GIRDER 5 558.284	GIRDER 6 558.502	GIRDER 7 558.318	GIRDER 8 558.471	
(BK)	557.321	557.496	557.667	557.835	558.000	558.161			
BENT 3 (FWD)	GIRDER 1 557.757	GIRDER 2 557.886	GIRDER 3 558.010	GIRDER 4 558.132	GIRDER 5 558.249	GIRDER 6 558.363	GIRDER 7 558.474	GIRDER 8 558.580	
(BK)	557.802	557.979	558.149	558.312	558.468	558.617			
ABUT 4 (FWD)	GIRDER 1 557.723	GIRDER 2 557.851	GIRDER 3 557.973	GIRDER 4 558.088	GIRDER 5 558.195	GIRDER 6 558.296			

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

Texas Department of Transportation

ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS

WB LONG AVE AT LITTLE FOSSIL CREEK

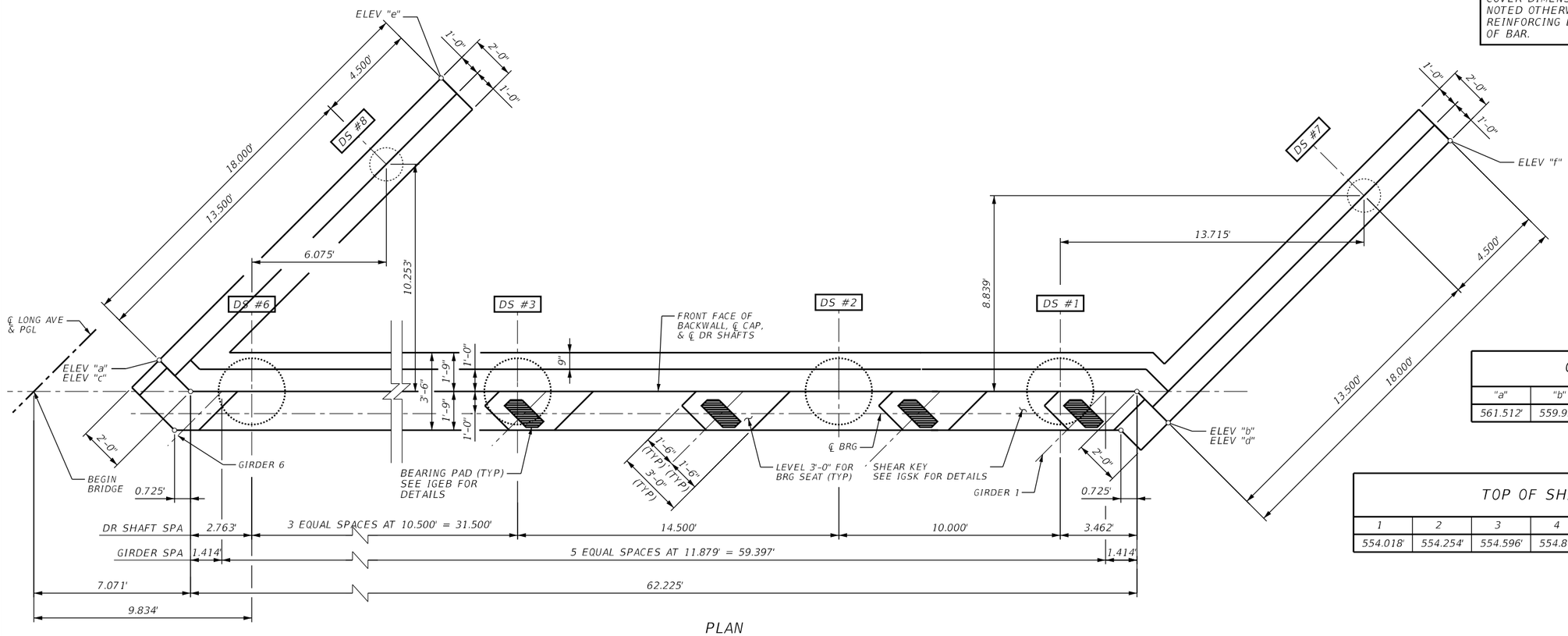
SCALE: N.T.S. SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	127
CHECK LVA	CONTROL 0902	SECTION 48	JOB 894	

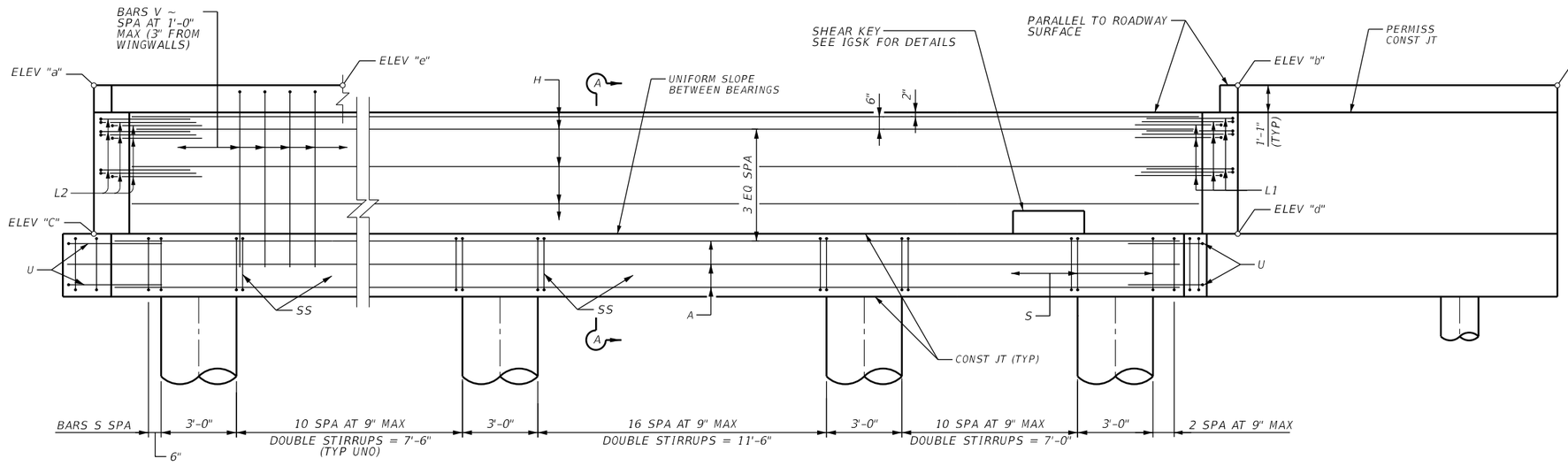
FILE: ...\894WB-QSOI.sht

TIME: 1:40:48 PM
DATE: 1/18/2023

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



PLAN



ELEVATION

CONTROL ELEVATIONS

"a"	"b"	"c"	"d"	"e"	"f"
561.512'	559.958'	557.971'	556.369'	561.292'	559.670'

TOP OF SHAFT ELEVATIONS

1	2	3	4	5	6	7	8
554.018'	554.254'	554.596'	554.844'	555.092'	555.339'	555.267'	553.700'

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

Texas Department of Transportation

ABUTMENT 1

WB LONG AVE AT LITTLE FOSSIL CREEK

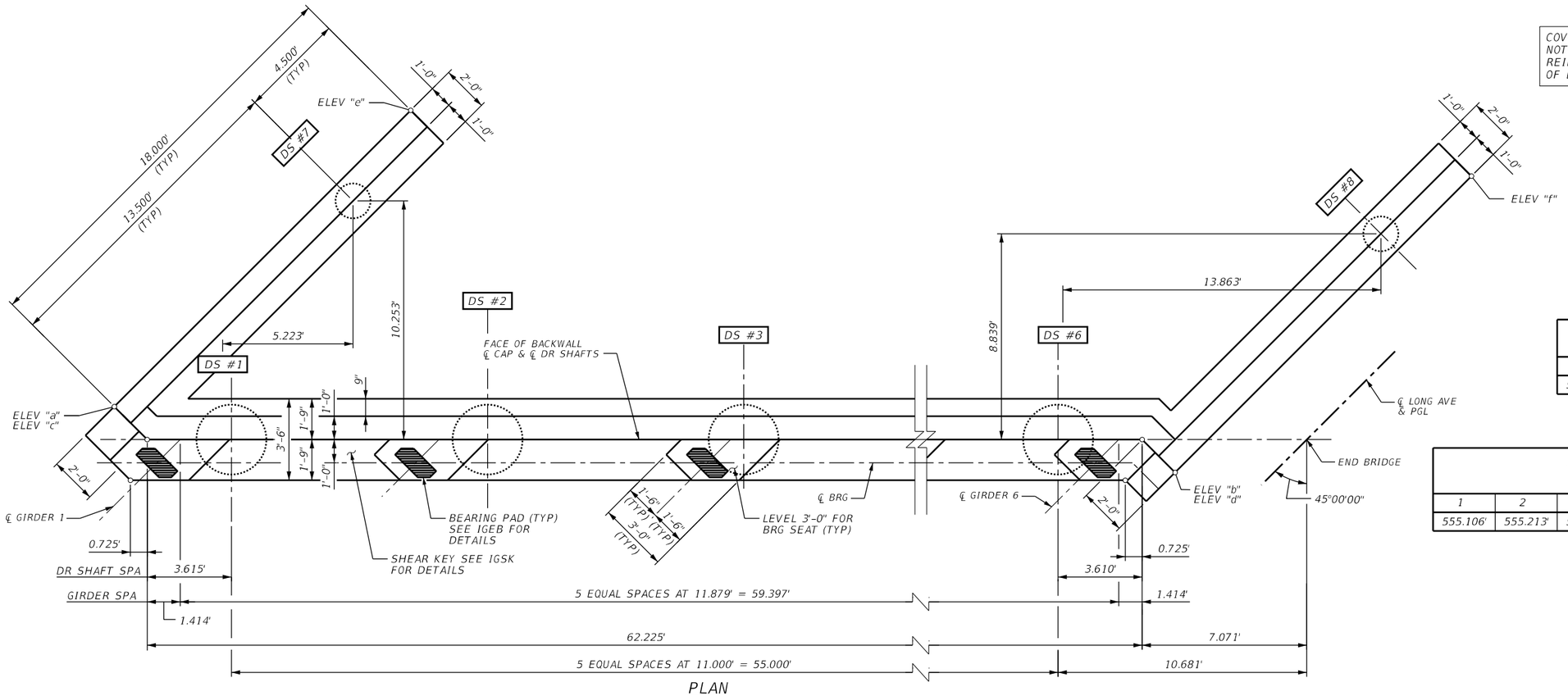
SCALE: N.T.S. SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	128
GRAPHICS	CONTROL	SECTION	JOB	
KC	0902	48	894	
CHECK				
LVA				

FILE: ...\894WB-AB01.sht

TIME: 1:41:00 PM
DATE: 1/18/2023

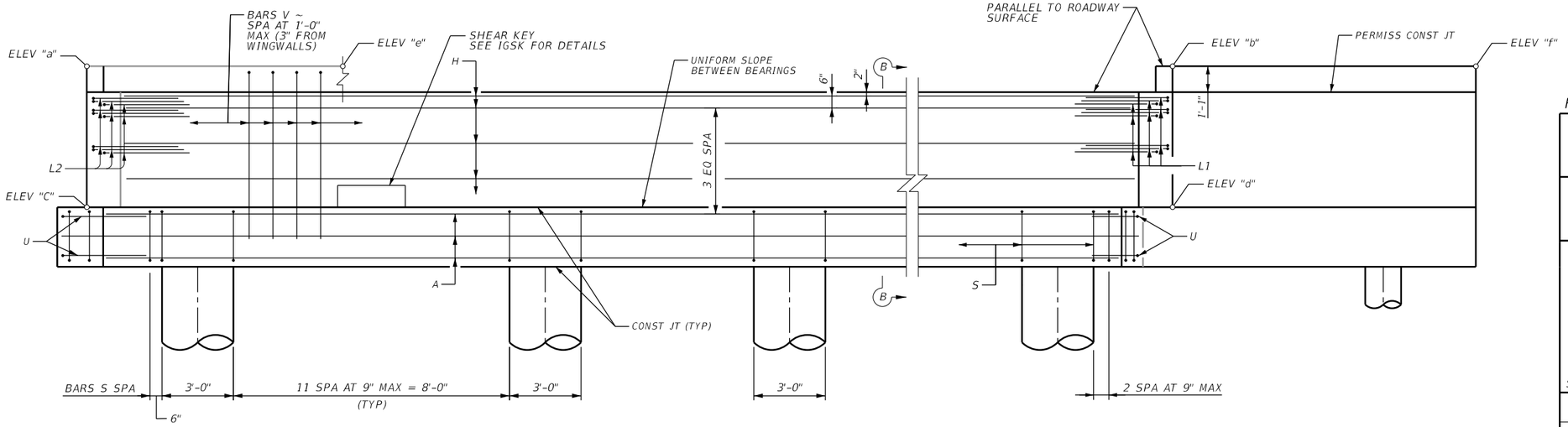
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.



PLAN

CONTROL ELEVATIONS					
"a"	"b"	"c"	"d"	"e"	"f"
561.098'	561.772'	557.544'	558.202'	561.004'	561.599'

TOP OF SHAFT ELEVATIONS							
1	2	3	4	5	6	7	8
555.106'	555.213'	555.320'	555.426'	555.533'	555.640'	555.563'	554.988'



ELEVATION

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

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

Texas Department of Transportation

ABUTMENT 4

WB LONG AVE AT LITTLE FOSSIL CREEK

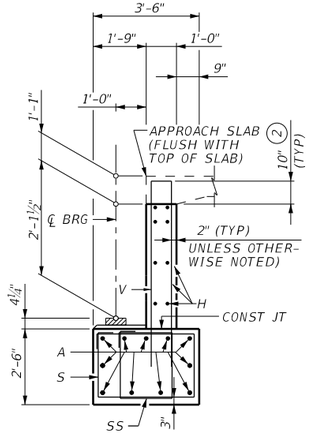
SCALE: N.T.S

SHEET 10F 1

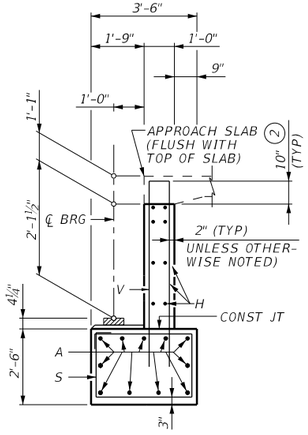
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS KC	TEXAS	FTW	TARRANT	129
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894WB-AB02.sht

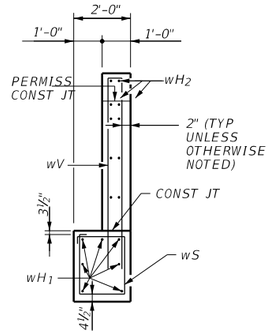
TIME: 1:41:13 PM
DATE: 1/18/2023



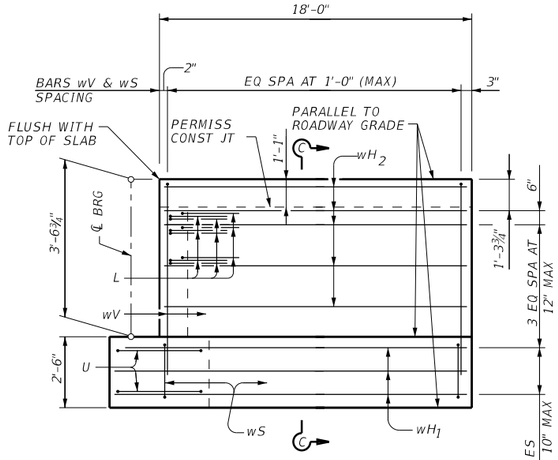
SECTION A-A



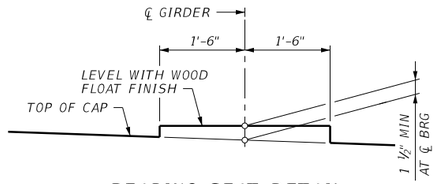
SECTION B-B



SECTION C-C

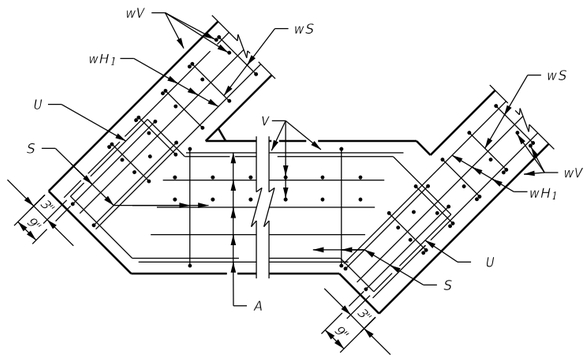


WINGWALL ELEVATION

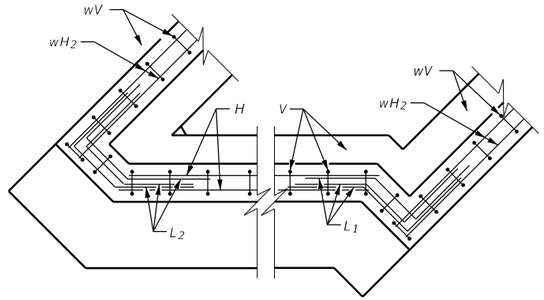


BEARING SEAT DETAIL

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

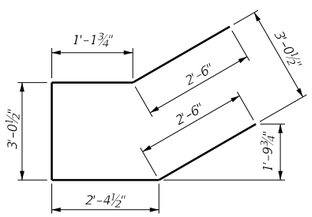


BACKWALL

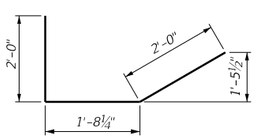


CAP

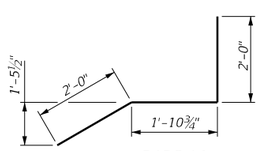
CORNER DETAILS



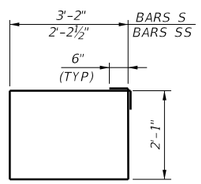
BARS U



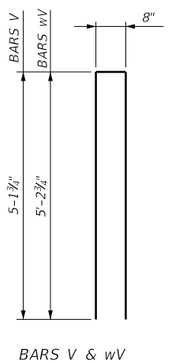
BARS L2



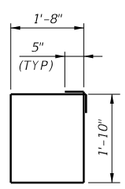
BARS L1



BARS S & SS



BARS V & wV



BARS wS

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, (2020), AS MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL (NOV 2021) AND BRIDGE DETAILING GUIDE (APR 2022).
2. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROSS SLOPE AND/OR SUPERELEVATIONS.
3. SEE BRIDGE LAYOUT FOR DRILLED SHAFT SIZES AND LENGTHS.
4. CALCULATED FOUNDATION SERVICE LOADS:
   ABUTMENT 1 ~ 98 TONS/SHAFT
   ABUTMENT 4 ~ 100 TONS/SHAFT.
5. SEE IGEB STANDARD FOR BEARING PAD DETAILS.
6. GIRDER & DRILLED SHAFT SPACINGS ARE MEASURED ALONG ℄ ABUT.
7. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR 18" & 36" DIA. DRILLED SHAFT DETAILS AND NOTES.
8. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS AND NOTES.
9. SEE T223 & C223 RAILS DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
10. SEE IGSK STANDARD FOR SHEAR KEY DETAILS.
11. INTENTIONALLY ROUGHEN CONSTRUCTION JOINTS PER TXDOT STANDARD SPECIFICATIONS ITEM 420.4.7.7.

MATERIAL NOTES:

CONCRETE STRENGTH SHALL BE CLASS "C" CONC (ABUT) (HPC), f'c = 3,600 PSI.

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

TABLE OF ESTIMATED QUANTITIES ABUTMENT 1

BAR	NO.	SIZE	LENGTH	WEIGHT
A	11	#11	62'-2"	3,633
H	8	#6	62'-2"	747
L_1	9	#6	5'-11"	80
L_2	9	#6	5'-8"	77
S	71	#5	11'-6"	852
SS	61	#5	9'-7"	610
U	4	#6	11'-7"	69
V	65	#5	11'-0"	743
wH_1	14	#6	19'-5"	408
wH_2	20	#6	17'-8"	531
wS	38	#4	7'-10"	199
wV	38	#5	11'-2"	441
REINFORCING STEEL (1)			LB	8,390
CLASS "C" CONC (ABUT) (HPC) (3)			CY	38.8

TABLE OF ESTIMATED QUANTITIES ABUTMENT 4

BAR	NO.	SIZE	LENGTH	WEIGHT
A	11	#11	62'-2"	3,633
H	8	#6	62'-2"	747
L_1	9	#6	5'-11"	80
L_2	9	#6	5'-8"	77
S	70	#5	11'-6"	840
U	4	#6	11'-7"	69
V	65	#5	11'-0"	743
wH_1	14	#6	19'-5"	408
wH_2	20	#6	17'-8"	531
wS	38	#4	7'-10"	199
wV	38	#5	11'-2"	441
REINFORCING STEEL (1)			LB	7,768
CLASS "C" CONC (ABUT) (HPC) (3)			CY	38.8

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

Texas Department of Transportation

ABUTMENT DETAILS

WB LONG AVE AT LITTLE FOSSIL CREEK

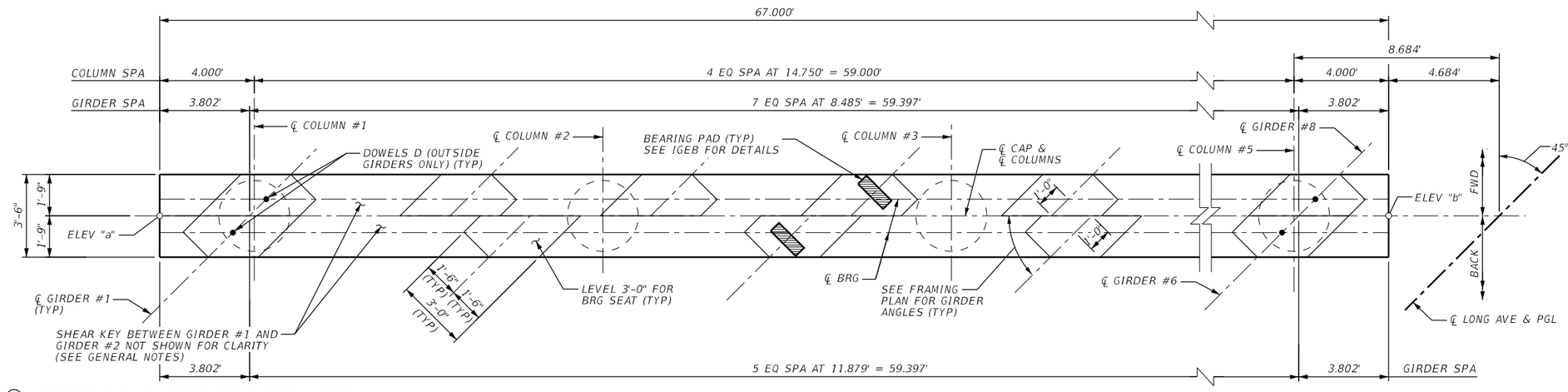
SCALE: N.T.S.

SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	130
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE:...\894WB-AB03.sht

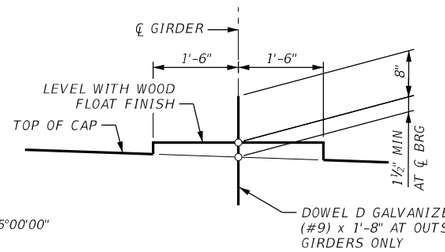
TIME: 1:41:28 PM
DATE: 1/18/2023



(1) MEASURED PARALLEL TO TOP OF CAP CROSS - SLOPE

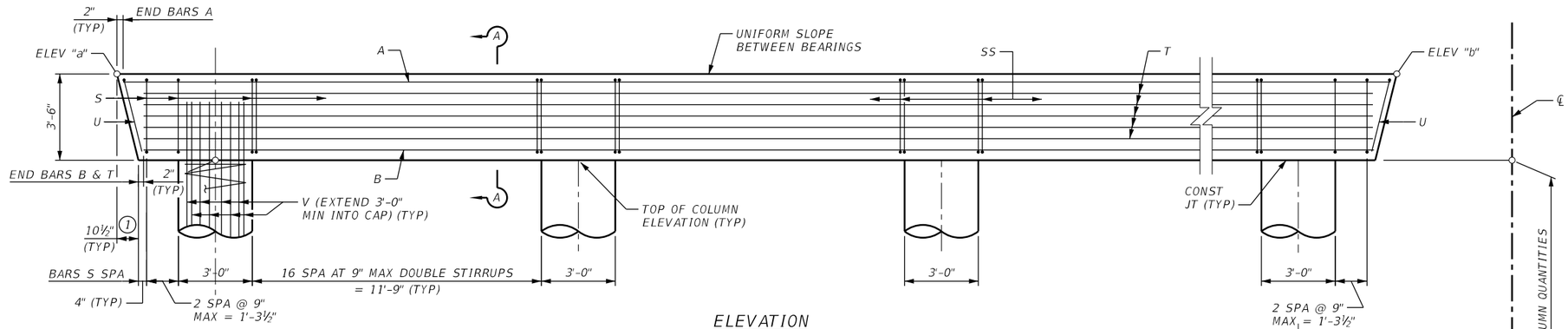
PLAN

(SHOWING BENT 2, BENT 3 IS SYMMETRIC)

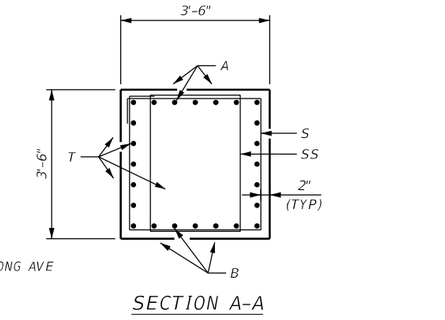


BEARING SEAT DETAIL

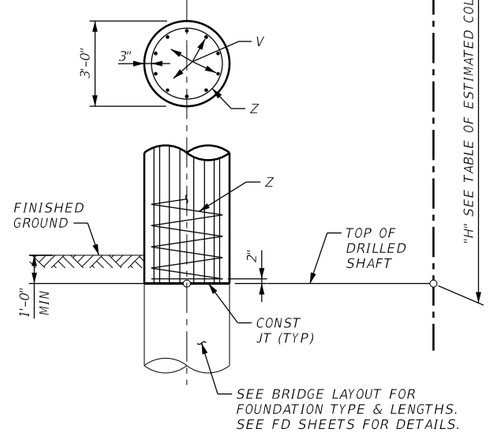
(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD)



ELEVATION



SECTION A-A



CONTROL ELEVATIONS		
	"a"	"b"
BENT 2	557.106'	558.406'
BENT 3	557.570'	558.494'

TOP OF COLUMN ELEVATIONS					
	1	2	3	4	5
BENT 2	553.684'	553.970'	554.256'	554.542'	554.828'
BENT 3	554.125'	554.329'	554.532'	554.736'	554.939'

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED PROFESSIONAL ENGINEER
F-2966

02/08/2023

HL93 LOADING

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

Texas Department of Transportation

BENT 2 & 3

WB LONG AVE AT LITTLE FOSSIL CREEK

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
LVA	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	131
KC	0902	48	894	
CHECK				
LVA				

FILE: ...\894WB-BEOI.sht

TIME: 1:41:42 PM
DATE: 1/18/2023

TABLE OF ESTIMATED (7) COLUMN QUANTITIES

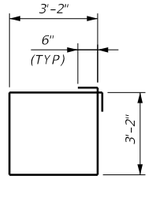
BENT NO.	COL NO.	"H" HEIGHT (FT)	BARS V 10 ~ #9 EA COL		BARS Z #4 EA COL		REINF (2) STEEL	CLASS "C" CONC (COL) (HPC)
			LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
2	1	15	18'-0"	612	494'-10"	331	943	3.94
	2	15	18'-0"	612	494'-10"	331	943	3.94
	3	15	18'-0"	612	494'-10"	331	943	3.94
	4	15	18'-0"	612	494'-10"	331	943	3.94
	5	15	18'-0"	612	494'-10"	331	943	3.94
3	1	15	18'-0"	612	494'-10"	331	943	3.94
	2	15	18'-0"	612	494'-10"	331	943	3.94
	3	15	18'-0"	612	494'-10"	331	943	3.94
	4	15	18'-0"	612	494'-10"	331	943	3.94
	5	15	18'-0"	612	494'-10"	331	943	3.94
						TOTALS	9,430	39.4

(7) QUANTITIES SHOWN ARE BASED ON "H" VALUE GIVEN IN TABLE OF COLUMN QUANTITIES. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE OF A COLUMN, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 31'-5"
REINFORCING STEEL, 63 LB
CLASS "C" CONC (HPC) (COL), 0.26 CY

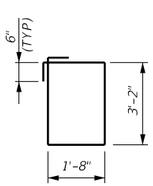
TABLE OF ESTIMATED (3) BENT CAP QUANTITIES

	BAR	NO.	SIZE	LENGTH	WEIGHT
(4)	A	7	#11	66'-6"	2,474
(5)	B	7	#11	65'-0"	2,417
	D	4	#9	1'-8"	23
	S	74	#5	13'-8"	1,055
	SS	68	#5	10'-8"	757
(6)	T	10	#5	65'-0"	678
	U	2	#5	9'-8"	20
REINFORCING STEEL (2)				LB	7,424
CLASS "C" CONC (CAP) (HPC) (8)				CY	31.3

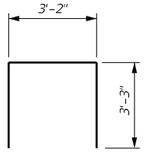
(2) FOR CONTRACTOR'S INFORMATION ONLY.
(3) QUANTITIES SHOWN FOR ONE BENT.
(4) INCLUDES ONE 6'-10" LAP.
(5) INCLUDES ONE 5'-3" LAP.
(6) INCLUDES ONE 1'-10" LAP.
(8) SHEAR KEY QUANTITY IS INCLUDED.



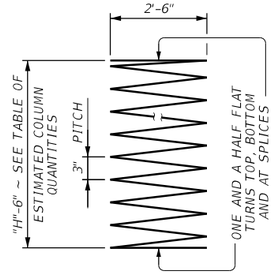
BARS S



BARS SS



BARS U



BARS Z

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, (2020), AS MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL (NOV 2021) AND BRIDGE DETAILING GUIDE (APR 2022).
2. SEE BRIDGE LAYOUT FOR DRILLED SHAFT SIZES & LENGTHS.
3. CALCULATED FOUNDATION SERVICE LOADS: 187 TONS/SHAFT.
4. SEE IGEB STANDARD FOR BEARING PAD DETAILS.
5. SEE IGSK STANDARD FOR SHEAR KEY DETAILS.
6. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROSS-SLOPE AND/OR SUPERELEVATIONS.
7. GIRDER, COLUMN & DRILLED SHAFT SPACINGS ARE MEASURED ALONG ℄ BENT.
8. INTENTIONALLY ROUGHEN CONSTRUCTION JOINTS PER TXDOT STANDARD SPECIFICATIONS ITEM 420.4.7.7.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'_c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE DOWEL BARS D.

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

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

BENT 2 & 3

WB LONG AVE AT LITTLE FOSSIL CREEK

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS KC	TEXAS	FTW	TARRANT	132
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

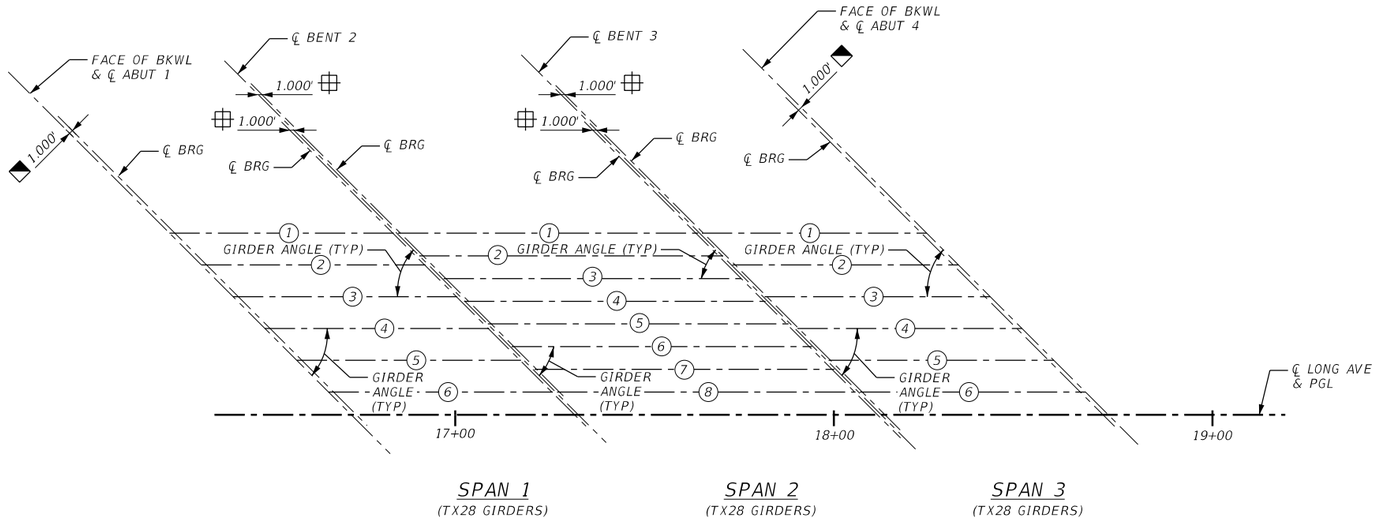
FILE: ...\894WB-BE02.sht

TIME: 1:41:54 PM
DATE: 1/18/2023

MEASURED PERPENDICULAR TO FRONT FACE OF ABUTMENT BACKWALL

MEASURED ALONG ℄ GIRDER

GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE



BENT REPORT

ABUT NO. 1 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 67.8823 L

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 1	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			

BENT NO. 2 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 67.8823 L

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 1	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			
SPAN 2	GIRDER 1	0.000	45	0	0
	GIRDER 2	8.485	45	0	0
	GIRDER 3	8.485	45	0	0
	GIRDER 4	8.485	45	0	0
	GIRDER 5	8.485	45	0	0
	GIRDER 6	8.485	45	0	0
	GIRDER 7	8.485	45	0	0
	GIRDER 8	8.485	45	0	0
	TOTAL	59.397			

BENT NO. 3 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 67.8823 L

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 2	GIRDER 1	0.000	45	0	0
	GIRDER 2	8.485	45	0	0
	GIRDER 3	8.485	45	0	0
	GIRDER 4	8.485	45	0	0
	GIRDER 5	8.485	45	0	0
	GIRDER 6	8.485	45	0	0
	GIRDER 7	8.485	45	0	0
	GIRDER 8	8.485	45	0	0
	TOTAL	59.397			
SPAN 3	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			

ABUT NO. 4 (N 45° 12' 00.00" W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 67.8823 L

		GIRDER SPAC. (C.L. ABUT)	GIRDER ANGLE D	M	S
SPAN 3	GIRDER 1	0.000	45	0	0
	GIRDER 2	11.879	45	0	0
	GIRDER 3	11.879	45	0	0
	GIRDER 4	11.879	45	0	0
	GIRDER 5	11.879	45	0	0
	GIRDER 6	11.879	45	0	0
	TOTAL	59.397			

GIRDER REPORT

GIRDER REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GR. FLG.	GIRDER SLOPE
GIRDER 1	60.000	57.586	59.40	0.0126
GIRDER 2	60.000	57.586	59.40	0.0117
GIRDER 3	60.000	57.586	59.40	0.0109
GIRDER 4	60.000	57.586	59.40	0.0101
GIRDER 5	60.000	57.586	59.40	0.0092
GIRDER 6	60.000	57.586	59.40	0.0083

GIRDER REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GR. FLG.	GIRDER SLOPE
GIRDER 1	80.000	78.000	79.50	-0.0056
GIRDER 2	80.000	78.000	79.50	-0.0050
GIRDER 3	80.000	78.000	79.50	-0.0044
GIRDER 4	80.000	78.000	79.50	-0.0038
GIRDER 5	80.000	78.000	79.50	-0.0032
GIRDER 6	80.000	78.000	79.50	-0.0026
GIRDER 7	80.000	78.000	79.50	-0.0020
GIRDER 8	80.000	78.000	79.50	-0.0014

GIRDER REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GR. FLG.	GIRDER SLOPE
GIRDER 1	60.000	57.586	59.40	-0.0014
GIRDER 2	60.000	57.586	59.40	-0.0022
GIRDER 3	60.000	57.586	59.40	-0.0031
GIRDER 4	60.000	57.586	59.40	-0.0039
GIRDER 5	60.000	57.586	59.40	-0.0047
GIRDER 6	60.000	57.586	59.40	-0.0056

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

Texas Department of Transportation

BRIDGE FRAMING PLAN

WB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: N.T.S.

SHEET 10F 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	133
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894WB-FMOI.sht

TIME: 1:42:07 PM
DATE: 1/18/2023

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB (HPC)	BRIDGE SIDEWALK (HPC)	PRESTR CONCRETE GIRDERS (Tx28) ③	REINF STEEL ①②	STR STL (MISC NON-BRIDGE)
NO.	SF	SF	LF	LB	LB
1	2,880	420	356.40	6,624	80
2	3,840	560	636.00	8,832	
3	2,880	420	356.40	6,624	80
TOTAL	9,600	1,400	1,348.80	22,080	160

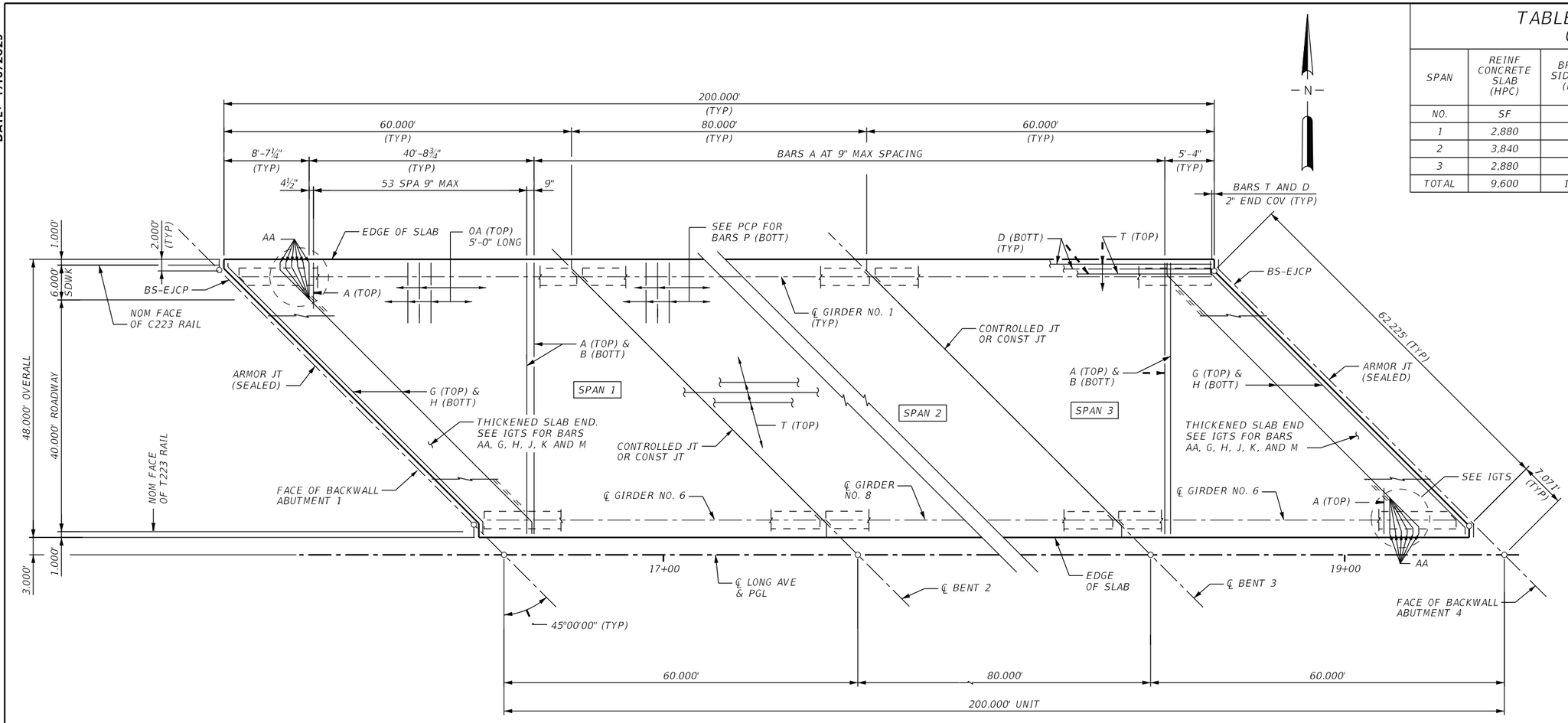
BAR TABLE

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

① FOR CONTRACTOR'S INFORMATION ONLY.

② REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

③ QUANTITIES SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE. SEE FRAMING PLAN SHEET FOR GIRDER.



PLAN

GENERAL NOTES:

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

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

SEE IGMS STANDARD FOR MISCELLANEOUS SLAB DETAILS.

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

SEE PCP(0) AND PCP(0)-FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.

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

SEE C223 AND T223 STANDARDS FOR RAIL ANCHORAGE IN SLAB.

SEE ARMOR JOINT STANDARD FOR DETAILS OF JOINT TO BE PLACED WITHIN SLAB.

CONCRETE COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE.

SEE BRSM STANDARD FOR SIDEWALK DETAILS AND ANCHORAGE INTO SLAB.

SEE BS-EJCP STANDARD FOR SIDEWALK COVER PLATE DETAILS.

MATERIAL NOTES:

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

PROVIDE GRADE 60 REINFORCING STEEL (EPOXY COATED).

BAR LAPS, WHERE REQUIRED, ARE AS FOLLOWS:
EPOXY COATED ~ #4 = 2'-5"
#5 = 3'-0"

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/08/2023

Lauren Van Andel

HL93 LOADING

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

Texas Department of Transportation

200.00' PRESTRESSED CONCRETE GIRDER UNIT

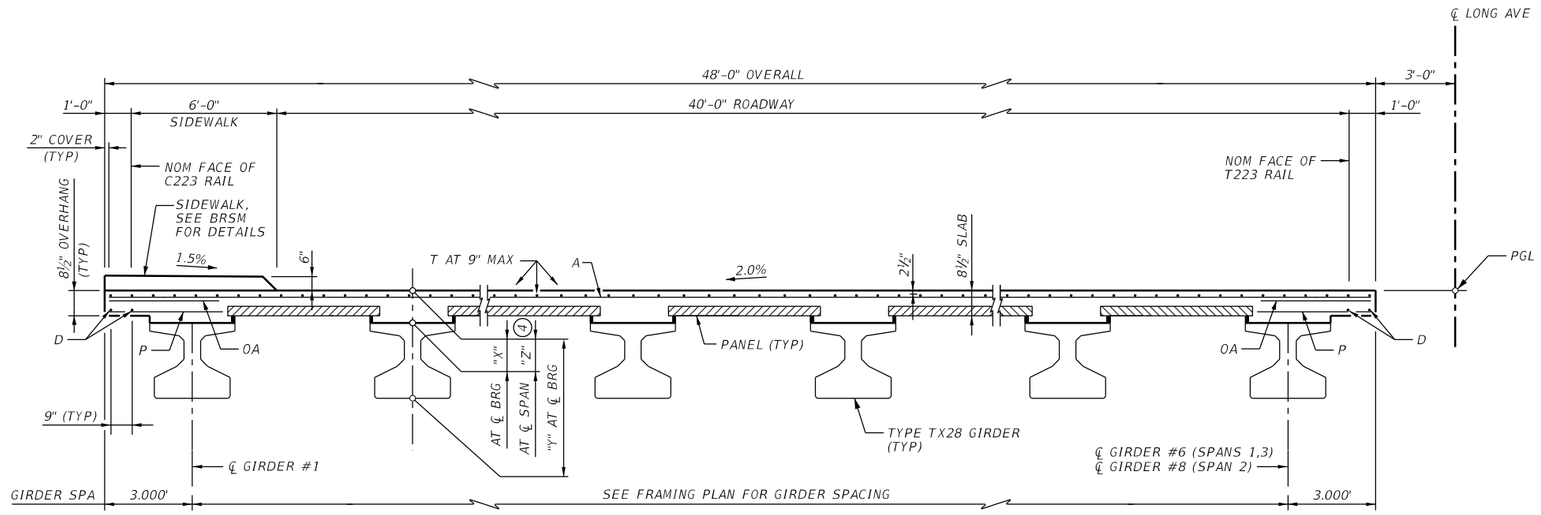
WB LONG AVE AT LITTLE FOSSIL CREEK

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS VH	TEXAS	FTW	TARRANT	134
CHECK LVA	CONTROL 0902	SECTION 48	JOB 894	

FILE: ...\894WB-SBOI.sht

TIME: 1:42:20 PM
DATE: 1/18/2023



TYPICAL TRANSVERSE SECTION

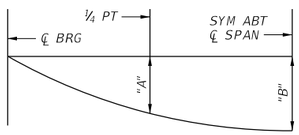
(4) THEORETICAL DIMENSION

TABLE OF DEAD LOAD DEFLECTIONS

SPAN NO.	GIRDER NO.	"A"	"B"
		FT	FT
1	1,6	-0.042	-0.060
	2-5	-0.049	-0.070
2	1-8	-0.118	-0.168
3	1,6	-0.042	-0.060
	2-5	-0.049	-0.070

TABLE OF SECTION DEPTHS

SPAN NO.	GIRDER NO.	"X" AT ℄ BRG	"Y" AT ℄ BRG	"Z" AT (4) ℄ SPAN
1	1,6	10½"	38½"	9⅜"
	2-5	10½"	38½"	9½"
2	1-8	11"	39"	9⅜"
3	1,6	10½"	38½"	9⅜"
	2-5	10½"	38½"	9½"



DEAD LOAD DEFLECTION DIAGRAM

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

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/08/2023

HL93 LOADING

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

Texas Department of Transportation

200.00' PRESTRESSED CONCRETE GIRDER UNIT

WB LONG AVE AT LITTLE FOSSIL CREEK

SCALE: N.T.S.

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
BB	6	(See Title Sheet)		CS
CHECK LVA	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS AG	TEXAS	FTW	TARRANT	135
CHECK LVA	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\894WB-SB02.sht

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) f'ct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) f'cb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv	
WB LONG AVENUE BRIDGE AT LITTLE FOSSIL CREEK	1 & 3	ALL	Tx28		20	0.6	270	9.88	5.88	4	24.5	4.000	7.000	2.442	-3.140	2,376	0.621	1.035	1.53	1.98	1.14	
	2	ALL	Tx28		32	0.6	270	9.11	5.73	6	24.5	6.000	8.500	3.861	-4.603	3,212	0.471	0.839	1.52	2.04	1.10	

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.

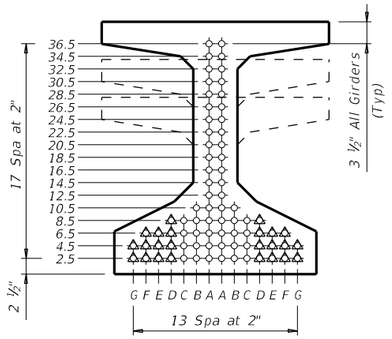
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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.

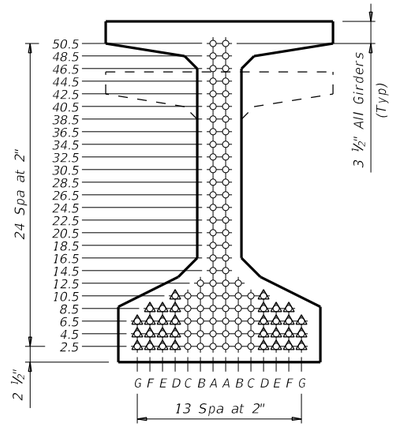
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

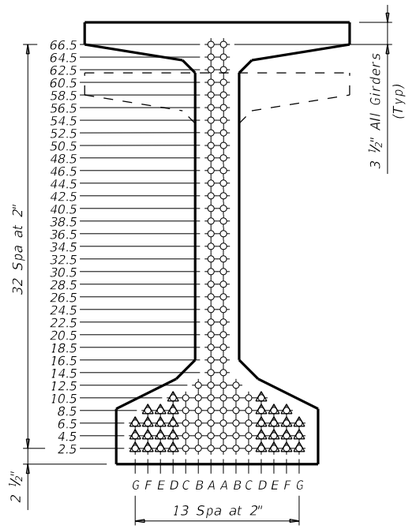
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands 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, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

Jacobs Engineering Group
STATE OF TEXAS
LAUREN VAN ANDEL
111751
LICENSED
PROFESSIONAL ENGINEER
F-2966

Lauren VanAndel
03/31/2023

Texas Department of Transportation | Bridge Division Standard

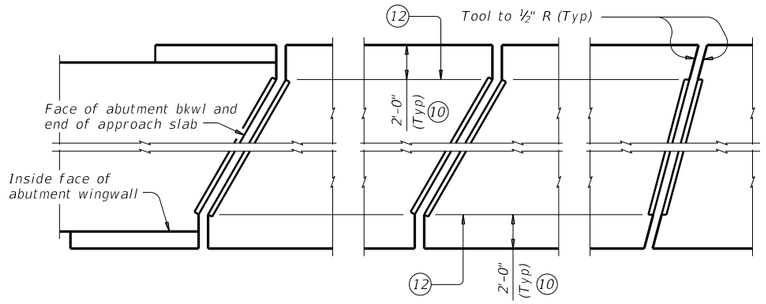
PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

FILE: 894WB-IGND.sht	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only. 3-22: Added Load Rating.	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		136

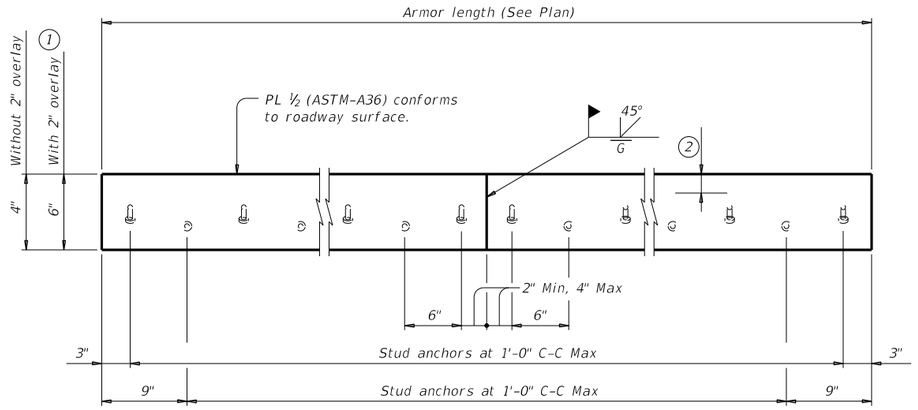
DATE:
FILE:

DATE: 1/18/2023 1:42:56 PM
FILE: ...\Long Ave\894ajstde01-19.dgn



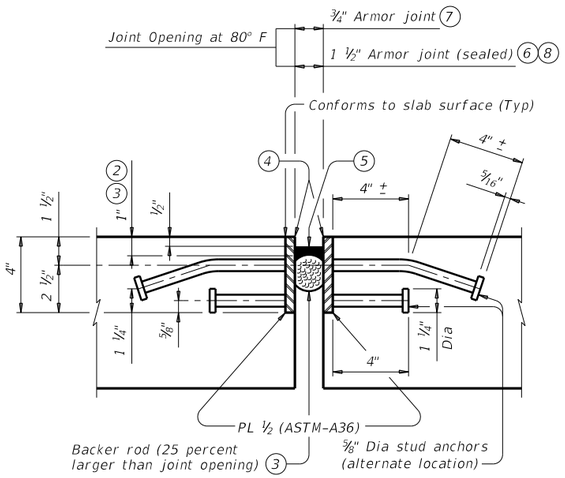
JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES

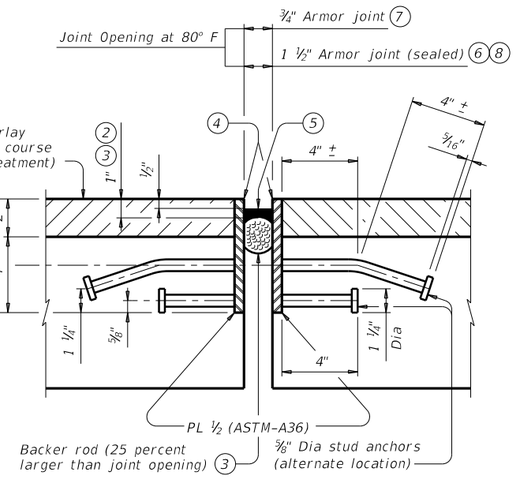


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor joint does not include joint sealant or backer rod.
8. Armor joint (sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



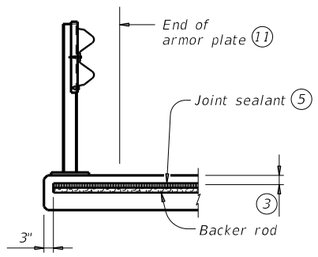
SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



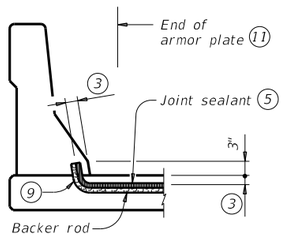
SHOWN WITH 2" OVERLAY AT JOINT LOCATION 1

ARMOR JOINT SECTIONS

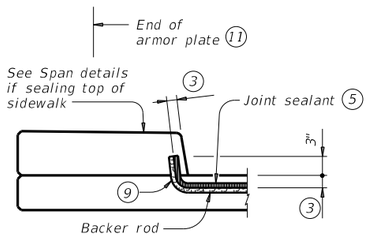
Showing Armor Joint (Sealed)



AT STEEL POST BRIDGE RAIL



AT CONCRETE BRIDGE RAIL



AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

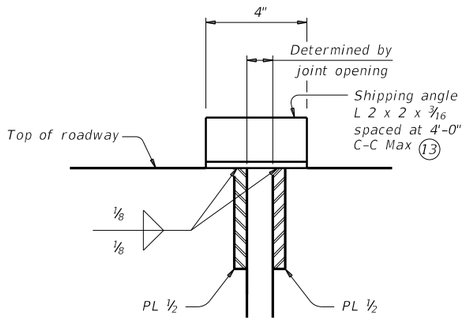
Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION
With overlay similar

SHIPPING ANGLE

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

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

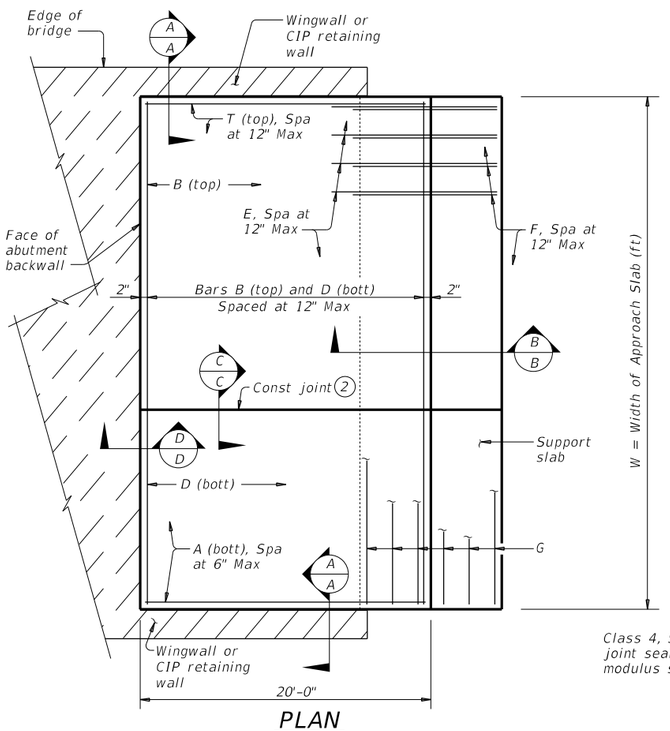
Texas Department of Transportation

Bridge Division Standard

ARMOR JOINT DETAILS

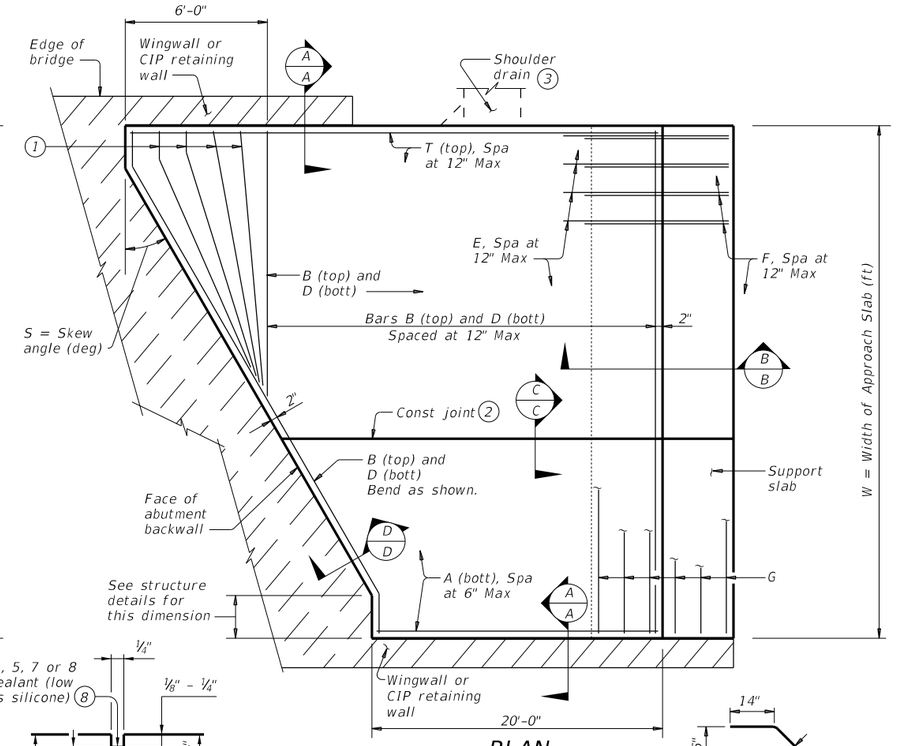
AJ

FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		137



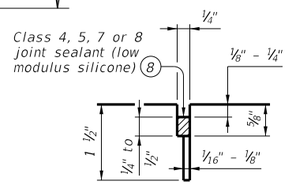
PLAN

(Showing non-skewed approach slab.)

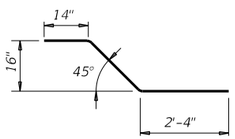


PLAN

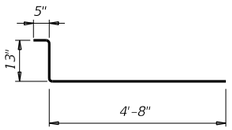
(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL



BARS E (#5)



BARS F (#5)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.057W – 0.008W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab only.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

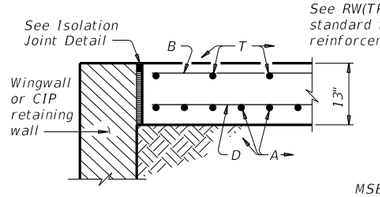
(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(7) See details elsewhere in plans for required cross-slope.

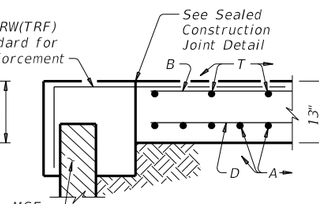
(8) Place in accordance with Item 438.

(9) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(10) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

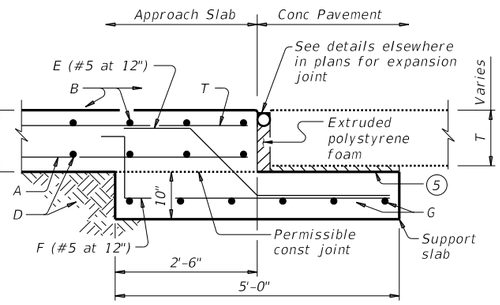


SHOWING WINGWALL OR CIP RETAINING WALL

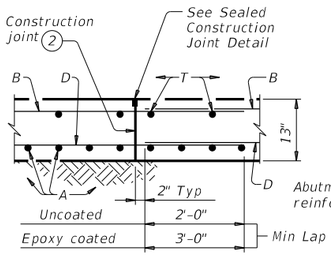


SHOWING MSE WALL

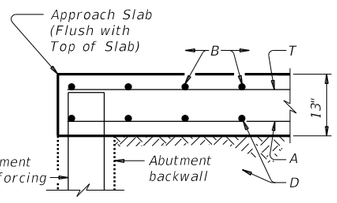
SECTION A-A



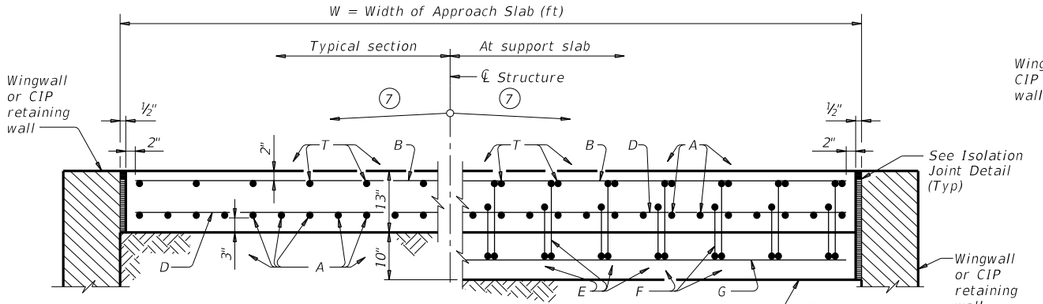
SECTION B-B



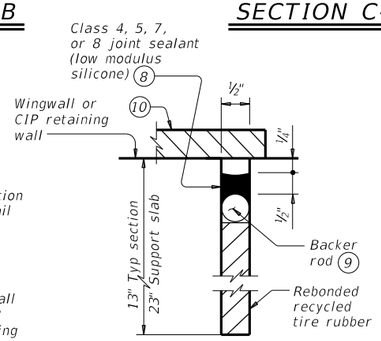
SECTION C-C (6)



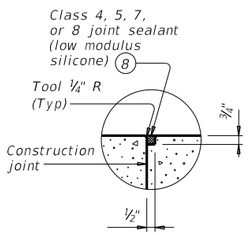
SECTION D-D



TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

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

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

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

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

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

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

All details shown herein are subsidiary to bridge approach slab.

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

Texas Department of Transportation

Bridge Division Standard

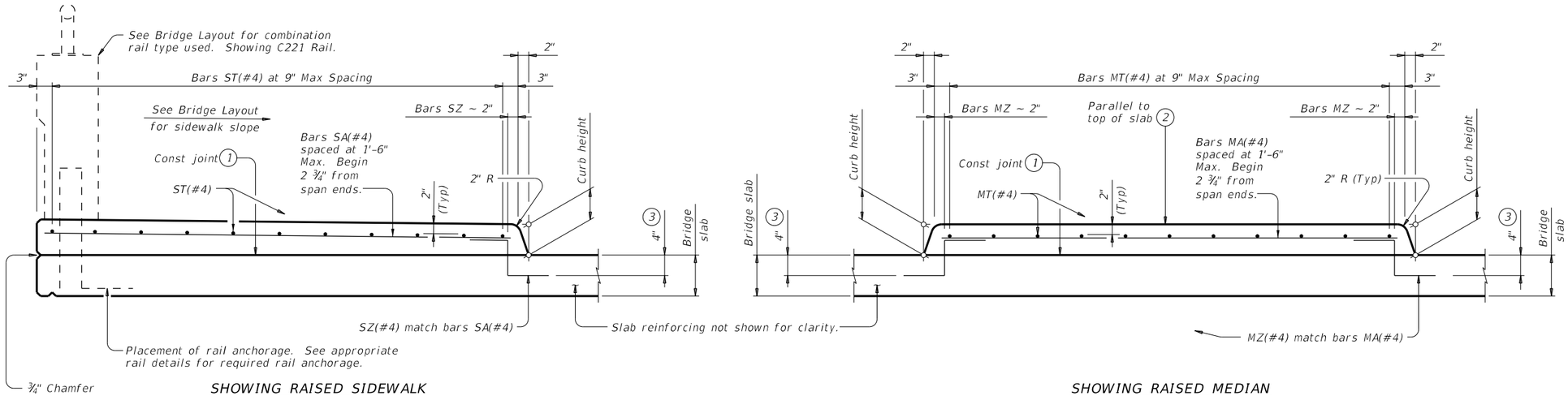
BRIDGE APPROACH SLAB

CONCRETE PAVEMENT

BAS-C

FILE: bascste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		138

DATE: 1/18/2023 1:43:10 PM
FILE: ...\Long Ave\894bascste1-20.dgn



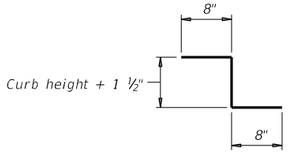
TYPICAL TRANSVERSE SECTIONS

See Span Details for dimensions not shown.

(1) Provide broom finish to top of bridge slab where raised sidewalk or raised median area is defined.

(2) Unless noted otherwise on the span details.

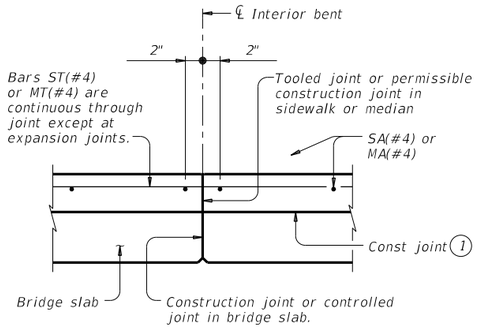
(3) Bars may rest on top of PCPs.



BARS SZ(#4) AND MZ(#4)

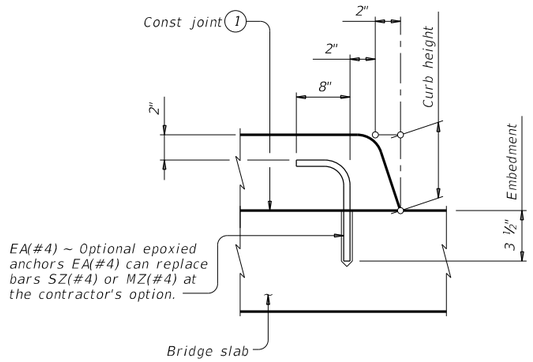
APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

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



LONGITUDINAL SECTION AT INTERIOR BENT

At bents with expansion joints, provide an open joint in the sidewalk/median matching the deck's joint width.



OPTIONAL EPOXY ANCHORS

Embed EA(#4) bar into concrete with a Type III (Class C, D, E, or F) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Follow manufacturer's directions for installing the epoxied anchor bars.

MATERIAL NOTES:

Provide the same concrete required for the bridge deck, Class S or Class S (HPC) concrete.

Provide Grade 60 reinforcing steel. Deformed welded wire reinforcement (WWR) meeting ASTM A1064 of equivalent size and spacing may be substituted for bars SA, ST, MA, and MT.

Provide epoxy coat or galvanize reinforcement if bridge deck reinforcement is required to be epoxy coated or galvanized.

Provide hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".

Chamfer or round edges approximately 1/16" prior to galvanizing.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide the following bar or wire lap lengths when required:
- Uncoated, 1'-7" Min
- Coated, 2'-5" Min

Submittal and approval of drain cover plate shop drawings is not required if fabrication is accordance with these details.

Raised sidewalks will be paid under Item 422 by the SF of Bridge Sidewalk or Bridge Sidewalk (HPC). Raised medians will be paid under Item 422 by the SF of Bridge Median or Bridge Median (HPC).

Payment for drain cover plates will be by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures". Weight of one drain cover plate is 48 plf.

DESIGNER NOTES:

These details do not apply for longitudinal grades exceeding 5 percent.

Cover dimensions are clear dimensions, unless noted otherwise.

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

Texas Department of Transportation

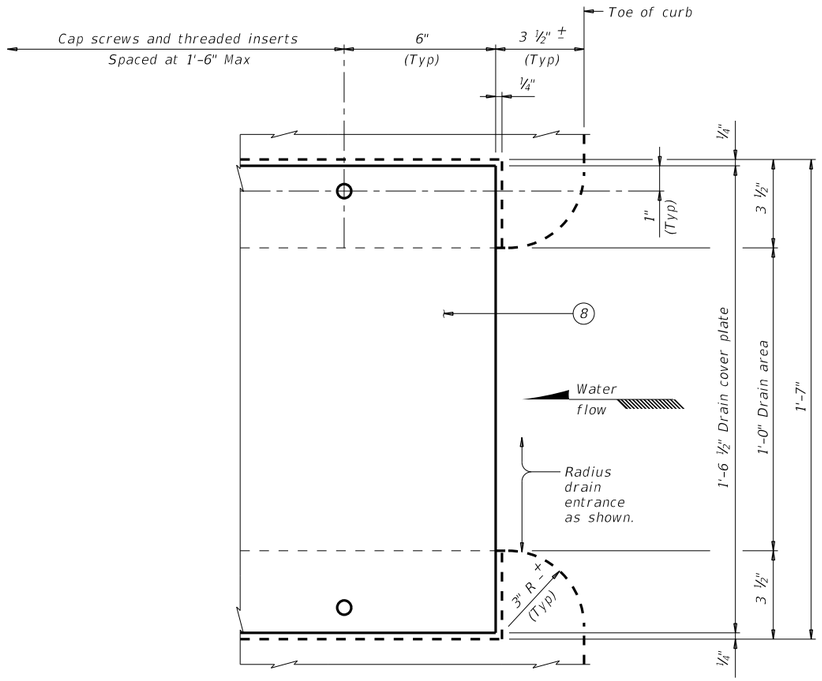
Bridge Division Standard

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

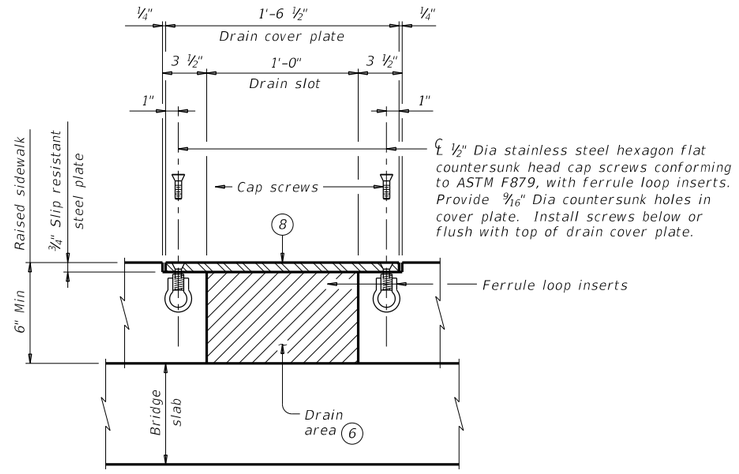
BRSM

FILE: brsmste1-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		139

DATE: 1/18/2023 1:43:24 PM
FILE: ...\Long Ave\894brsmste1-19.dgn

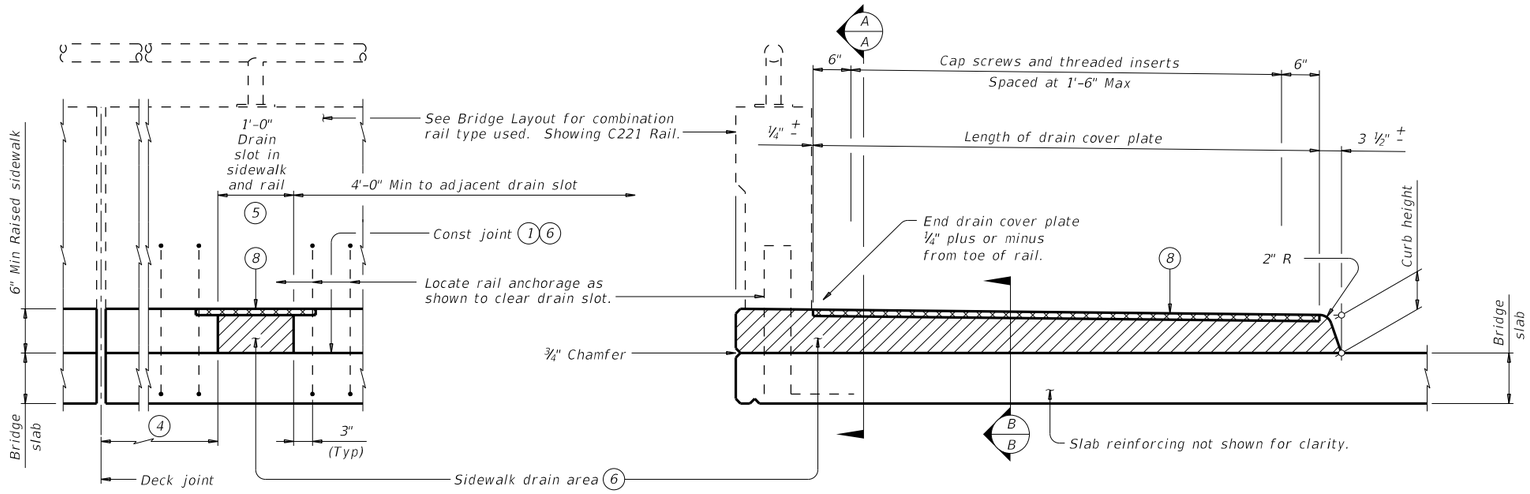


PARTIAL PLAN CURB DRAIN



SECTION B-B

Reinforcing not shown for clarity.



SECTION A-A

SHOWING RAISED SIDEWALK WITH DRAIN SLOT

OPTIONAL DRAIN DETAILS (7)

(1) Provide broom finish to top of bridge slab where raised sidewalk or raised median area is defined.

(4) 3'-0" Min at deck expansion joints, deck construction joints or controlled joints, rail intermediate wall joints or from face of substructure.

(5) For rail Type C1W, center drain slots between posts.

(6) Steel trowel top surface of bridge deck in drain locations.

(7) Provide sidewalk drains where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. Place drain and cover plate perpendicular to toe of rail.

(8) Drain cover plate (PL ¾ x 18 ½ slip resistant steel plate). Install flush with top of sidewalk.

SHEET 2 OF 2

Texas Department of Transportation

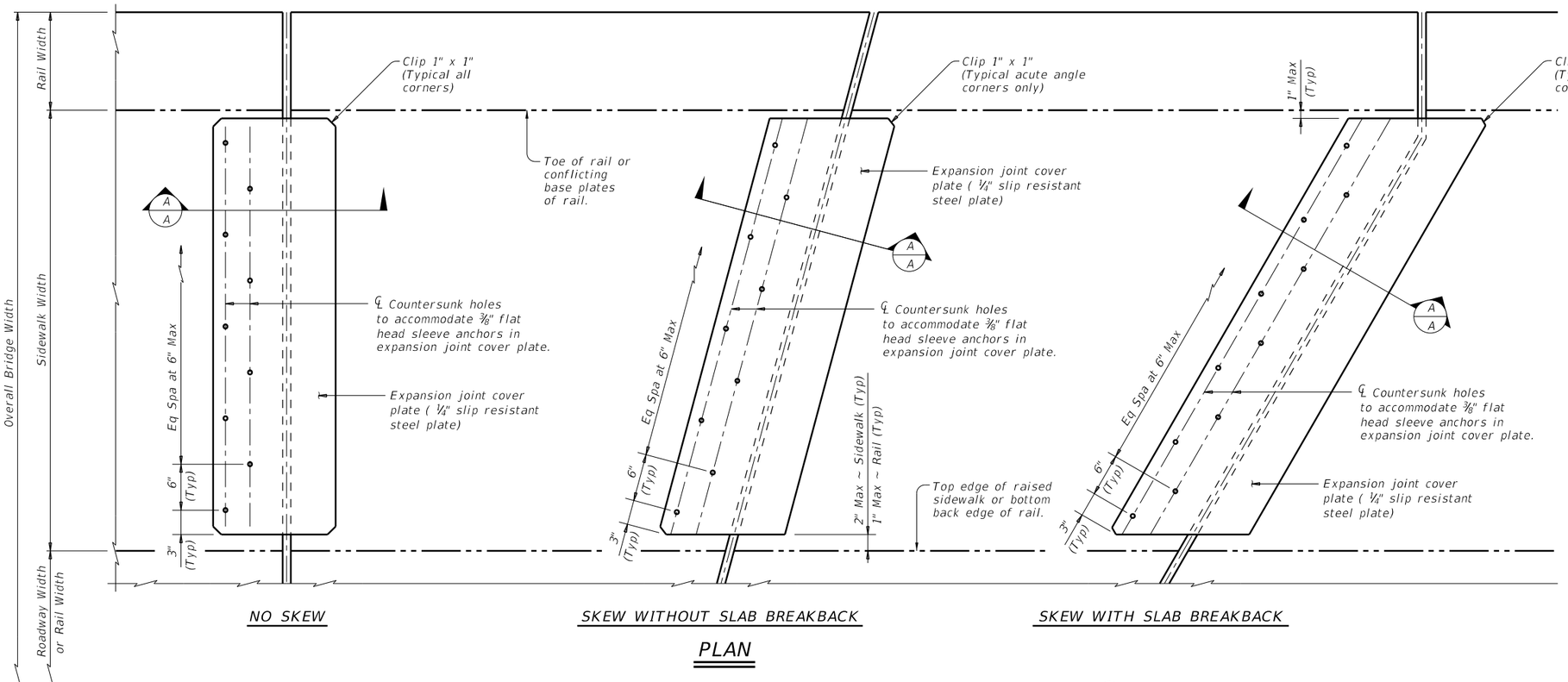
Bridge Division Standard

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

BRSM

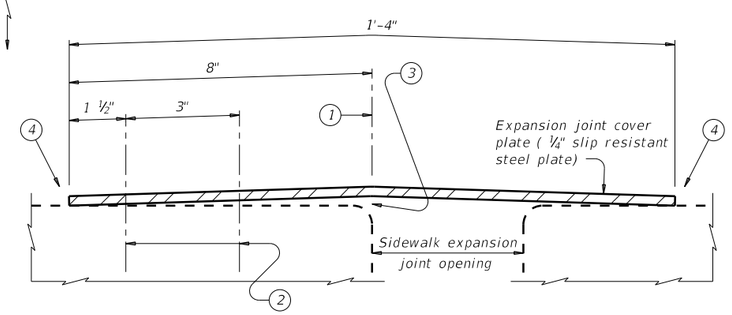
FILE: brsmste1-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		140

DATE: 1/18/2023 1:43:24 PM
FILE: ...\Long Ave\894brsmste1-19.dgn

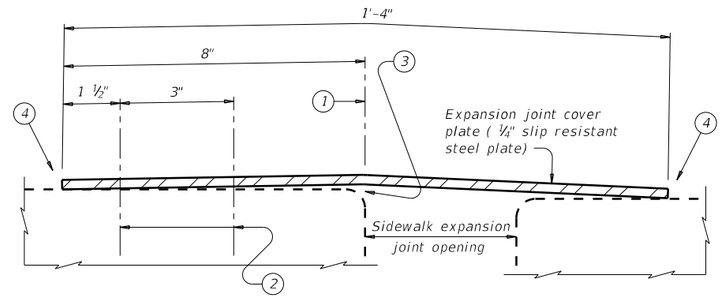


NO SKEW | SKEW WITHOUT SLAB BREAKBACK | SKEW WITH SLAB BREAKBACK

PLAN



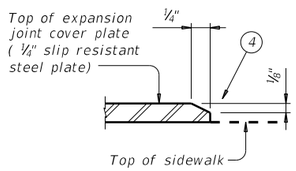
SHOWING LEVEL EXP JOINT



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

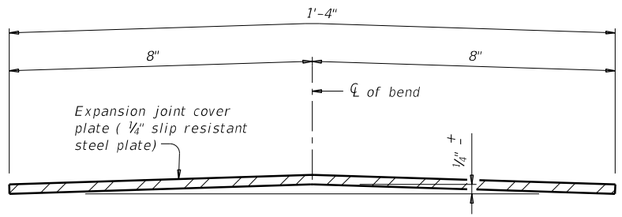
SECTION A-A

1. ℄ Expansion joint cover plate and edge of expansion joint.
2. ℄ ⅜" x 2 ½" Min, Flat Head Sleeve Anchors, Stainless Steel. Countersink Flat Head Sleeve Anchors in ¼" Slip Resistant Steel Plate.
3. It is not necessary to remove plate crown provided the plate is firmly secured to the sidewalk.
4. Transverse edges must be in contact with sidewalk surface after installation.



EXP JOINT COVER PLATE BEVEL DETAIL

Bevel all plate edges as shown.



BENDING DIAGRAM OF EXP JOINT COVER PLATE

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

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

FABRICATION NOTES:

Shop drawings for the fabrication of Bridge Sidewalk Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve anchors and orientation of all cover plate sections must be developed by the fabricator. Mark each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate Layout. A copy of the Bridge Sidewalk Expansion Joint Cover Plate Layout is to be provided to the Engineer.

Sidewalk expansion joint cover plates must be hot-dipped galvanized ¼" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films and non-metallic coatings.

Minimum required yield strength of steel plate is 36 ksi.

Hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".

Provide stainless steel flat head sleeve anchors meeting the requirements of ASTM F 593, Group I, Alloy 304. Countersink holes in slip-resistant plate for sleeve anchors. Drill holes in sidewalk as per sleeve anchor manufacturer's recommendations. Install sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.

GENERAL NOTES:

Sidewalk expansion joint cover plates can only accommodate up to a 7" maximum expansion joint opening.

Details provided are applicable to concrete walkway surfaces only.

Payment for sidewalk expansion joint cover plates are by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures".

Estimated weight of one sidewalk expansion joint cover plate is 14 plf.

Texas Department of Transportation

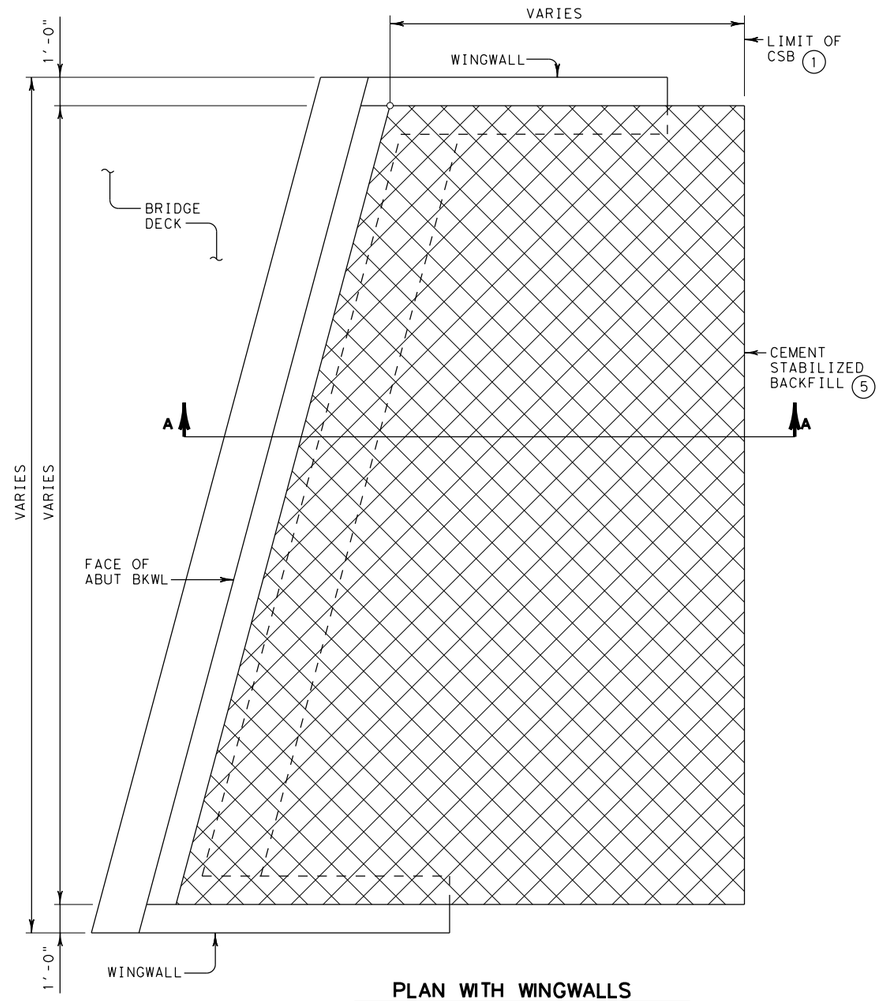
Bridge Division Standard

BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)

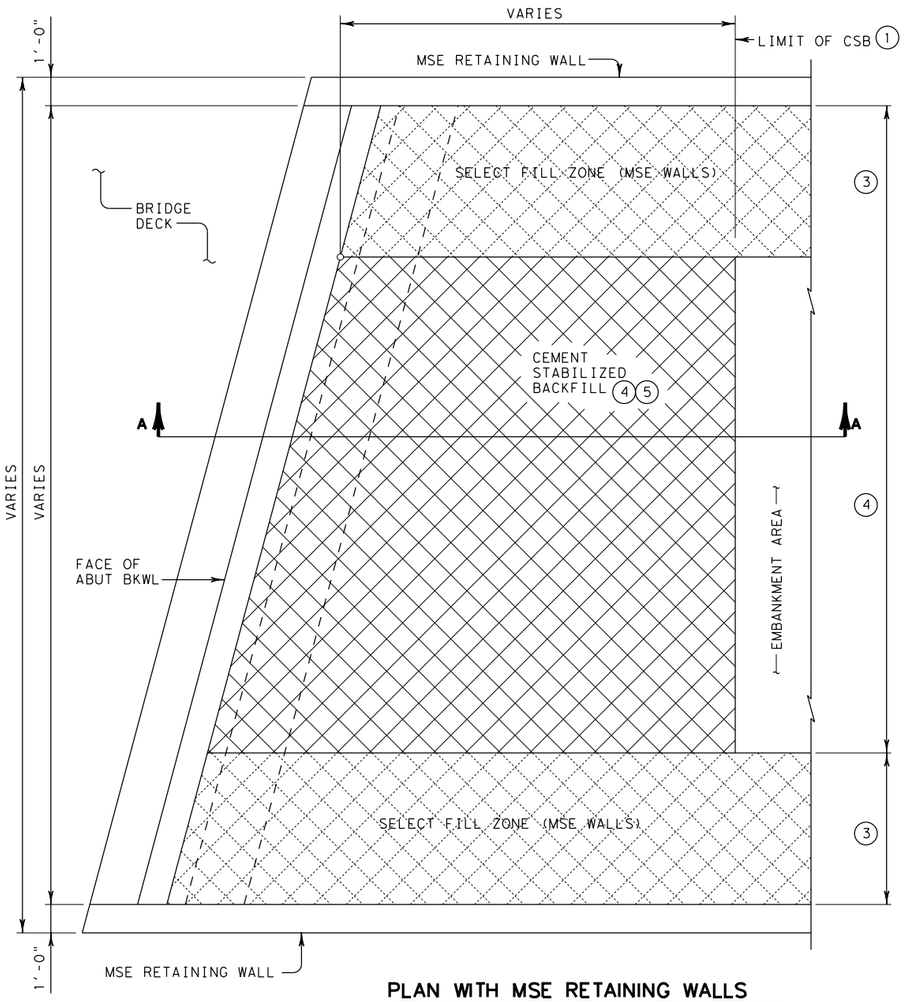
BS-EJCP

FILE: bsejste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
8-20: Closer tolerances on cover plate.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		141

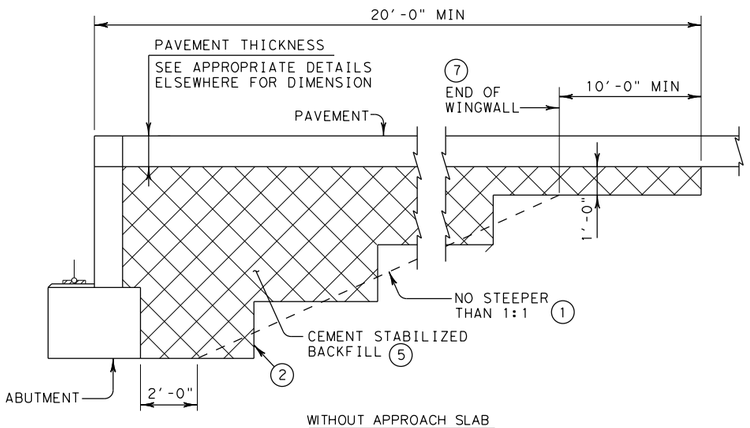
DATE: 1/18/2023 1:43:38 PM
FILE: ...\Long Ave\894bsejste1-20.dgn



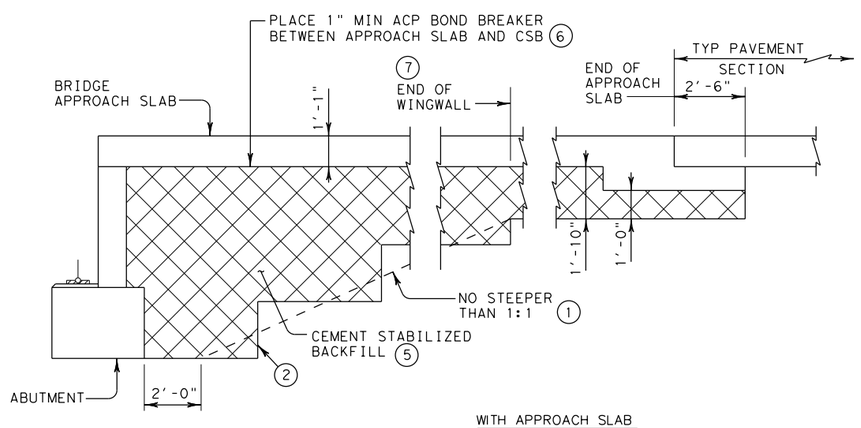
PLAN WITH WINGWALLS
CAST-IN-PLACE RETAINING WALLS SIMILAR



PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



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

SECTION A-A

GENERAL NOTES

1. PROVIDE CEMENT STABILIZED BACKFILL (CSB) MEETING THE REQUIREMENTS OF ITEM 400, "EXCAVATION AND BACKFILL FOR STRUCTURES", TO THE LIMITS SHOWN AT BRIDGE ABUTMENTS. PLACE CSB IN ACCORDANCE WITH ITEM 400.
2. DETAILS ARE DRAWN SHOWING LEFT FORWARD SKEW. SEE BRIDGE LAYOUT FOR ACTUAL SKEW.
3. THESE DETAILS DO NOT APPLY WHEN CONCRETE BLOCK RETAINING WALLS ARE USED IN LIEU OF WINGWALLS. CONTACT THE BRIDGE DIVISION FOR MORE INFORMATION.

(1) USUAL LIMIT OF CEMENT STABILIZED BACKFILL IS AT 20' FROM BACK OF ABUTMENT BACKWALL, IF NO APPROACH SLAB, OR AT END OF SUPPORT SLAB IF APPROACH SLAB IS USED.

(2) BENCH BACKFILL AS SHOWN WITH 12"(APPROXIMATE) BENCH DEPTHS.

(3) WHERE MSE RETAINING WALLS ARE PRESENT, ADJUST CSB LIMITS TO ACCOMMODATE THE SELECT FILL ZONE. SEE RETAINING WALL DETAILS FOR ADDITIONAL INFORMATION.

(4) WHEN DISTANCE BETWEEN SELECT FILL ZONES IS LESS THAN 5'-0", MSE SELECT FILL MAY BE SUBSTITUTED FOR CEMENT STABILIZED BACKFILL WITH APPORVAL FROM THE ENGINEER.

(5) IF APPROVED BY THE ENGINEER, "NON-EXCAVATABLE" FLOWABLE BACKFILL, AS DEFINED BY ITEM 401, TABLE 2, MAY BE USED AS A SUBSTITUTE FOR CEMENT STABILIZED BACKFILL, WITH THE FOLLOWING CONSTRAINTS:
   a. IF FLOWABLE BACKFILL IS TO BE PLACED OVER MSE BACKFILL, PLACE A FILTER FABRIC OVER THE MSE BACKFILL; AND
   b. PLACE FLOWABLE FILL IN LIFTS NOT EXCEEDING 2 FEET IN DEPTH; PLACE EACH SUCCESSIVE LIFT WHEN THE PREVIOUS LIFT HAS STIFFENED/HARDENED (HAS LOST ITS FLOWABILITY).
   c. NO ADJUSTMENT IN PAYMENT WILL BE MADE FOR SUBSTITUTION OF FLOWABLE FILL IN LIEU OF CEMENT STABILIZED BACKFILL.

(6) OTHER MATERIALS MAY BE USED AS A BOND BREAKER IF PERMITTED BY THE ENGINEER. 2 LAYERS OF 30 LB ROOFING FELT OR 2 LAYERS OF HEAVY MIL POLYETHYLENE SHEETING ARE EXAMPLES. BOND BREAKER WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

(7) 10'-0" FROM BACK OF ABUTMENT BACKWALL, IF NO WINGWALLS.

Texas Department of Transportation

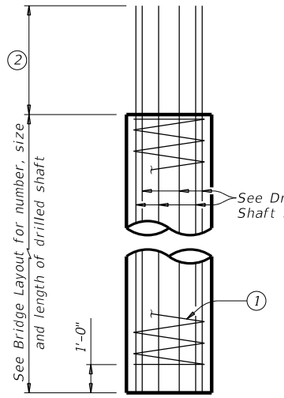
Fort Worth District Standard

CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT

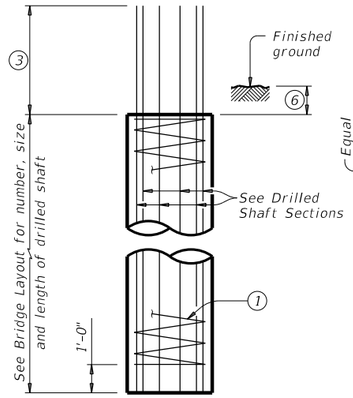
CSAB (FTW)

ORIGINAL DRAWING: 05/2019 csab-ftw.dgn		PROJECT NO.			SHEET NO.
DATE	REVISIONS	(See Title Sheet)			142
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
11/2020	REVISE NOTES; ELIMINATE SKEWED END.	TEXAS	FTW	TARRANT	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0902	48	894	CS

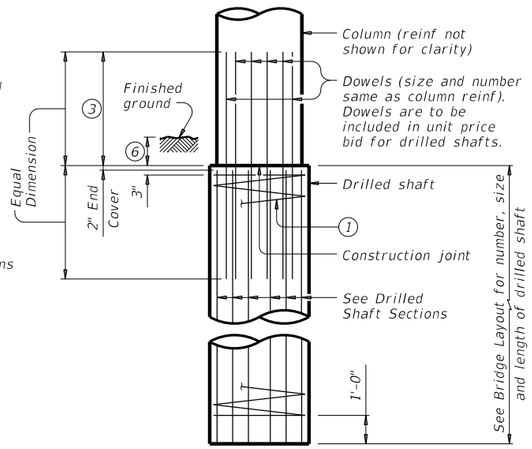
http://www.dot.state.tx.us/ftw/specinfo/standard.htm
1/18/2023 1:43:51 PM
$PATH$
:: \Long Ave\894csab-ftw.dgn



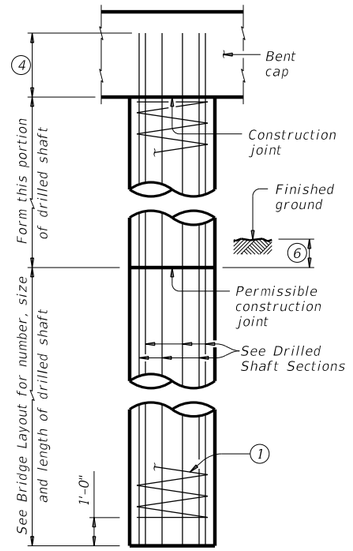
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



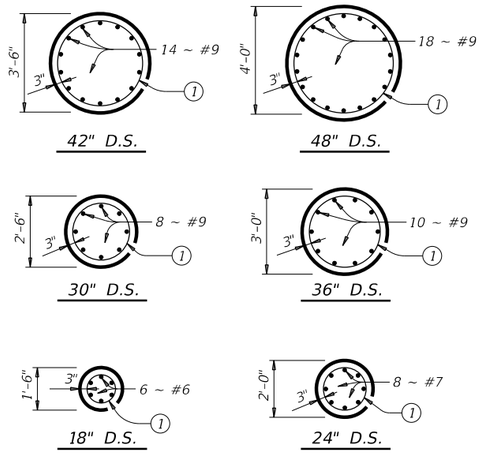
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

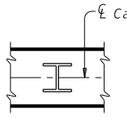


DRILLED SHAFT SECTIONS

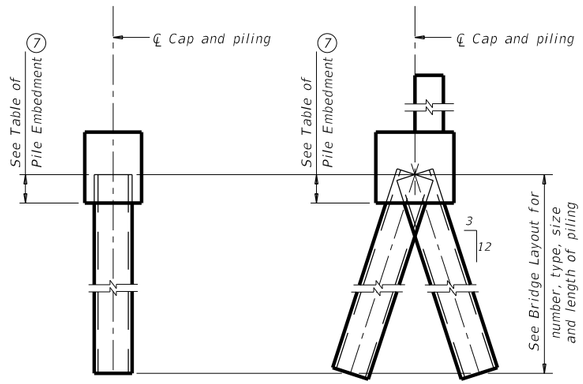
DRILLED SHAFT DETAILS

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"

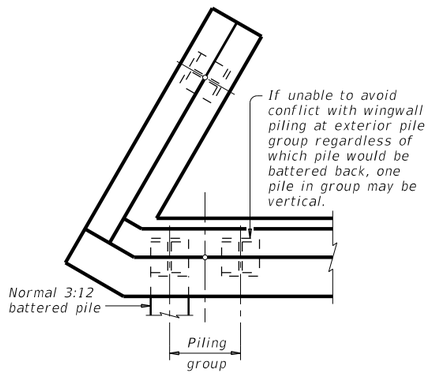
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



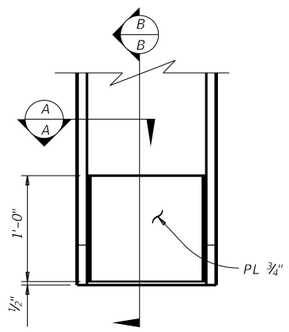
ORIENTATION OF STEEL H-PILING



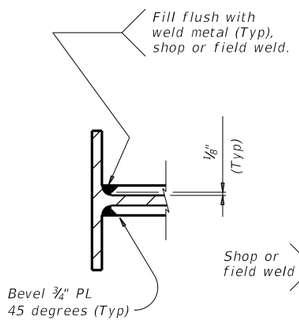
PILING DETAILS
(Concrete or steel H)



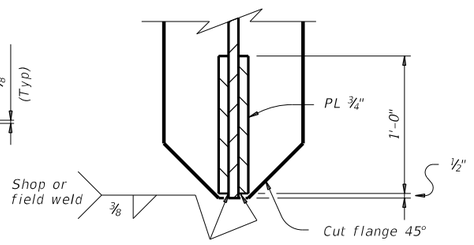
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



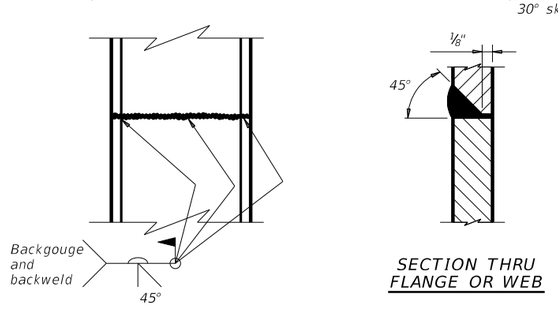
SECTION A-A



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

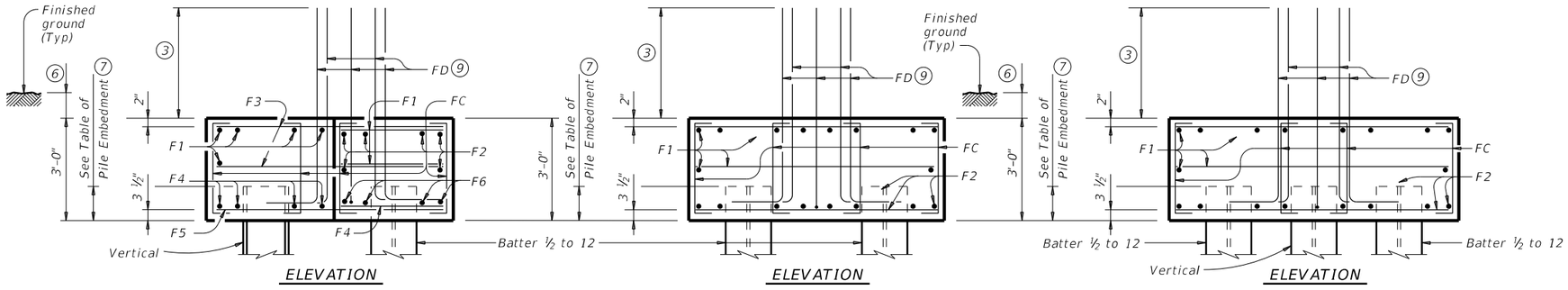
Bridge Division Standard

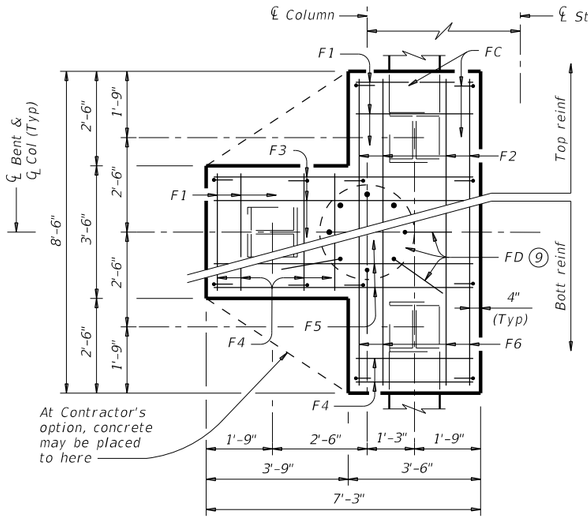
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		143

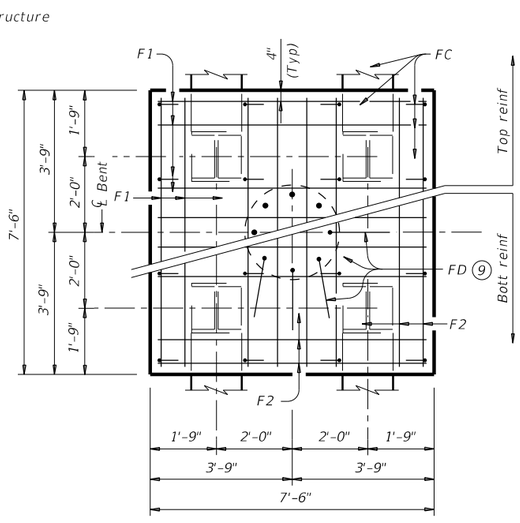
DATE: 1/18/2023 1:44:04 PM
FILE: ...\Long Ave\894fdstde01-20.dgn





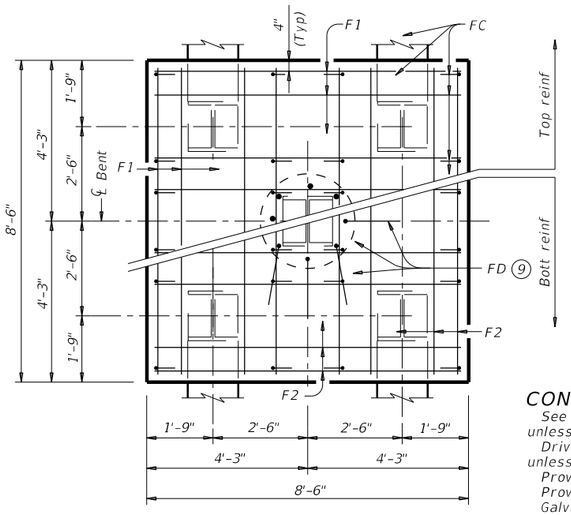
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



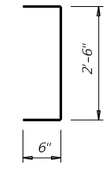
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

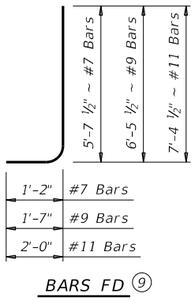


FIVE PILE FOOTING (8)

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

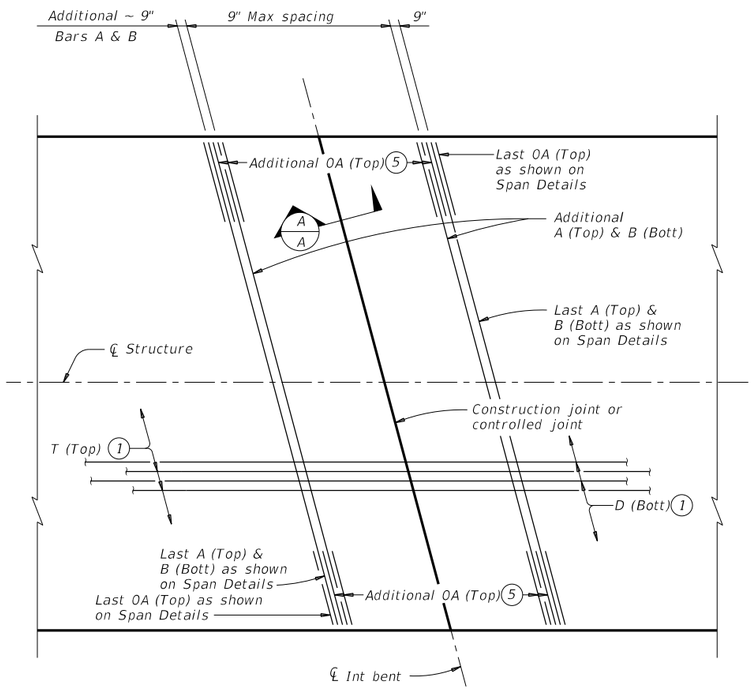
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

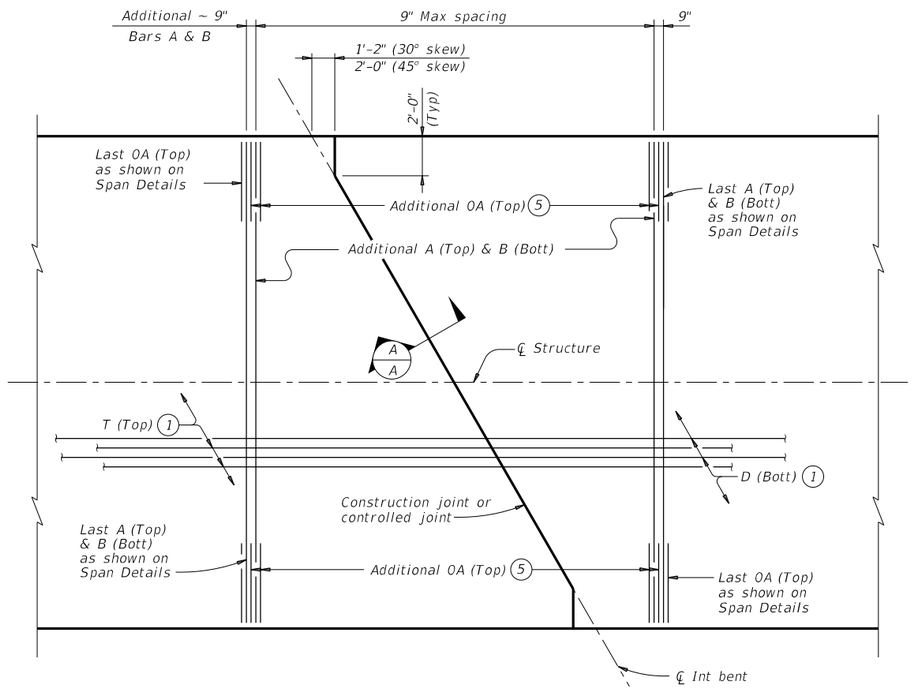
FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		144

DATE: 1/18/2023 1:44:05 PM
FILE: ...\Long Ave\894fdstde01-20.dgn



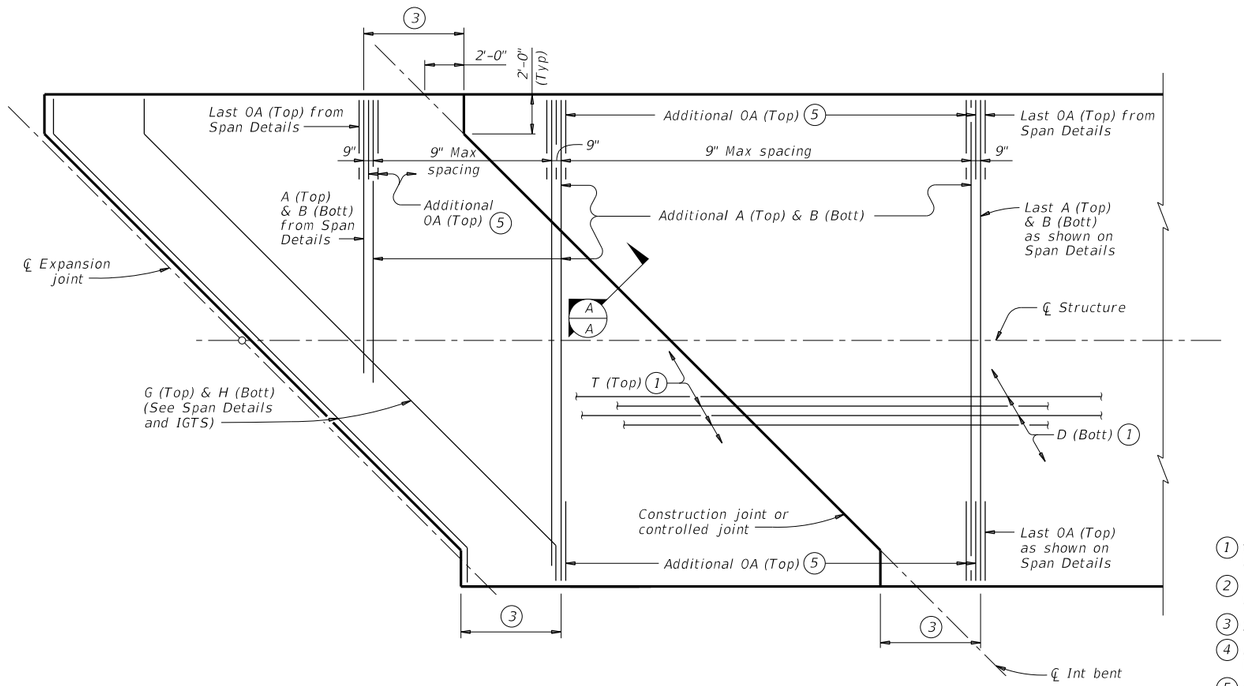
PLAN FOR 0° OR 15° SKEW

(Showing 15° skew)



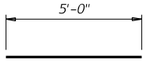
PLAN FOR 30° OR 45° SKEW

(Showing 30° skew)

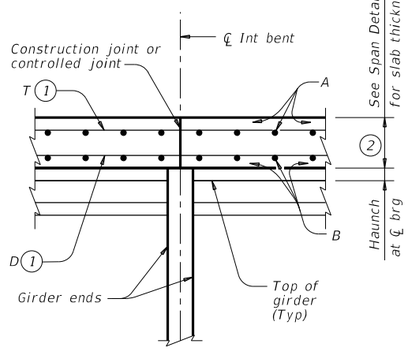


PLAN FOR 45° SKEW 4

(Showing short span condition.)



BARS OA (#5)



SECTION A-A

Bars 0A (Top) not shown for clarity.

1. Top and bottom mats must be continuous through joint.
2. Maintain a constant slab thickness over the bent.
3. 5'-4" as shown on Span Details.
4. Use these details when no full slab width bars A and B are shown on Span Details.
5. Bars 0A (Top) at 9" Max spacing between Bars A (Top).
6. Values in table assume a temperature change of 70° F after erection when calculating thermal movement in one direction (not total).

TABLE OF ⑥ ALLOWABLE UNIT LENGTH

Max Rdwy Grade, Percent	Unit Length Factor
0.00	4.1
1.00	3.9
2.00	3.7
3.00	3.5
4.00	3.3
5.00	3.1

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

BAR TABLE

BAR	SIZE
A	#4
B	#4
D	#4
T	#4
0A	#5

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

CONSTRUCTION NOTES:

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

Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units).

See Span Details for remainder of slab reinforcement and details.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide Class "S" concrete (f'c = 4,000 psi). Provide Class "S" (HPC) if shown elsewhere on the plans.

Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

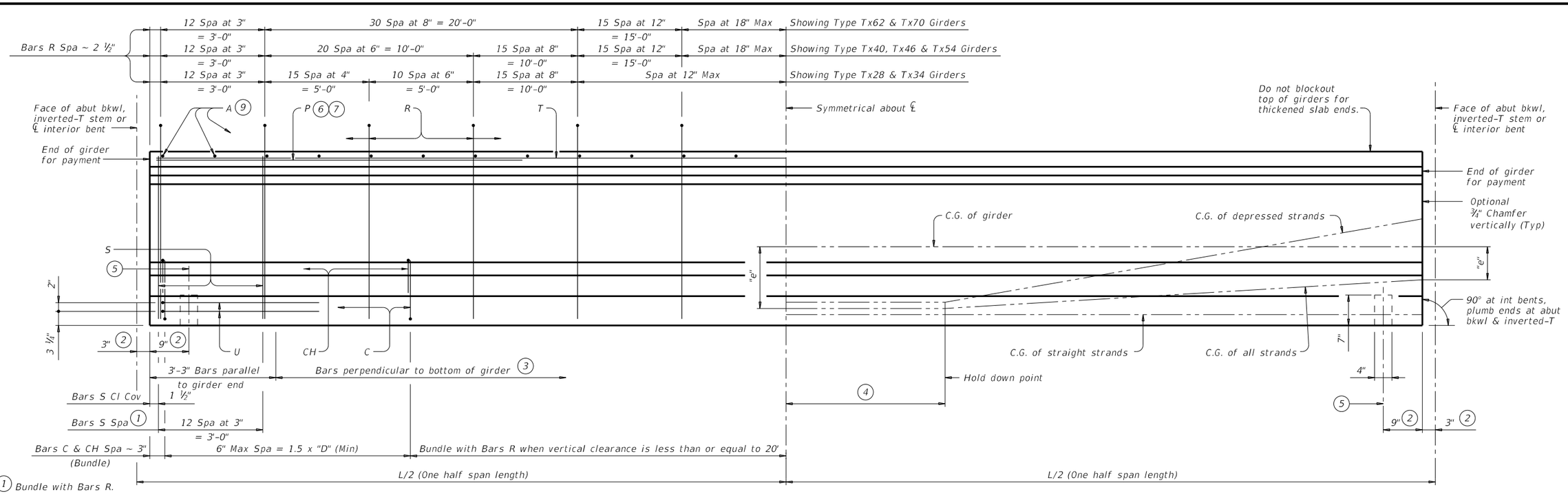
CONTINUOUS SLAB DETAILS

PRESTR CONC I-GIRDER SPANS

IGCS

FILE: igcs1sts-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10-19: Added bubble note 6.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		145

DATE: 1/18/2023 1:44:18 PM
FILE: ...\Long Ave\894igcs1sts-19.dgn



(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.

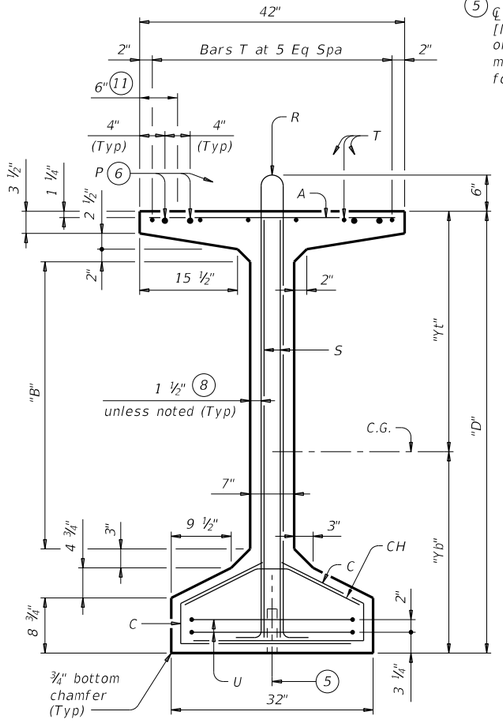
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

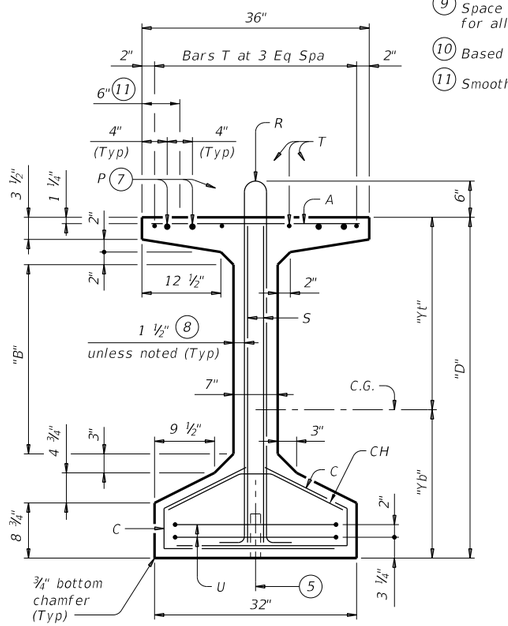
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

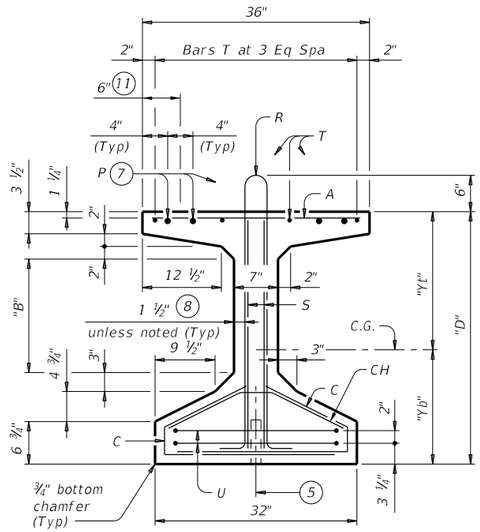
(11) Smooth trowel finish on the slab overhang side of exterior girder.



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

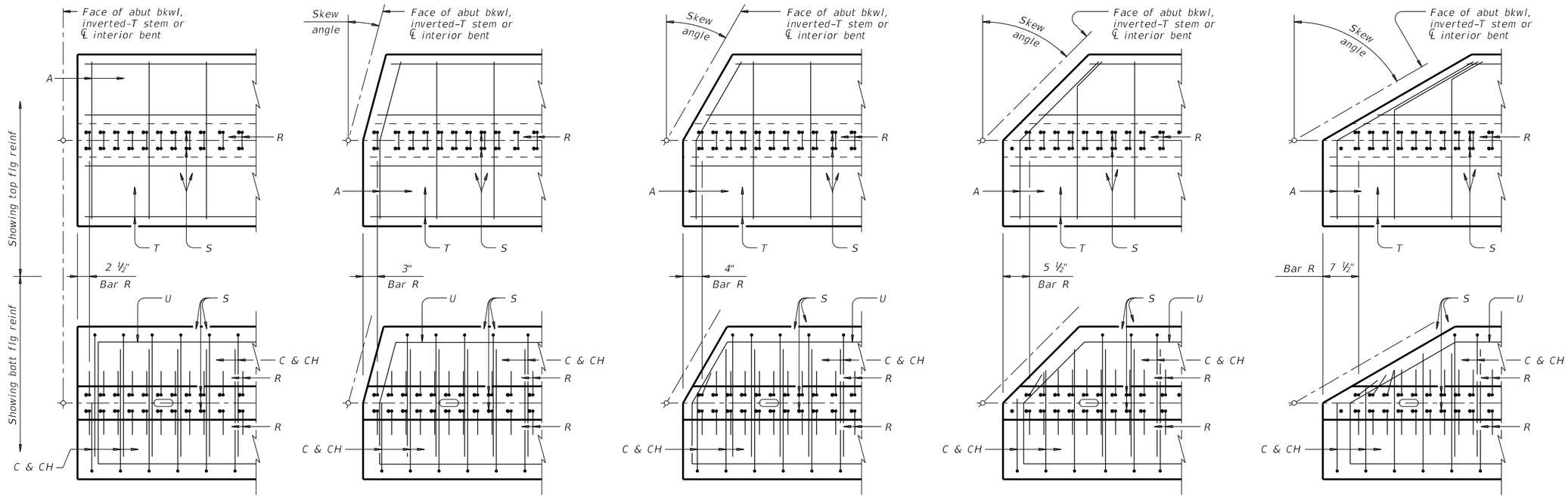
Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

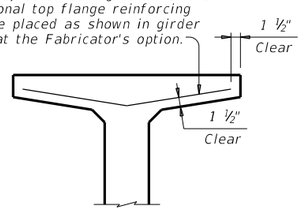
FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		146

DATE: 1/18/2023 1:44:32 PM
FILE: ...\Long Ave\894\gdstds1-19.dgn

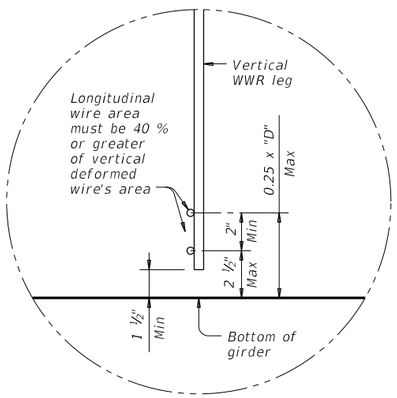


PLAN OF GIRDER ENDS (12)

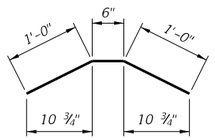
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



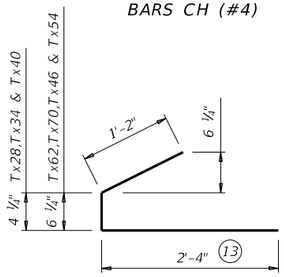
OPTIONAL TOP FLANGE REINFORCING DETAIL



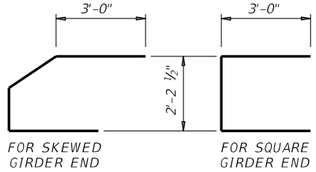
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



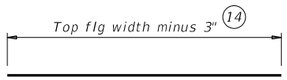
BARS CH (#4)



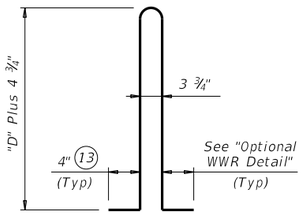
BARS C (#4)



BARS U (#5)

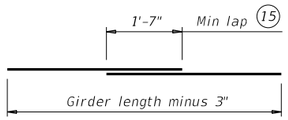


BARS A (#3)



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.

HL93 LOADING SHEET 2 OF 2

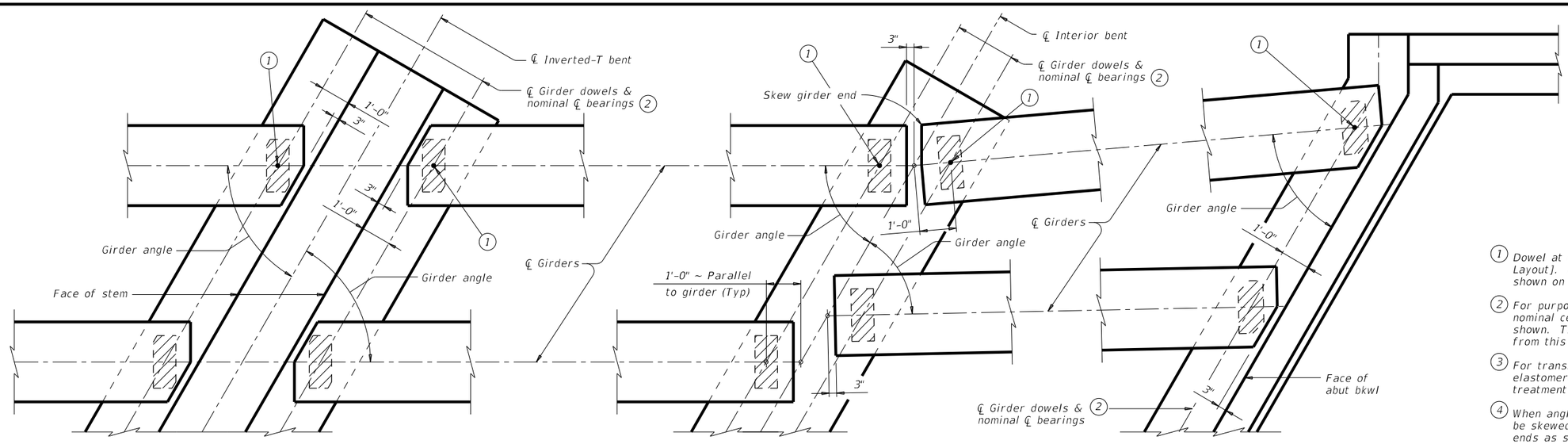
Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		147



AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

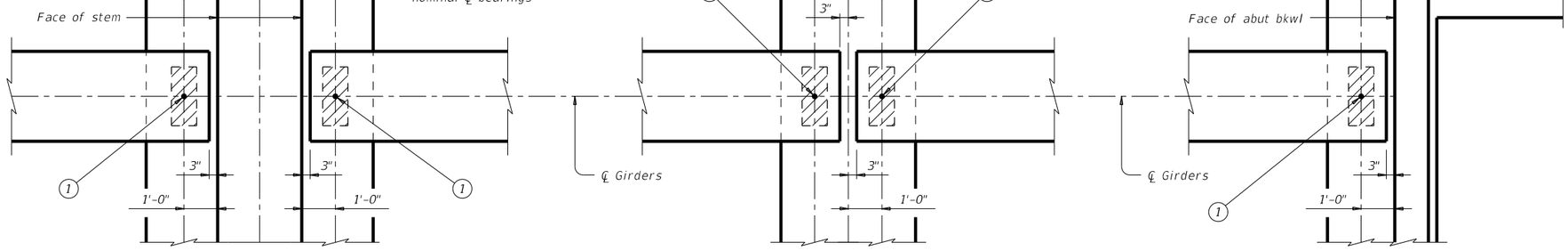
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(4) When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.

(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.

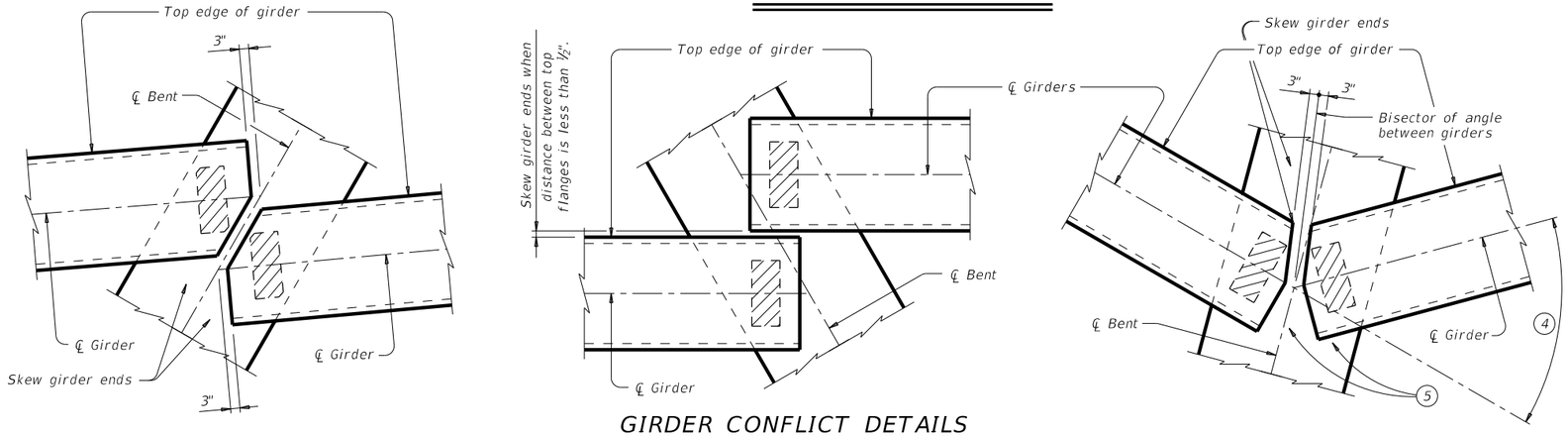


AT INVERTED-T BENT

AT CONVENTIONAL INTERIOR BENT

AT ABUTMENT (3)

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".

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

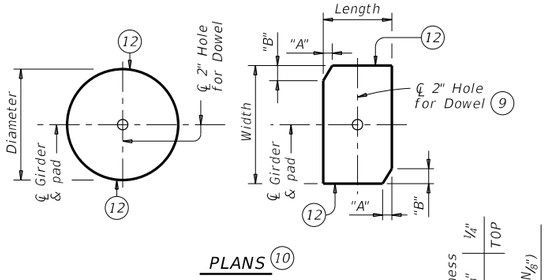
ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

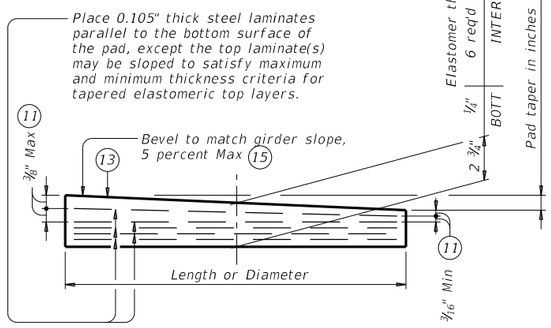
IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		148

DATE: 1/18/2023 1:44:46 PM
FILE: ...\Long Ave\894igebsts1-17.dgn



PLANS (10)



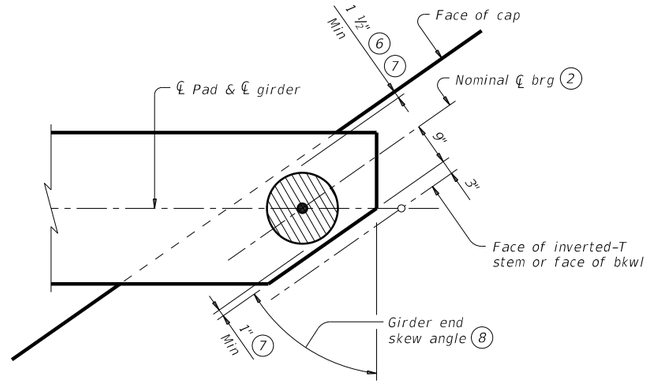
ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

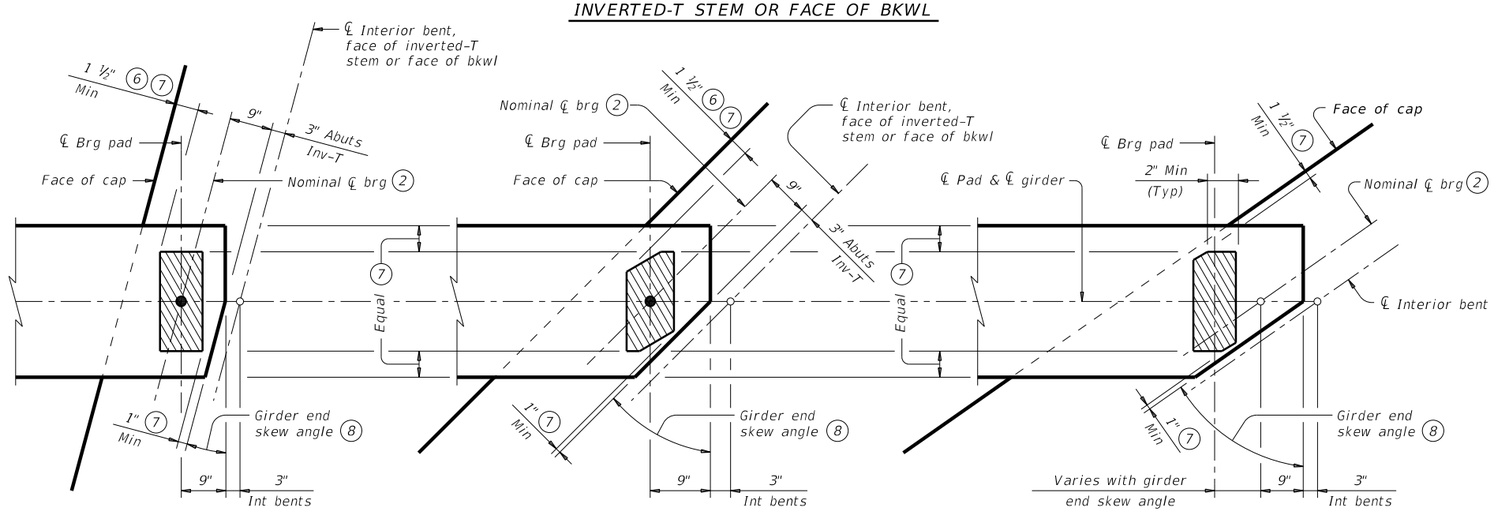
(50 DUROMETER)

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)			
Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 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"



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

(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.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation | Bridge Division Standard

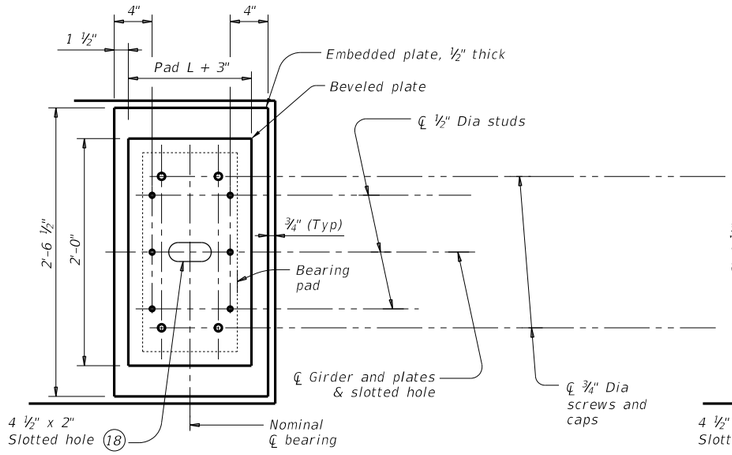
ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

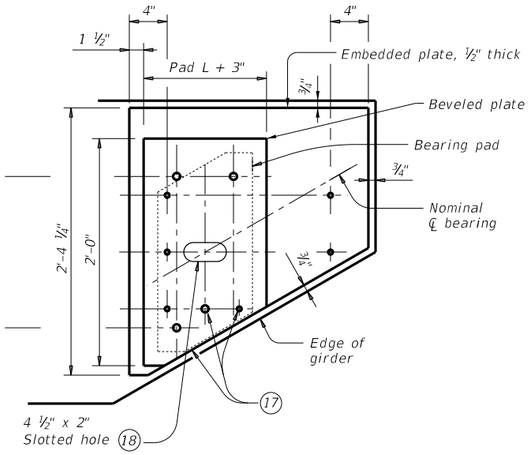
IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		149

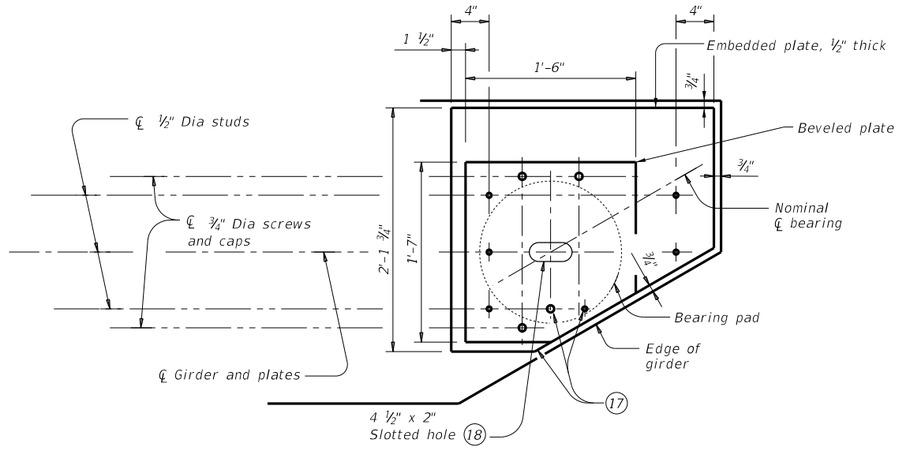
DATE: 1/18/2023 1:44:47 PM
FILE: ...\Long Ave\894\igebsts1-17.dgn



NORMAL GIRDER END
RECTANGULAR BEARING PAD

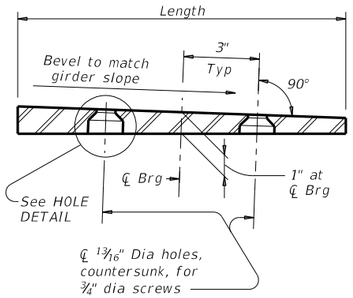


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

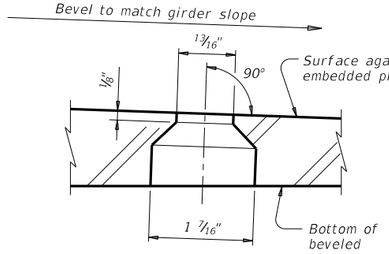


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

BEVELED PLATE DETAILS

(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.

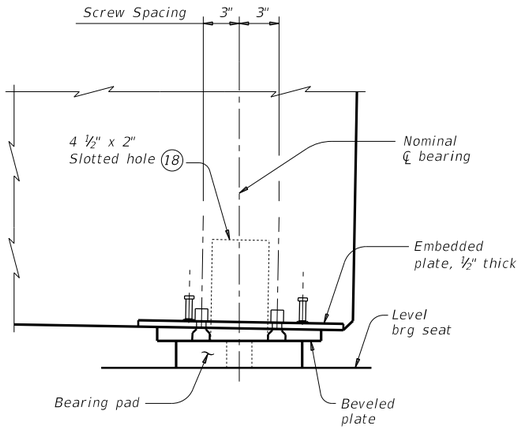
Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

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".

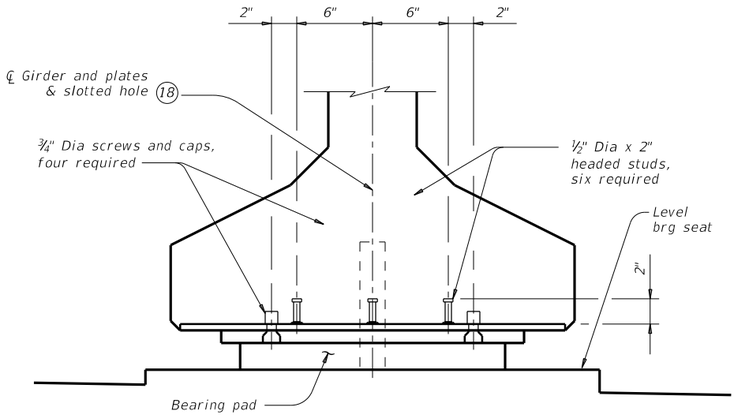
Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

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.



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

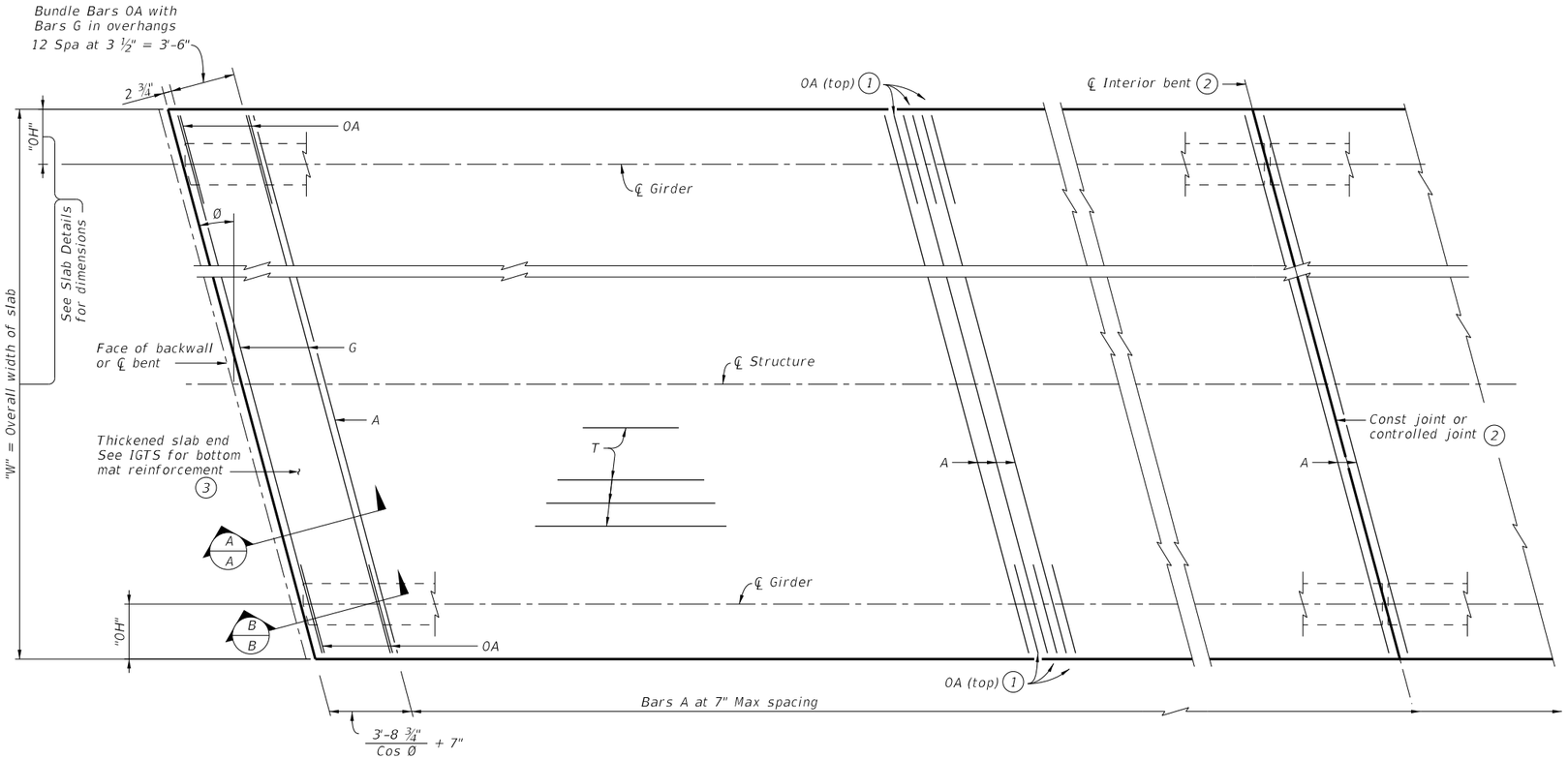
Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		150

DATE: 1/18/2023 1:44:48 PM
FILE: ...\Long Ave\894\igebsts1-17.dgn

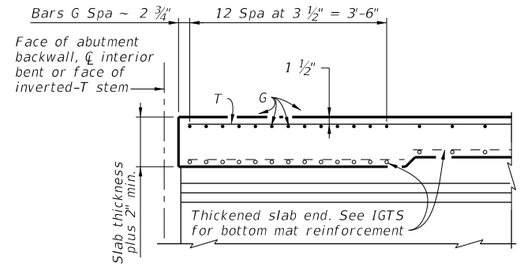


AT THICKENED SLAB END

AT SLAB CONTINUOUS OVER INTERIOR BENTS

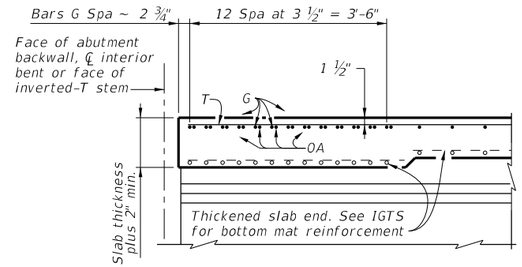
PLAN FOR SLABS WITHOUT BREAKBACKS

Showing top mat reinforcement only.



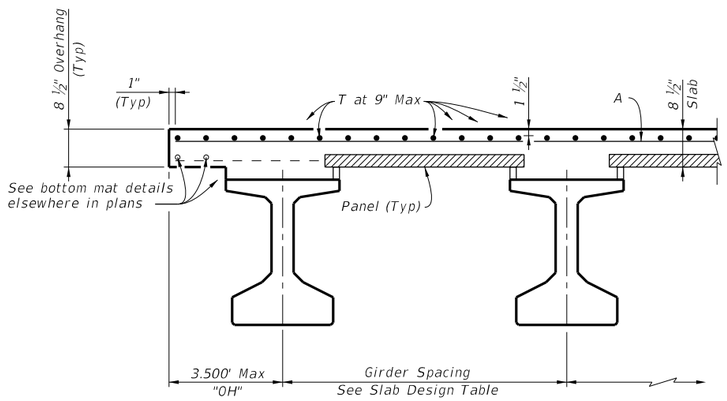
SECTION A-A

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

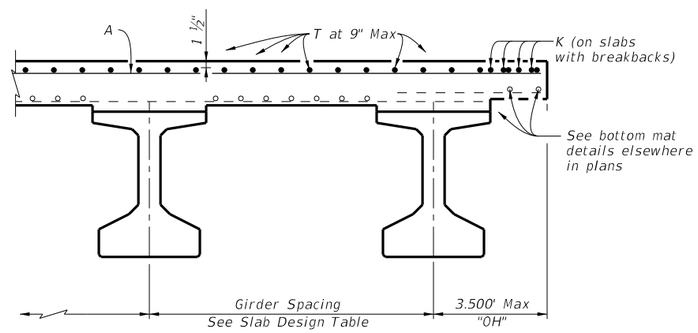


SECTION B-B

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



PARTIAL TYPICAL TRANSVERSE SECTION



SECTION OF THICKENED SLAB END

Showing PCP Option 1. Option 2 similar.

1. Place Bars 0A midway between Bars A at overhang.
2. Bars are continuous through joint.
3. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT

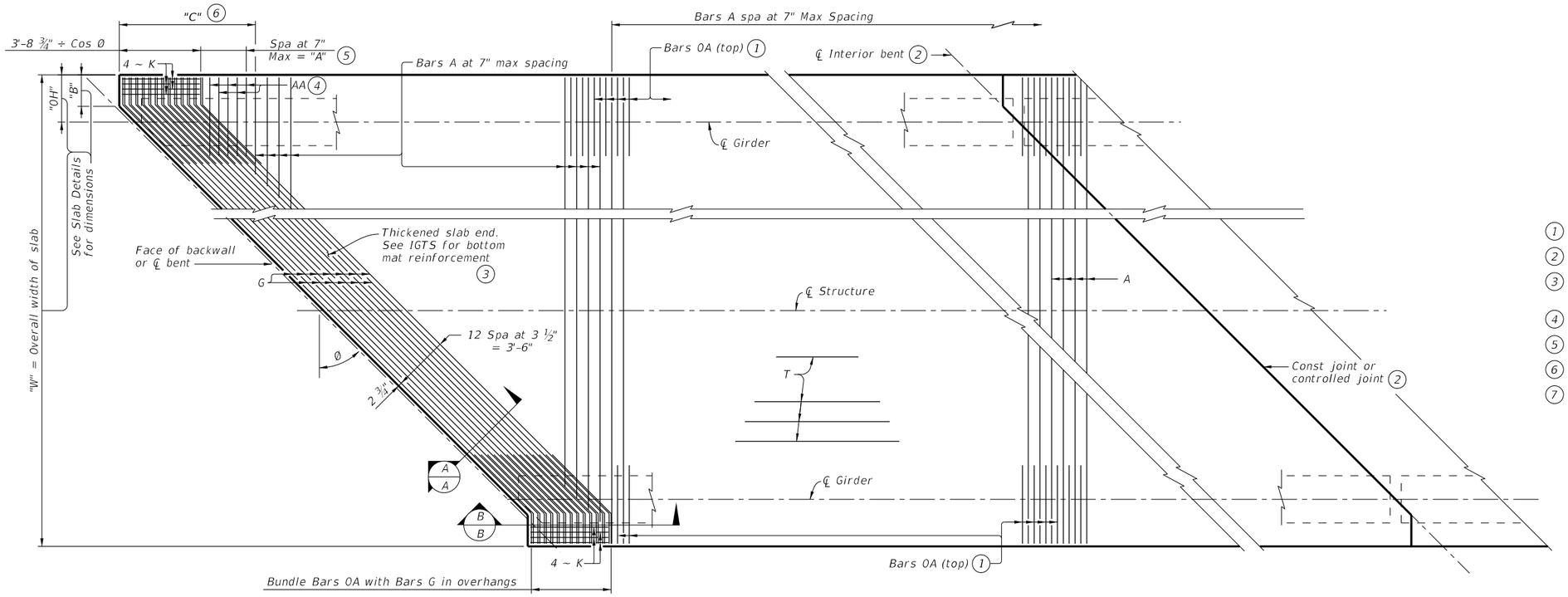
PRESTRESSED CONC I-GIRDER SPANS

IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Updated to latest design specification.	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		151

DATE: 1/18/2023 1:45:03 PM
FILE: ...\Long Ave\894igfrp001-19.dgn

DATE: 1/18/2023 1:45:04 PM
FILE: ...\Long Ave\894\gfrp001-19.dgn



AT THICKENED SLAB END

BAR TABLE

BAR	SIZE
A	#5
AA	#5
G	#5
K	#5
0A	#5
T	#5

(1) Place Bars 0A midway between Bars A at overhang.

(2) Bars are continuous through joint.

(3) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

(4) Tie Bars AA to bottom of Bars G in this location.

(5) A = ("0H" + 2.333' - "B") x Tan Ø

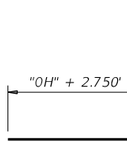
(6) $C = \frac{3.729'}{\cos Ø} + \text{"A"} + \text{Bar A spacing}$

(7) Only required on slabs with breakbacks.

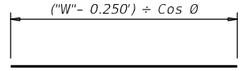
PLAN FOR SLABS WITH BREAKBACKS

Showing top mat reinforcement only.

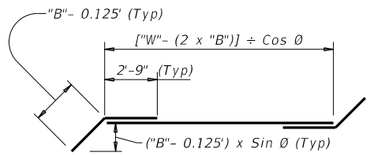
AT SLAB CONTINUOUS OVER INTERIOR BENTS



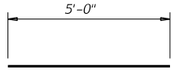
BARS AA (#5) (7)



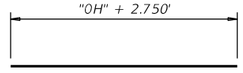
BARS G (#5)
(For slabs without breakbacks)



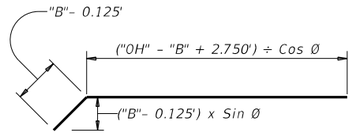
BARS G (#5)
(For slabs with breakbacks)



BARS K (#5) (7)



BARS OA (#5)



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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

These details are restricted to Prestressed Concrete I-Girder spans with an 8 ½" slab and up to a 10'-0" girder spacing.

These details are to be used in conjunction with the Span Details and PCP Standard (if prestressed concrete panels are used).

This standard provides Glass Fiber Reinforced Polymer (GFRP) reinforcement details for the top mat of slab reinforcement. The bottom mat reinforcement and other slab details are as shown elsewhere in the plans.

The Contractor has the option to provide GFRP reinforcement, in accordance with the details shown, when epoxy-coated steel bars are specified for the deck slab. The Contractor may provide an alternate GFRP slab design with calculations signed and sealed by a Professional Engineer.

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

MATERIAL NOTES:

Provide GFRP bars, conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.

Provide Grade 60 steel bars for all bottom mat reinforcement as shown elsewhere in plans.

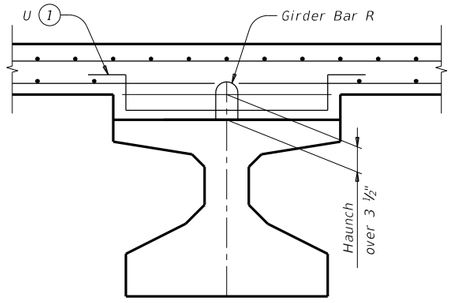
Provide bar laps, where required, as follows:
#5 GFRP bar = 2'-9"

HL93 LOADING SHEET 2 OF 2

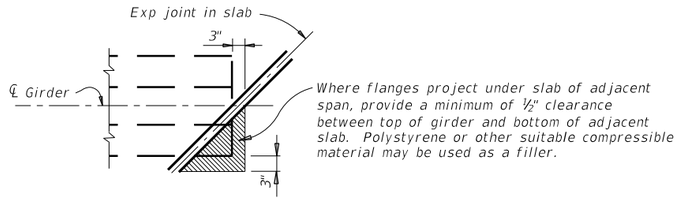
Texas Department of Transportation | Bridge Division Standard

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

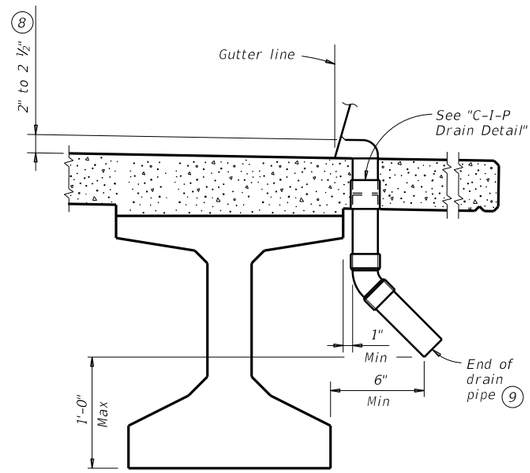
FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10-19: Updated to latest design specification.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		152



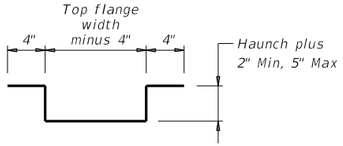
HAUNCH REINFORCING DETAIL



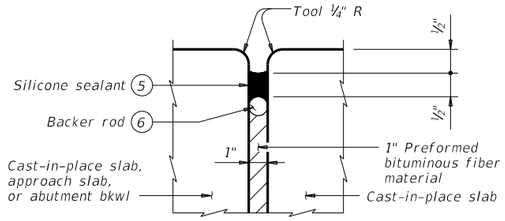
TREATMENT AT GIRDER END FOR SKEWED SPANS



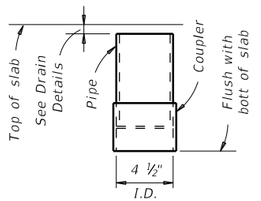
DRAIN DETAIL (10)



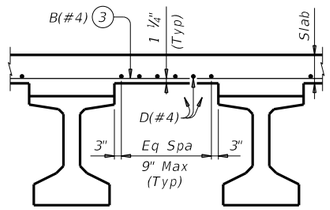
BARS U (#4)



TYPE A JOINT DETAIL (7)



C-I-P DRAIN DETAIL (2)



TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.

(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

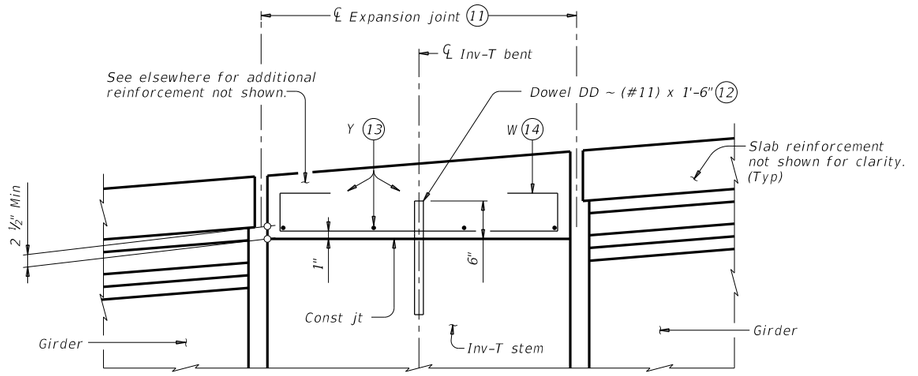
MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

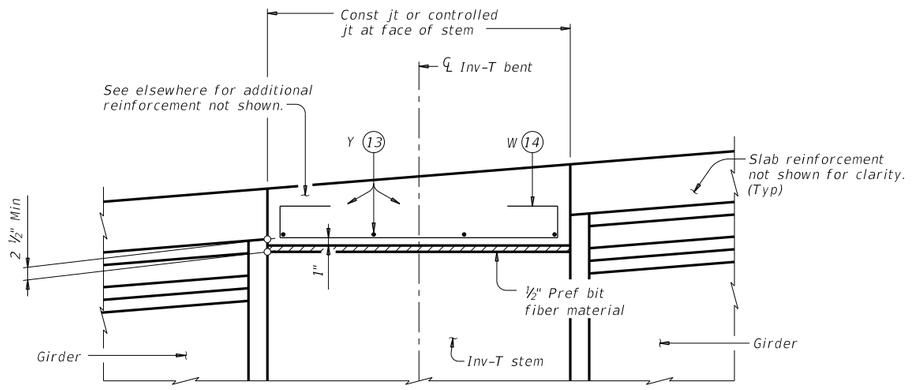
IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		153

DATE: 1/18/2023 1:45:25 PM
FILE: ...\Long Ave\894igmssts1-19.dgn

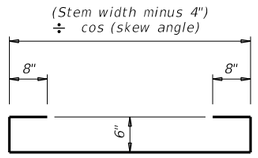


SHOWING EXPANSION JOINTS

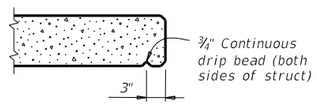


SHOWING CONST JTS OR CONTROLLED JTS

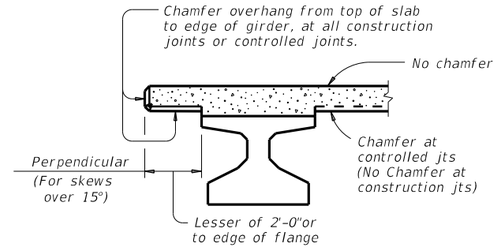
REINFORCEMENT OVER INV-T BENTS



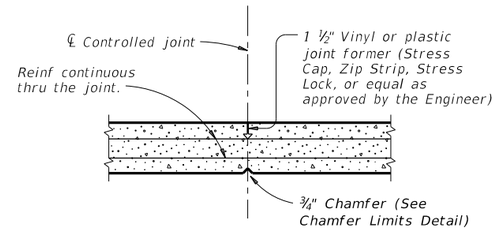
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

DATE: 1/18/2023 1:45:26 PM
FILE: ...\Long Ave\894\gmssts1-19.dgn

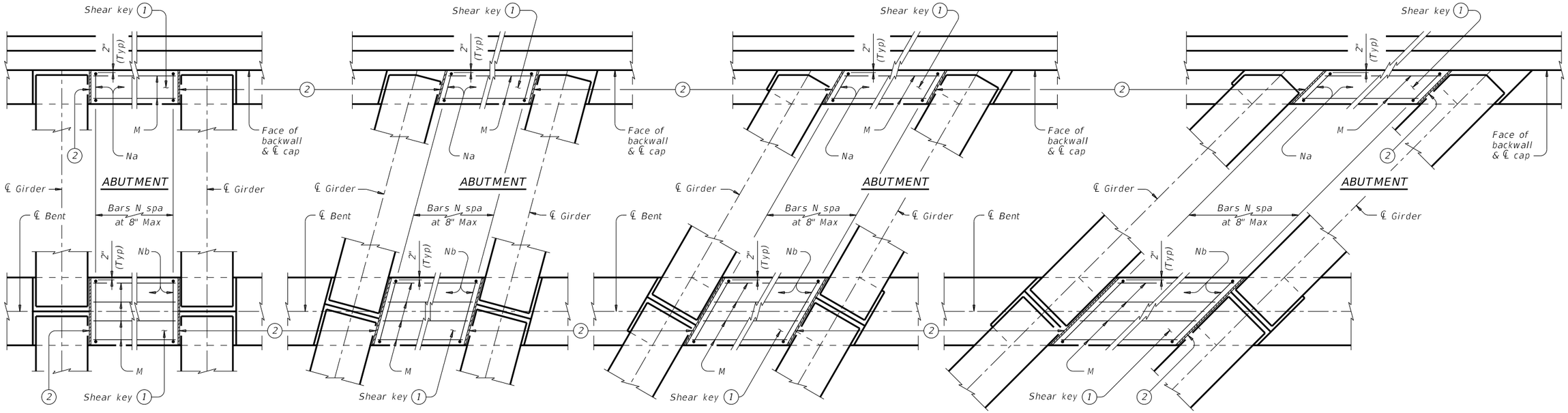
SHEET 2 OF 2

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	0902	48	894	CS		
10-19: Modified Note 7, Type A now a pay item.	DIST	COUNTY		SHEET NO.		
	FTW	TARRANT		154		



INTERIOR BENT

PARTIAL PLANS WITH NO SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 15° SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 30° SKEW

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

INTERIOR BENT

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.

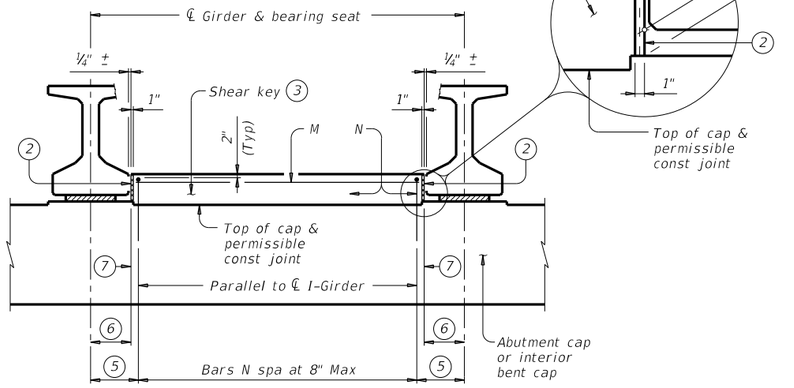
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(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.

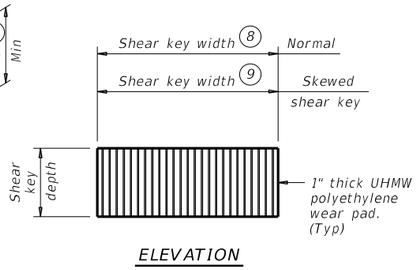
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

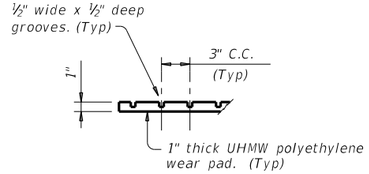


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

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

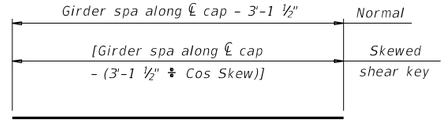


ELEVATION

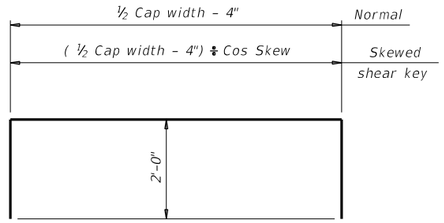


PART SECTION

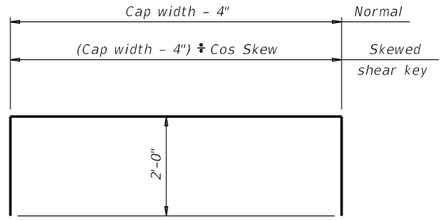
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

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

Provide Grade 60 reinforcing steel.

Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.

Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

These details are limited to bridges skewed 45 degrees and less.

This standard is only applicable for I-Girders.

Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.

Include shear key concrete in abutment or bent concrete for payment.

UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

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

Texas Department of Transportation

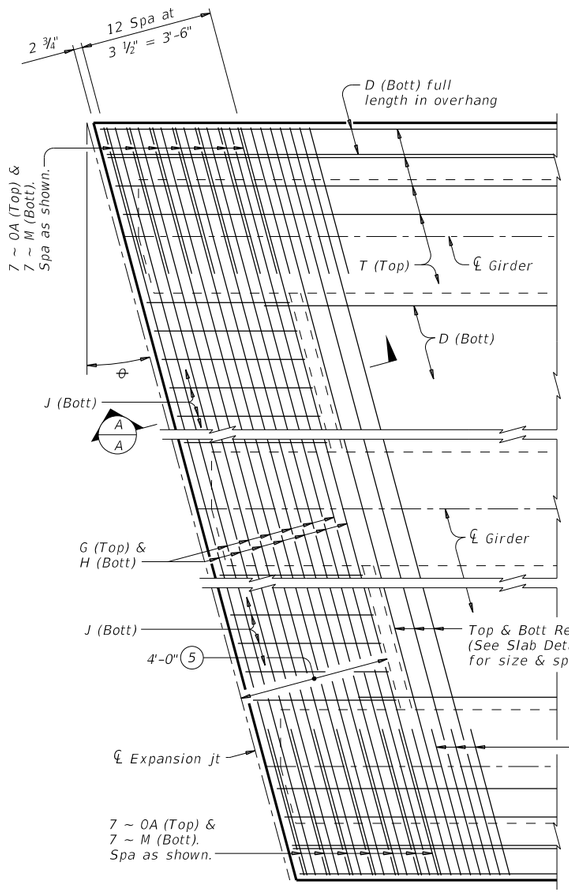
Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

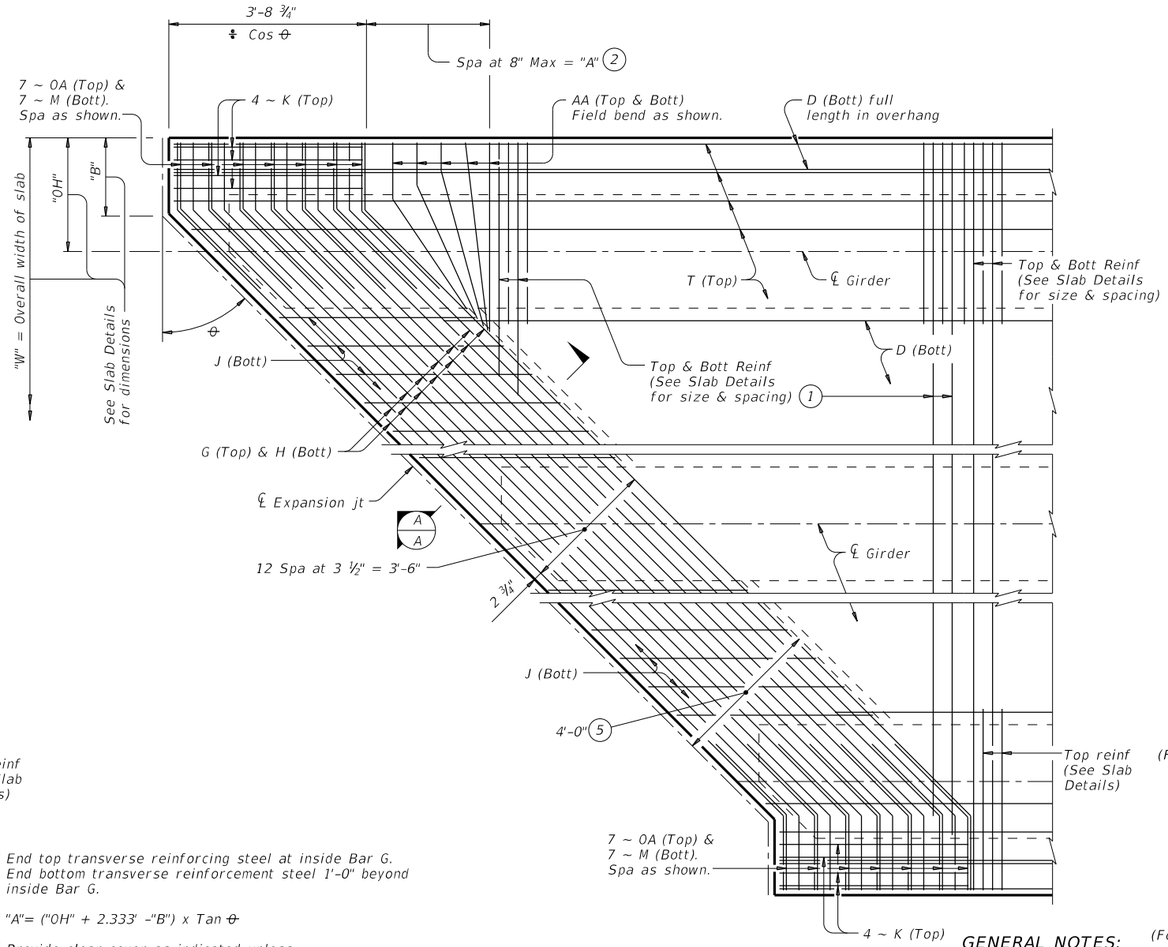
IGSK

FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		155

DATE: 1/18/2023 1:45:44 PM
FILE: ...\Long Ave\894igskstds-17.dgn

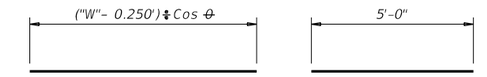


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



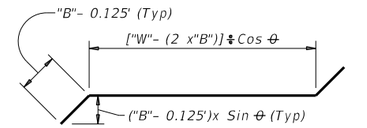
PARTIAL PLAN FOR SLABS WITH BREAKBACK

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.

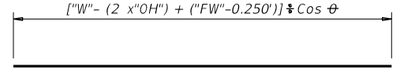


BARS G (#4)
(For slabs without breakbacks)

BARS K (#4) (4)



BARS G (#4)
(For slabs with breakbacks)

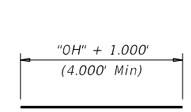


"FW" = girder's top flange width (ft)

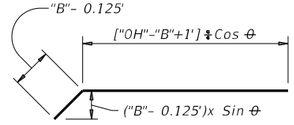
BARS H (#4)

BARS AA (#5) (4)

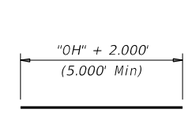
BARS J (#4)



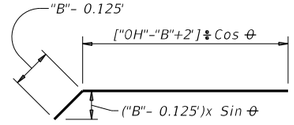
BARS M (#4)
(For slabs without breakbacks)



BARS M (#4)
(For slabs with breakbacks)



BARS OA (#5)
(For slabs without breakbacks)



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

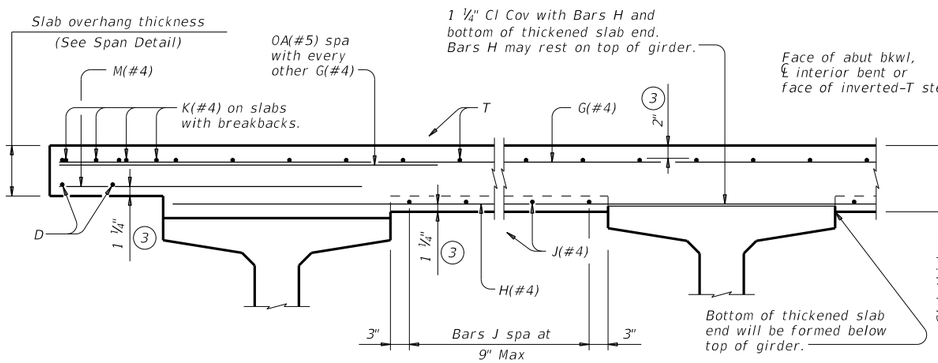
GENERAL NOTES:

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.

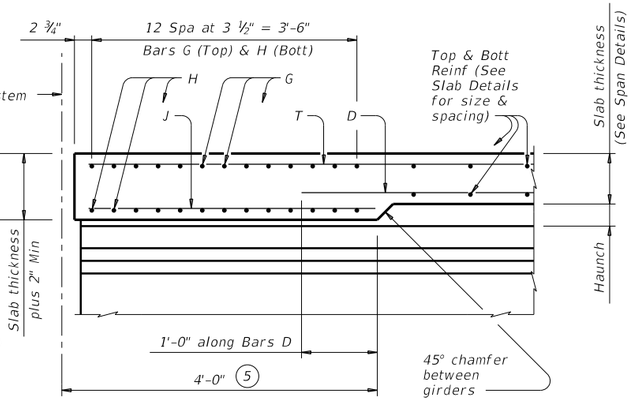


2" AND MORE OF HAUNCH

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

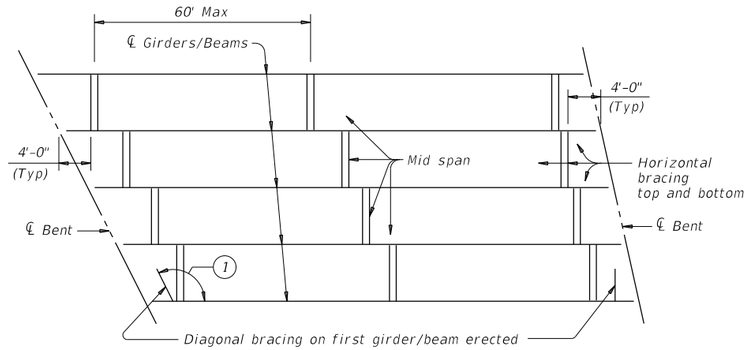
PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

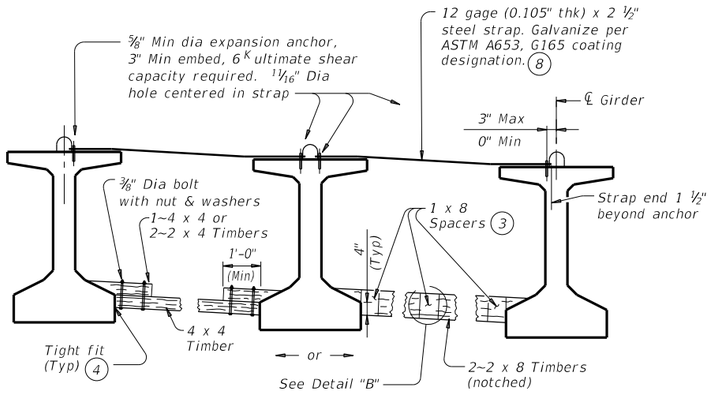
FILE: igtssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		156

DATE: 1/18/2023 1:45:57 PM
FILE: ...\Long Ave\894igtssts1-17.dgn

DATE: 1/18/2023 1:46:13 PM
FILE: ...\Long Ave\894mebcsts1-17.dgn

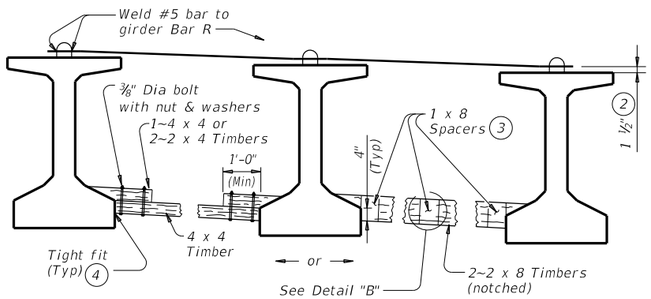


ERECTION BRACING



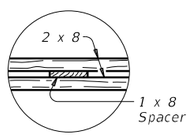
FOR ERECTION BRACING, OPTION 1

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



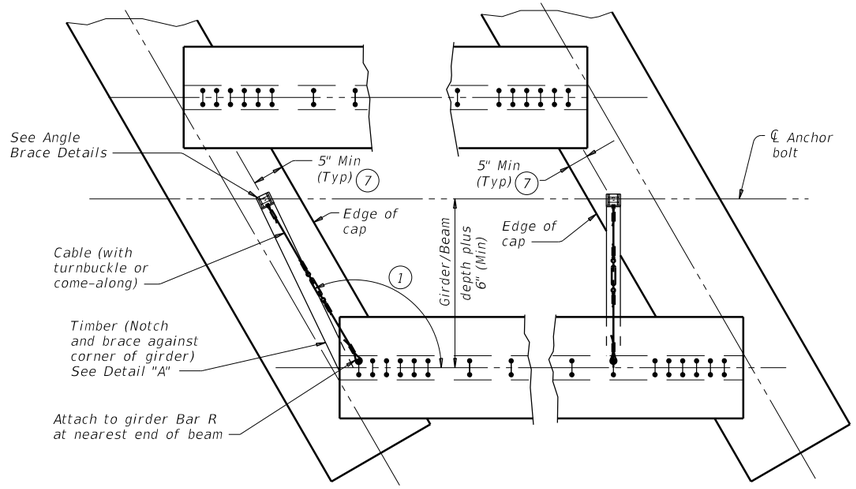
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

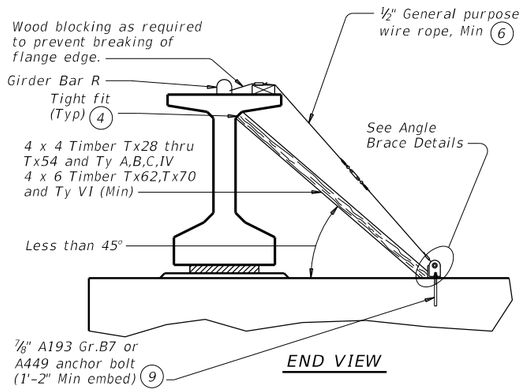


PLAN

DETAIL "B"



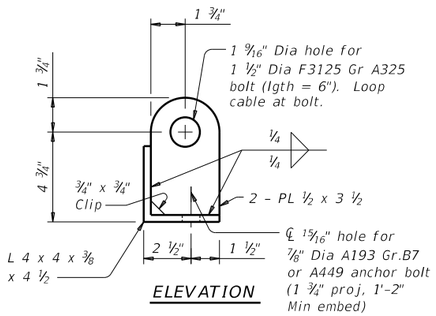
PLAN



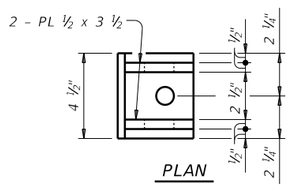
END VIEW

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.

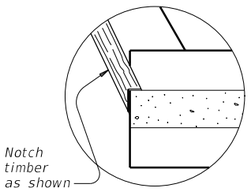
ERECTION BRACING:

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.

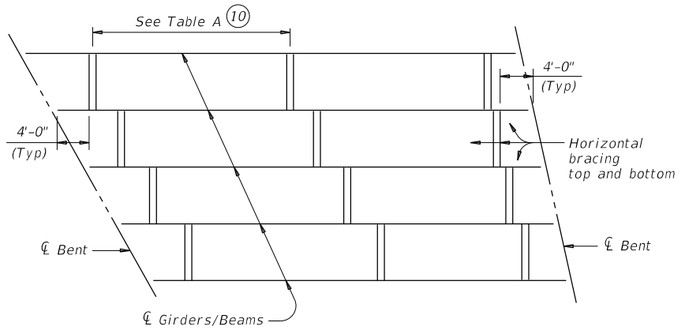
Texas Department of Transportation

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
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		157



SLAB PLACEMENT BRACING

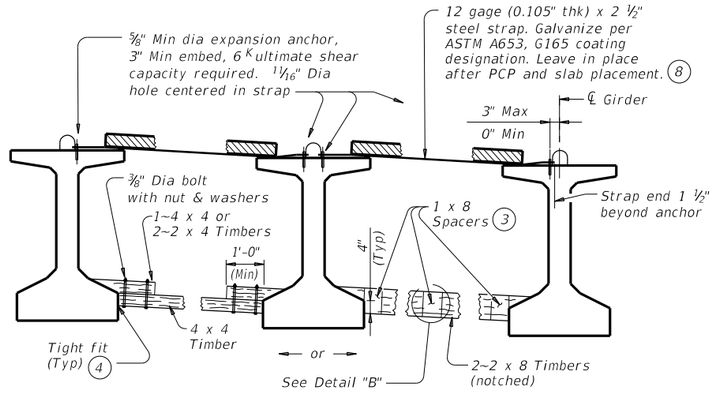
TABLE A

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

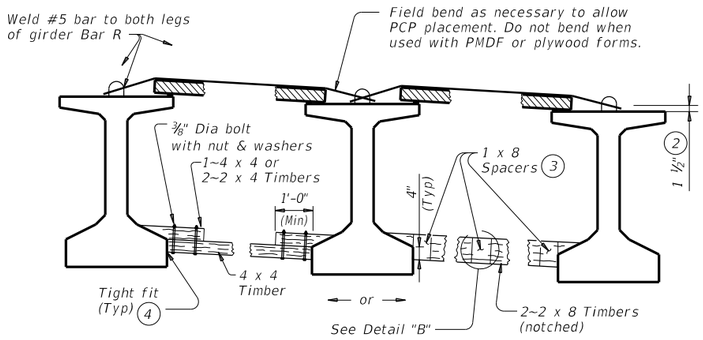
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

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

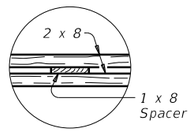
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



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

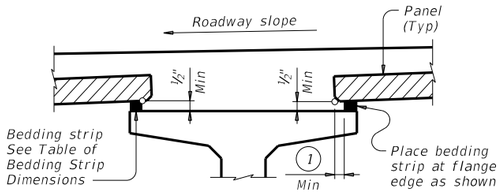
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		158

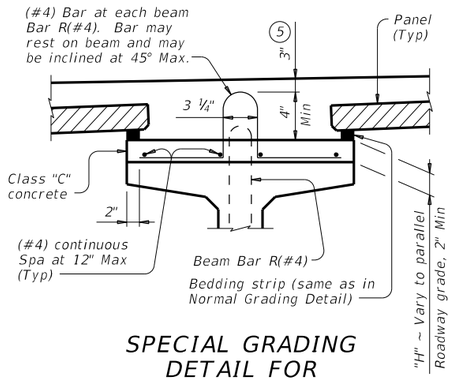
DATE: 1/18/2023 1:46:14 PM
FILE: ...\Long Ave\894mebcsts1-17.dgn

DATE: 1/18/2023 1:46:28 PM
FILE: ...\Long Ave\894pcpstde1-19.dgn



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..

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.

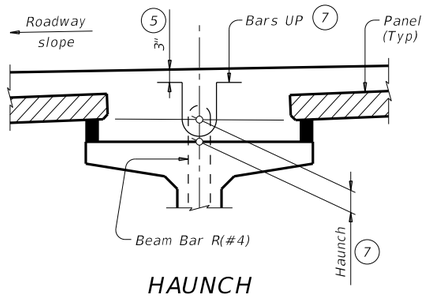
Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

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.

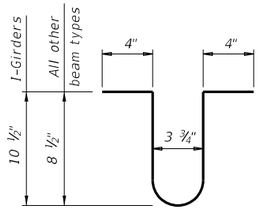
Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

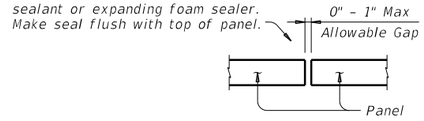


HAUNCH REINFORCING DETAIL

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

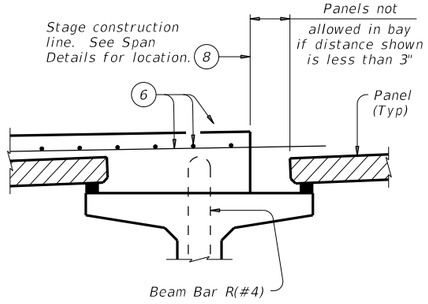


BARS UP (#4) (7)

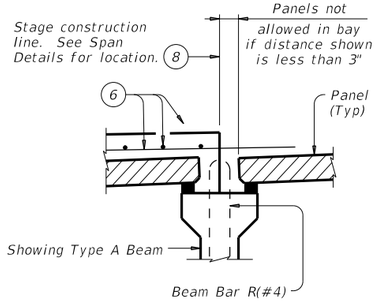


PANEL JOINTS

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



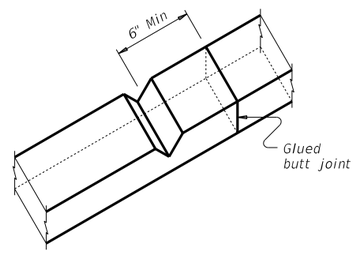
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

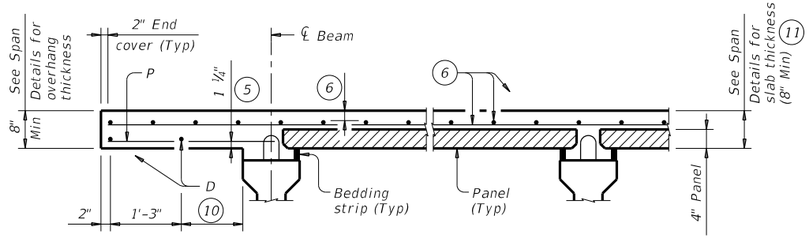
HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation | Bridge Division Standard

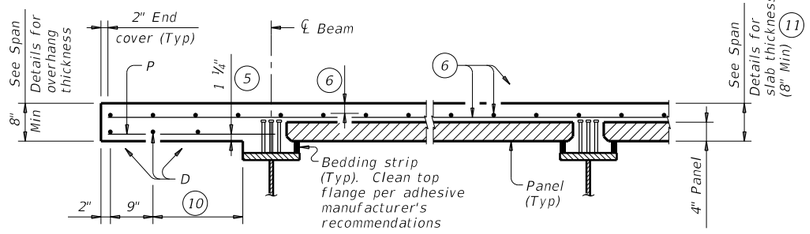
PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

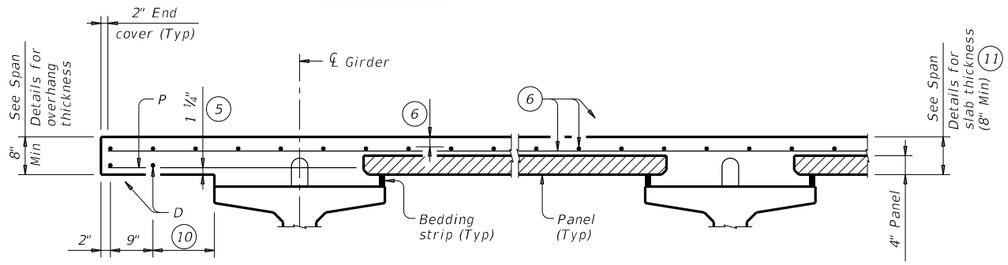
FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		159



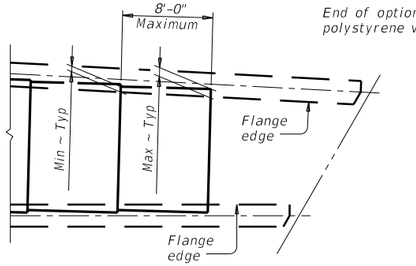
PRESTRESSED CONCRETE I-BEAMS



STEEL BEAMS

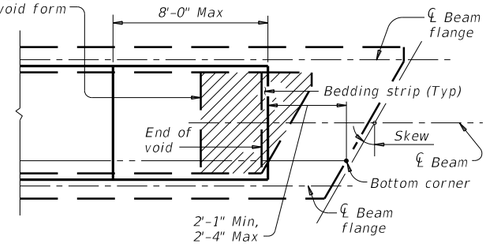


PRESTRESSED CONCRETE I-GIRDERS

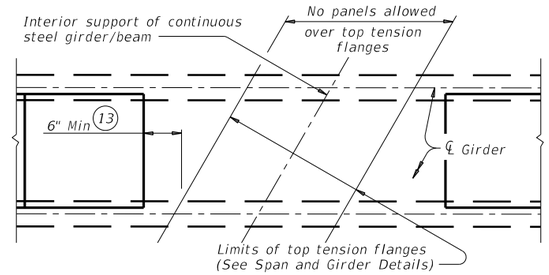


AT FLARED BEAMS OR GIRDERS

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.

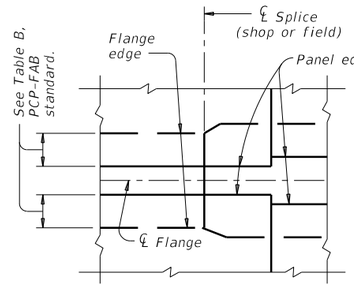
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(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.

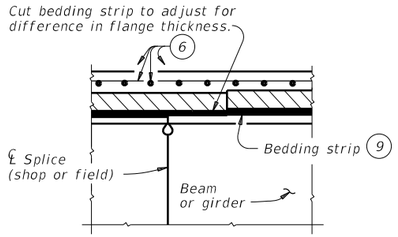
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



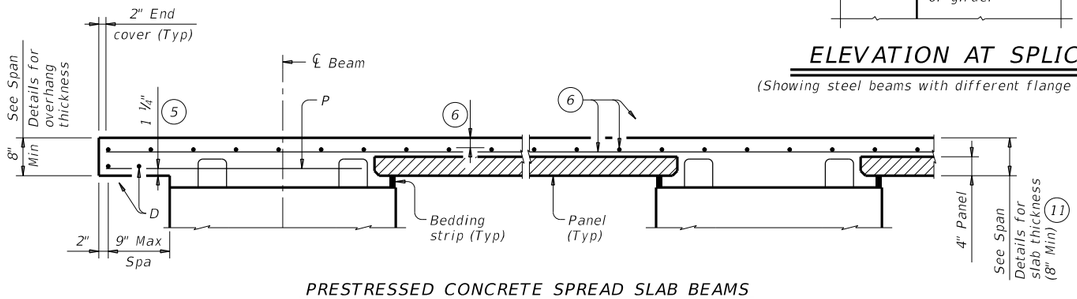
PLAN AT SPLICE

(Showing steel beams with flange width transition)



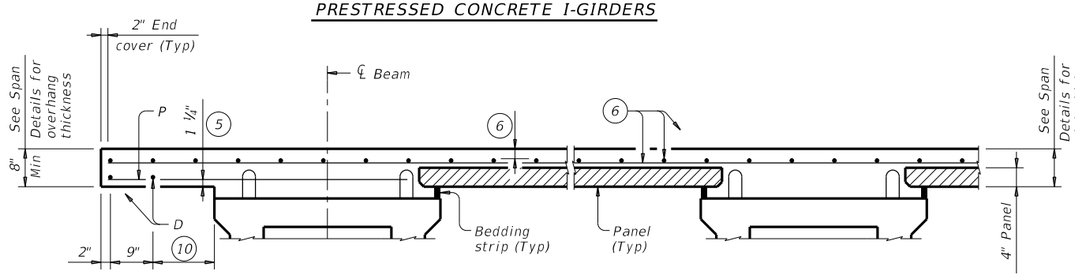
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

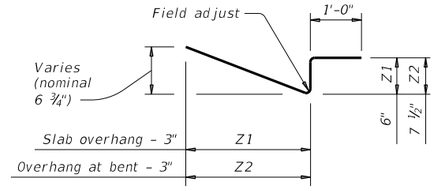
Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

SLOPED OVERHANG WITH PRESTR CONC U-BEAMS



BARS Z (#4) (12)

HL93 LOADING SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

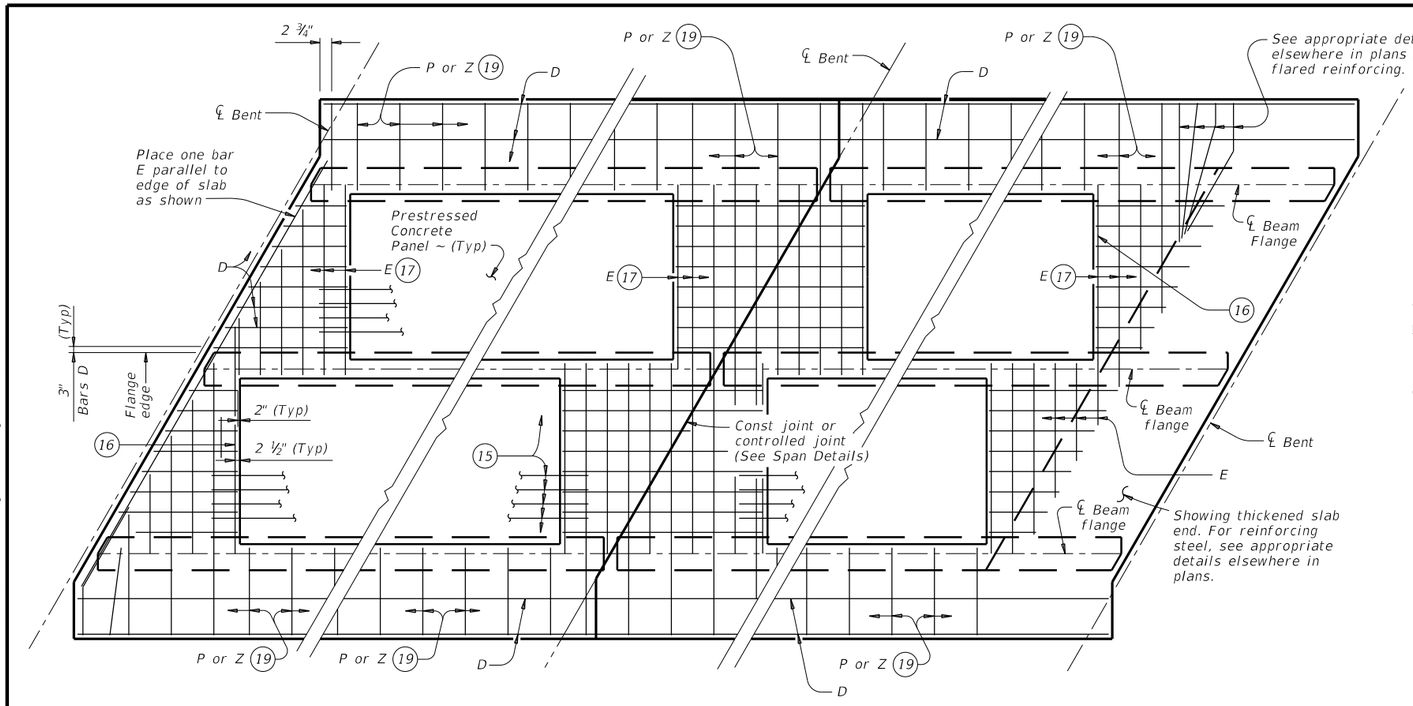
PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		160

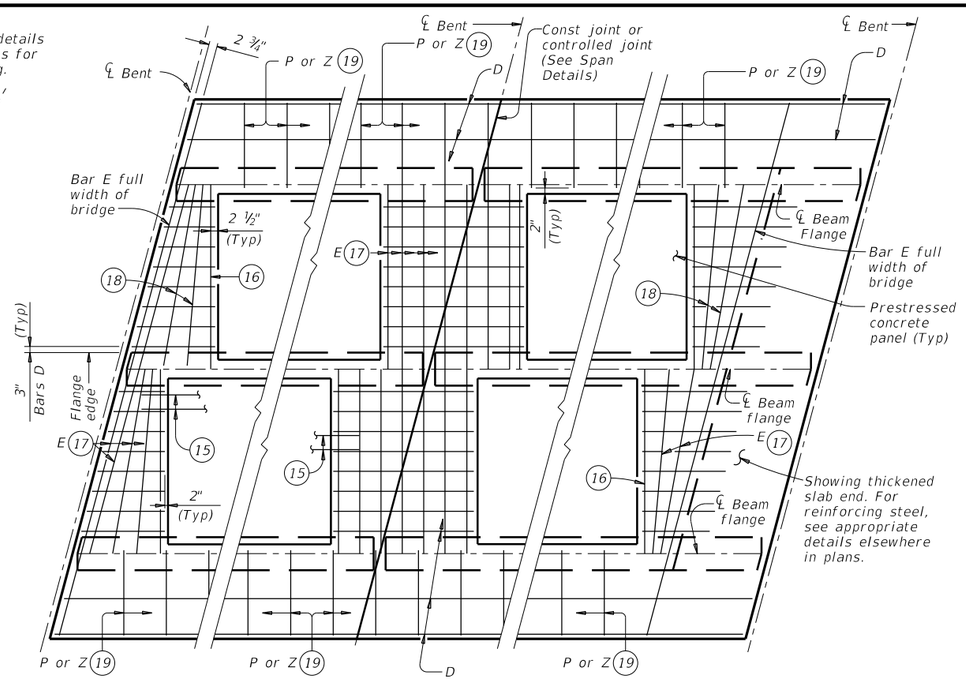
DATE: 1/18/2023 1:46:29 PM
FILE: ...\Long Ave\894pcpstde1-19.dgn

DATE: 1/18/2023 1:46:30 PM
FILE: ...\Long Ave\894pcpstde1-19.dgn



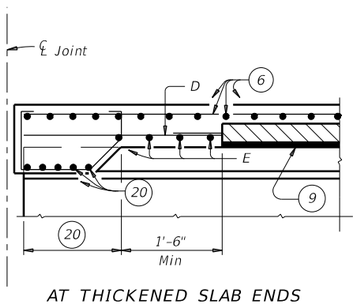
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

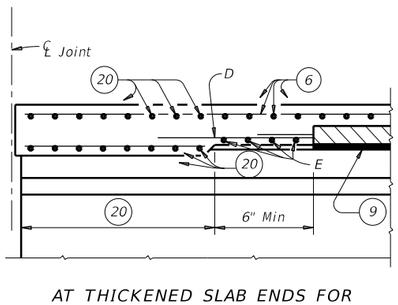


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

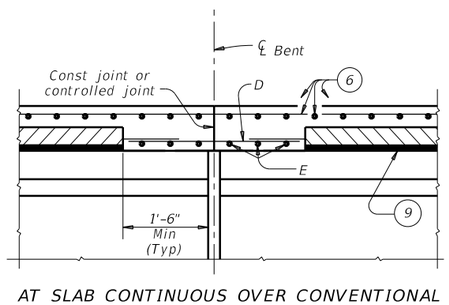
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



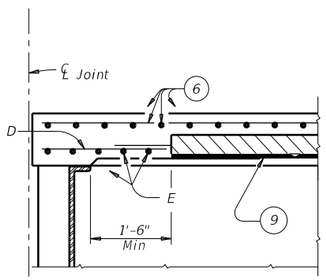
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



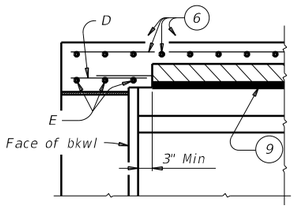
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



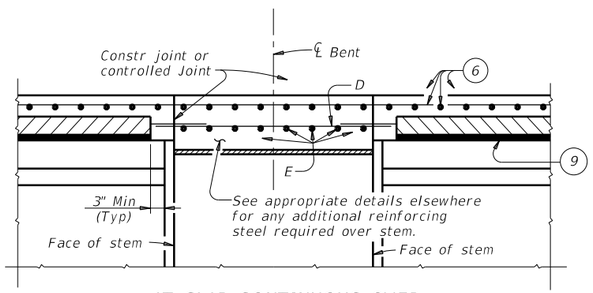
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



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

SHEET 3 OF 4

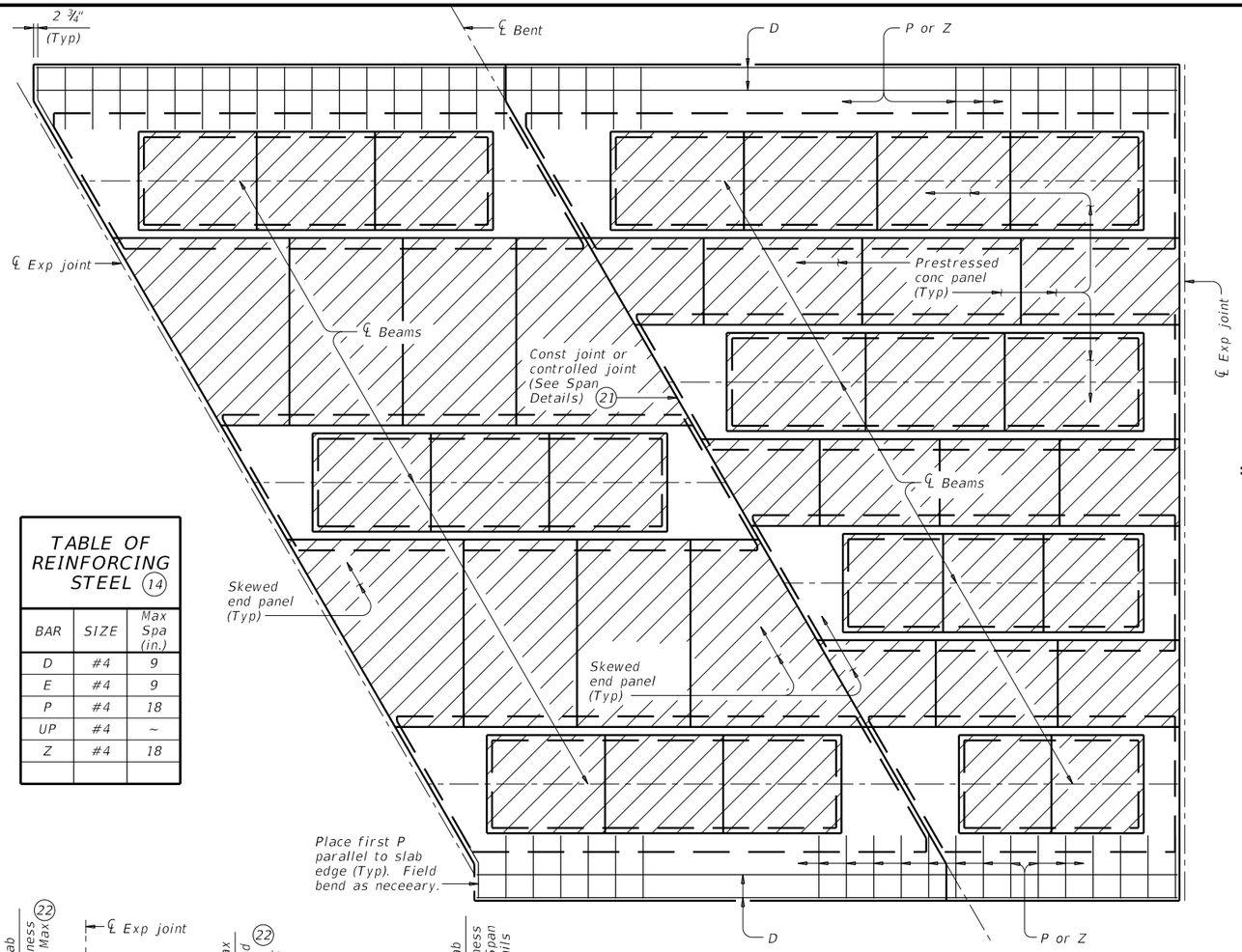
Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

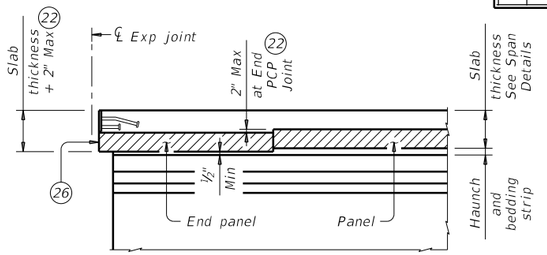
PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH		
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0902	48	894	CS		
	DIST	COUNTY		SHEET NO.		
	FTW	TARRANT		161		



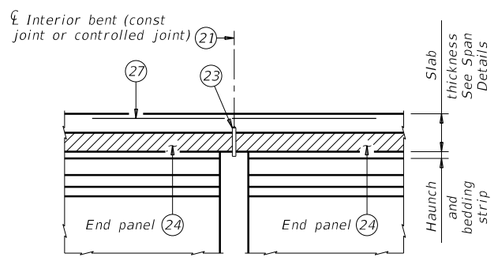
OPTION 2 ~ PLAN OF SLAB

(Showing U-Beams; other beams similar)



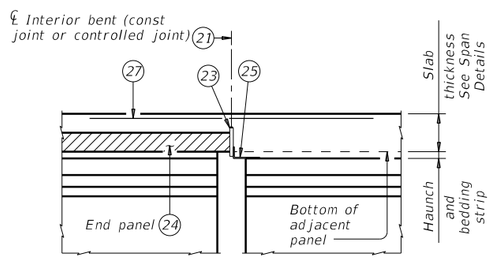
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



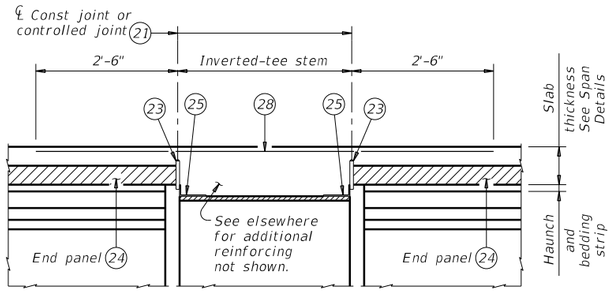
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

Panel against beam/girder end in adacent span.

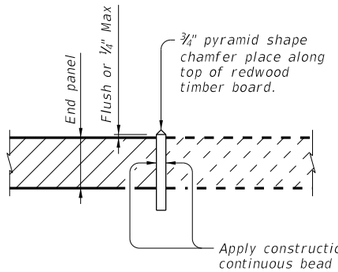


INVERTED-T BENT

Panels against inverted-tee stem

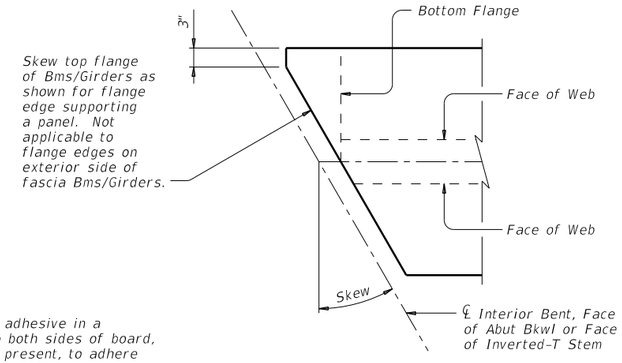
OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)

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



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 ½" 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 OA from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

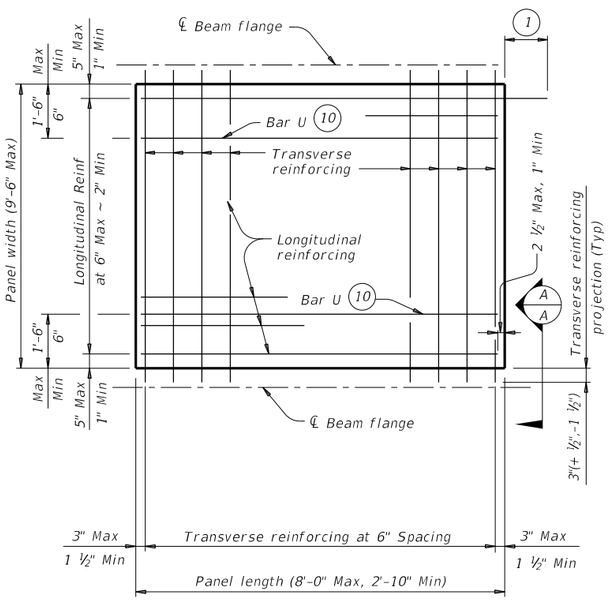
Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

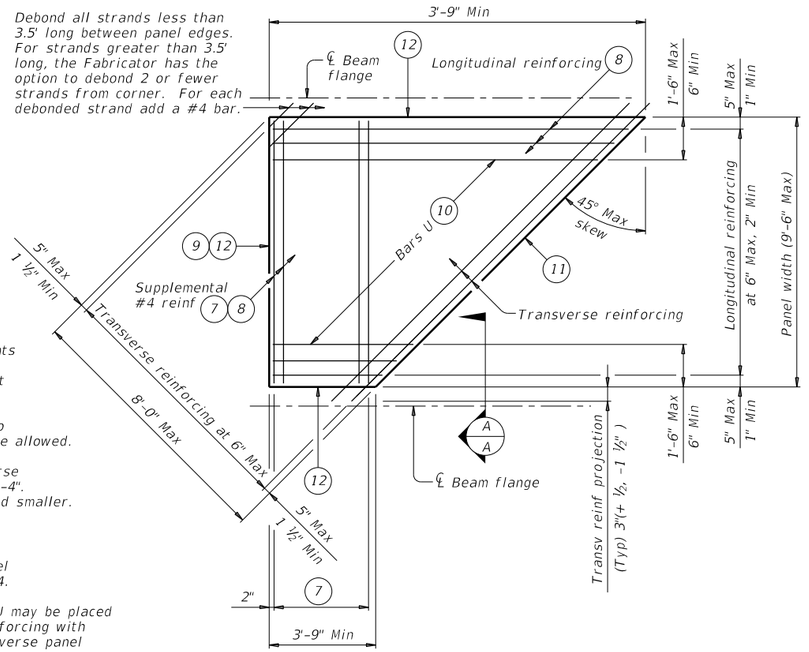
PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		162

DATE: 1/18/2023 1:46:44 PM
FILE: ...\Long Ave\894pcpstde2-19.dgn



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.

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.

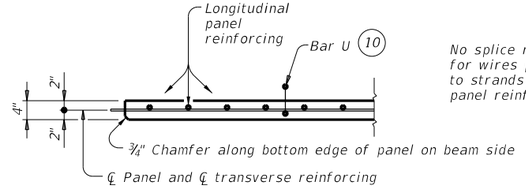
LONGITUDINAL PANEL REINFORCEMENT:

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.

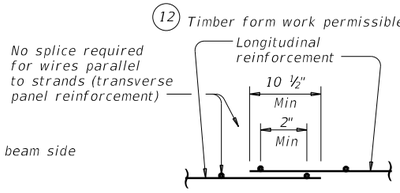
No combination of longitudinal reinforcement options in a panel is allowed.

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.

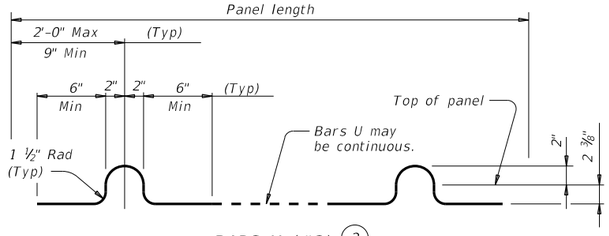


SECTION A-A

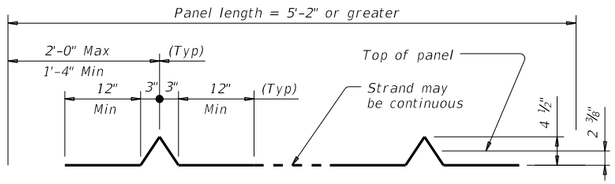
(Not showing supplemental #4 bars for skewed end panels.)



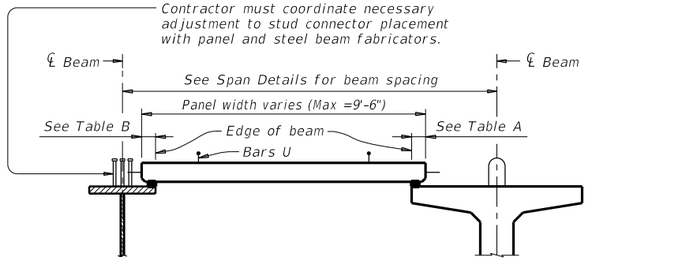
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



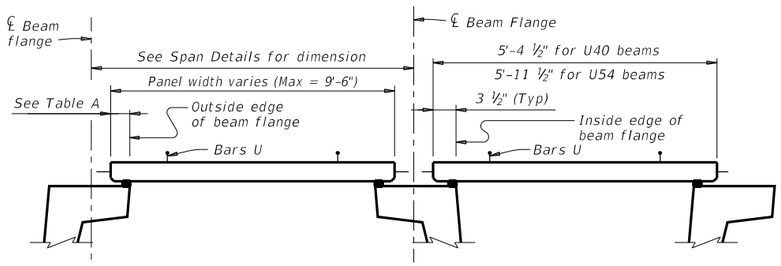
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

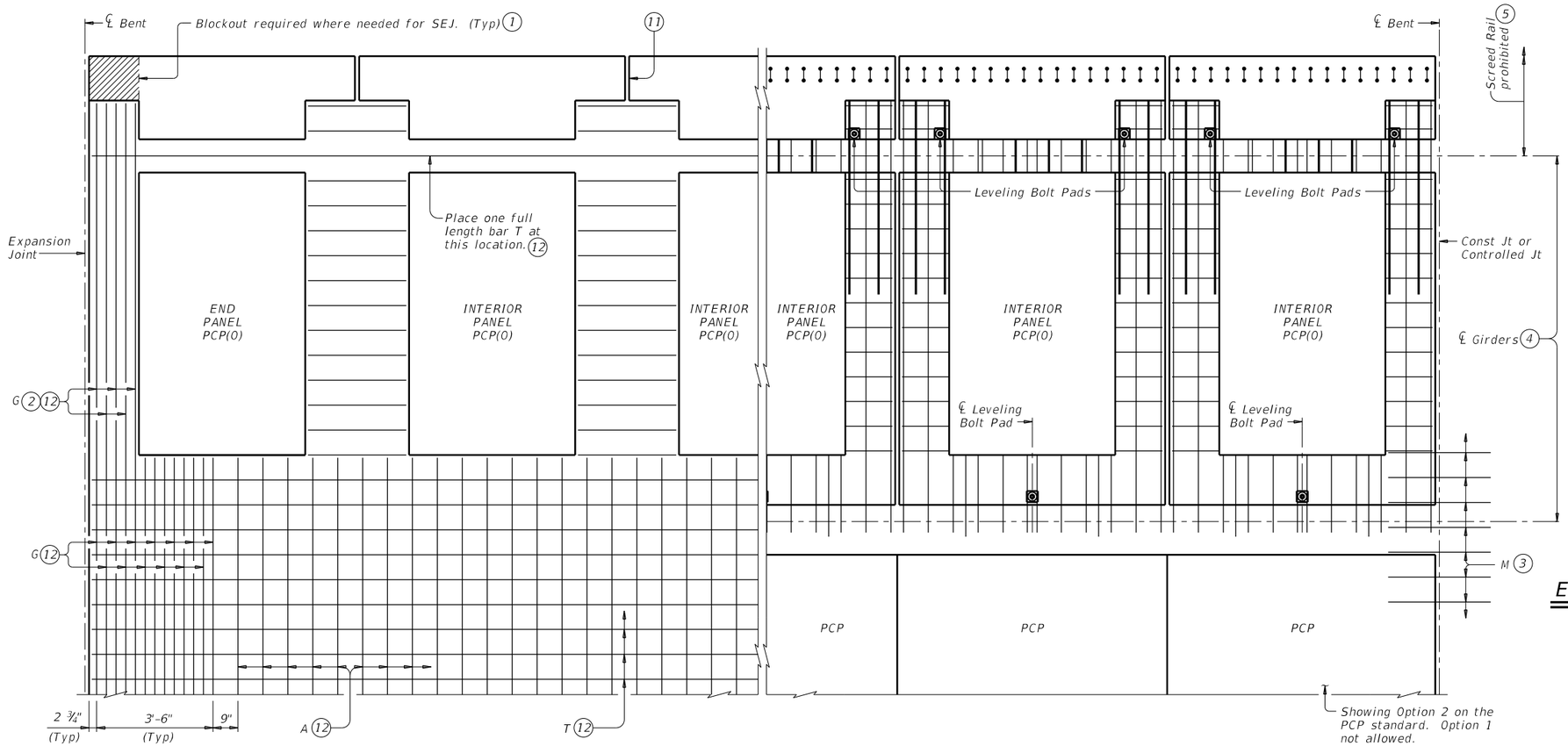
Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

FILE: pcpstde2-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		163



SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

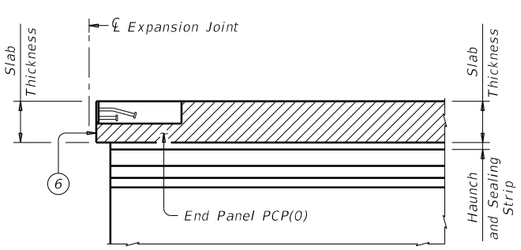
SHOWING PCP(0) EXPOSED REINFORCING STEEL

Field placed bars M shown for clarity.

PANEL LAYOUT

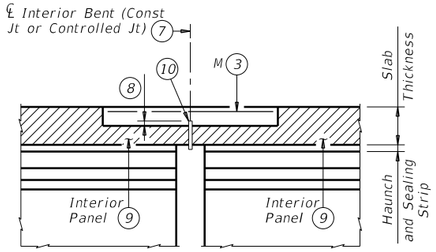
PCP(0) shown with gaps between panels for clarity.
The gap cannot be considered as a panel fabrication tolerance.

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(0) 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(0) 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.

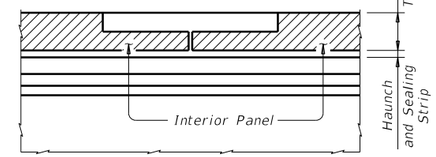


CONST JT OR CONTROLLED JT

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

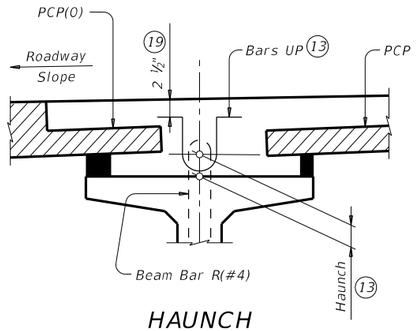
Texas Department of Transportation — Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

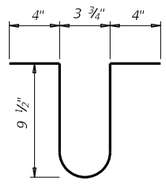
PCP(O)

FILE: pcpostd1-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		164

DATE: 1/18/2023 1:46:58 PM
FILE: ...\Long Ave\894pcpostd1-17.dgn



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.

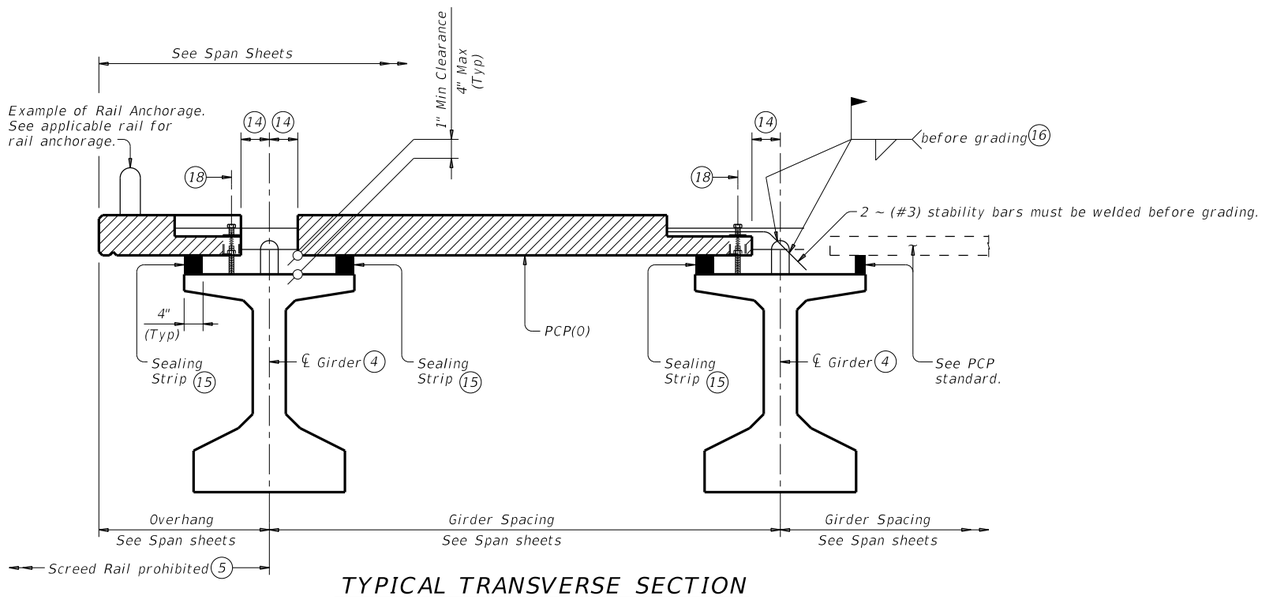
(15) Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and 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

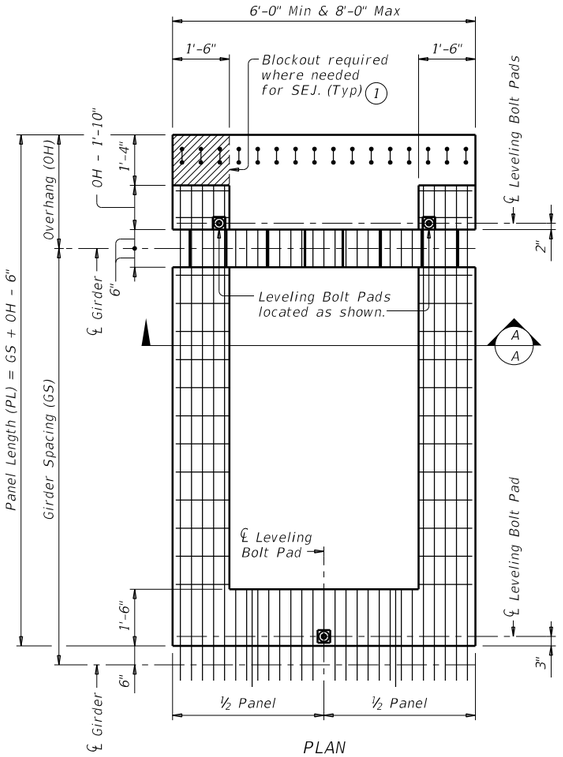
PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

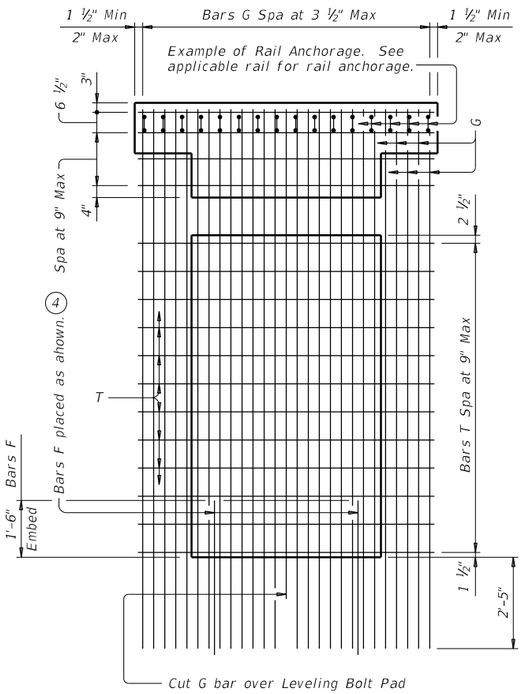
FILE: pcpostd1-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		165

DATE: 1/18/2023 1:46:59 PM
FILE: ...\Long Ave\894pcpostd1-17.dgn

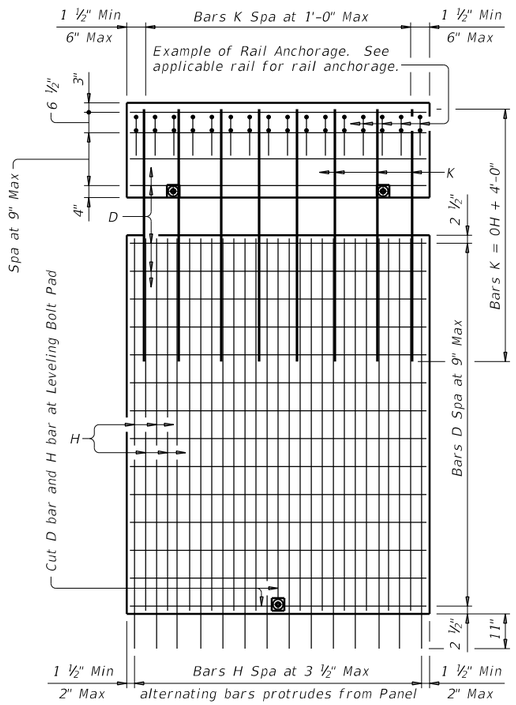
DATE: 1/18/2023 1:47:12 PM
FILE: ...\Long Ave\894pcpostd2-17.dgn



PLAN



TOP REINFORCING STEEL



BOTTOM REINFORCING STEEL

END PANEL

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

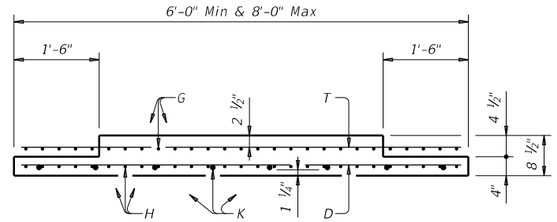
(1) 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.

(2) 1 ½" End Cover on bars. (Typ)

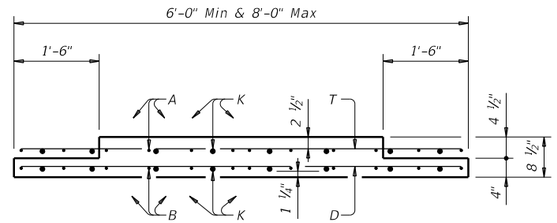
(3) Bars that are not allowed to have lap splices.

(4) Place F bars under bars T and against bars G.

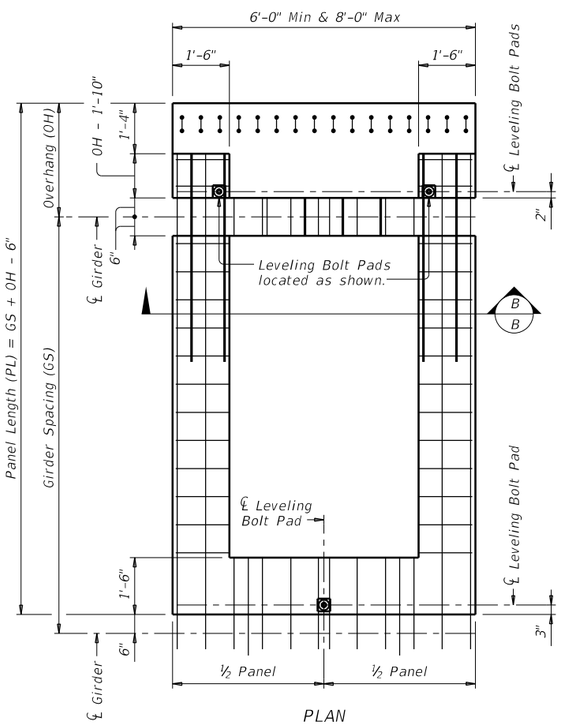
(5) Place F bars under bars T and between bars A.



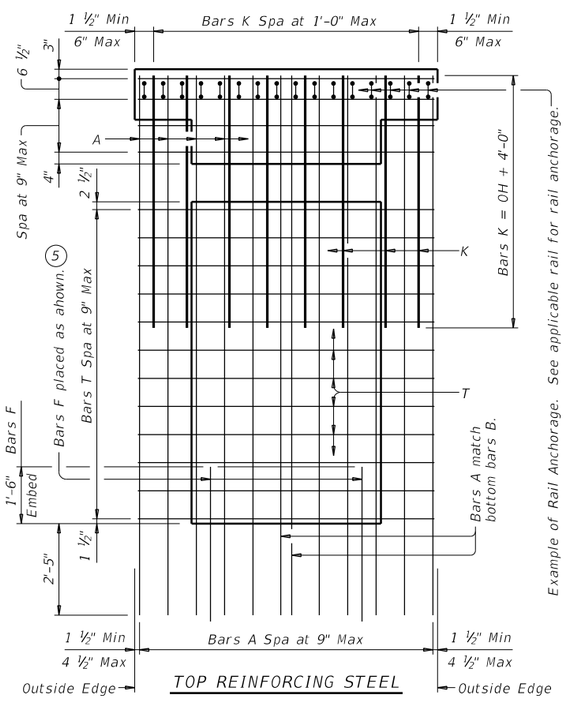
SECTION A-A



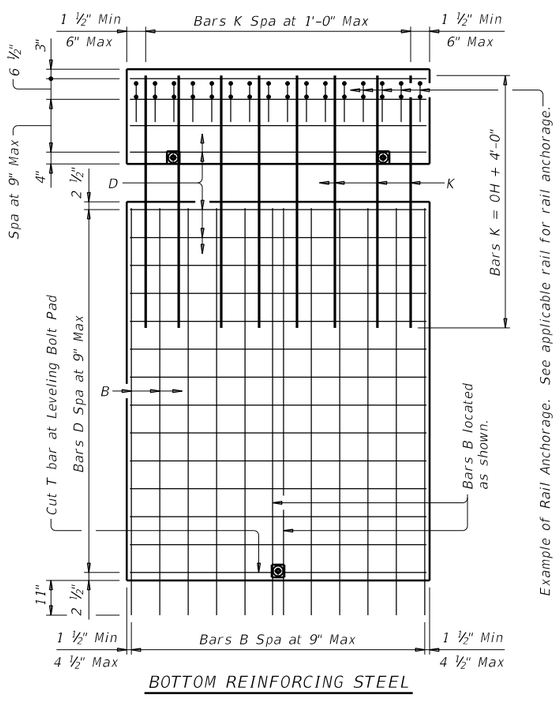
SECTION B-B



PLAN



TOP REINFORCING STEEL



BOTTOM REINFORCING STEEL

INTERIOR PANEL

HL93 LOADING SHEET 1 OF 2

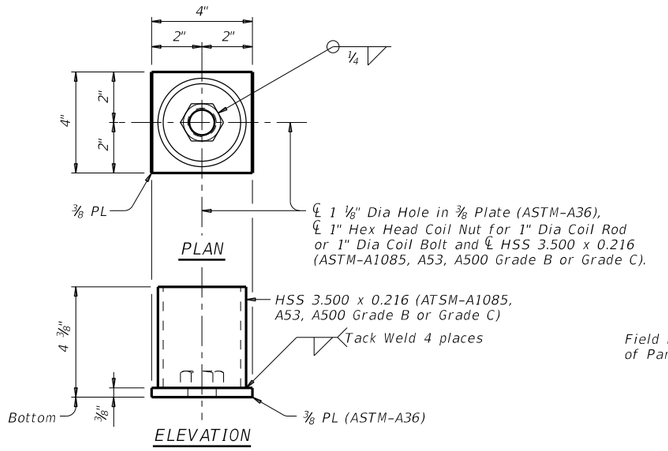
Texas Department of Transportation | Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

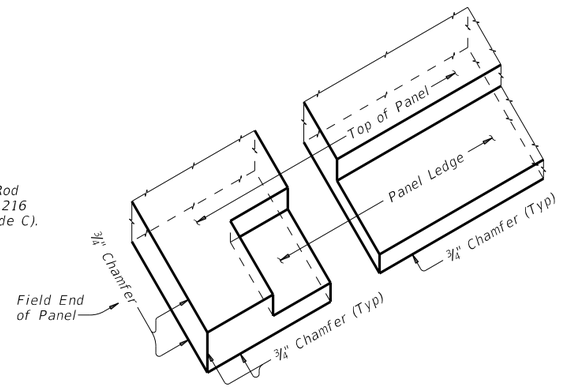
FILE: pcpostd2-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		166

DATE: 1/18/2023 1:47:13 PM
FILE: ...\Long Ave\894pcpostd2-17.dgn



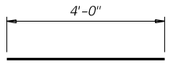
LEVELING BOLT PAD DETAILS

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

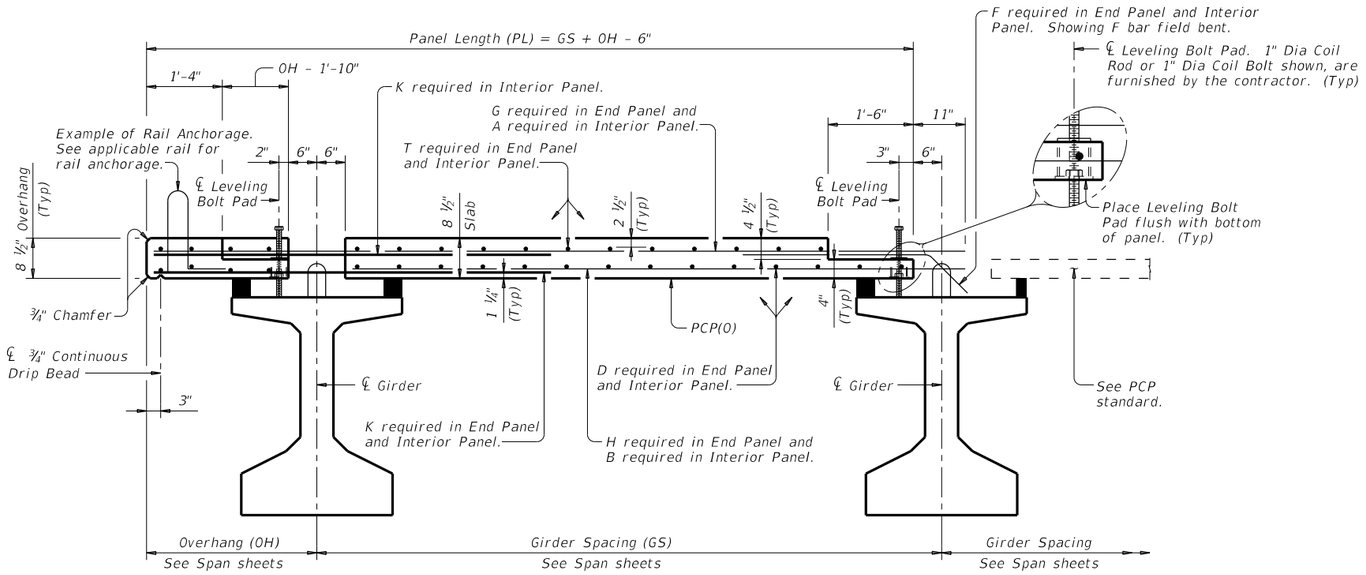


ISOMETRIC VIEW AT CORNER OF PANEL

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.

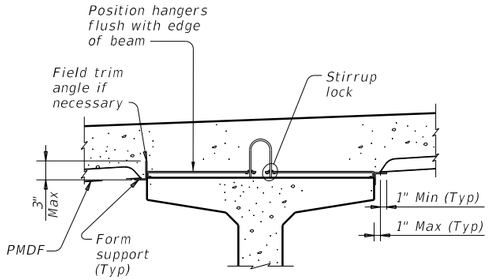
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division

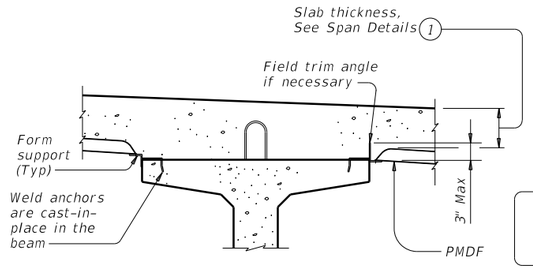
PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

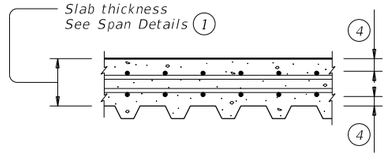
FILE: pcpostd2-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		167



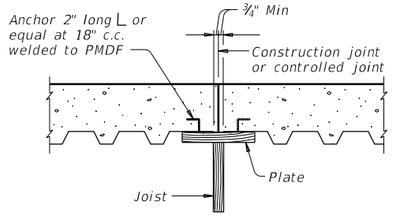
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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

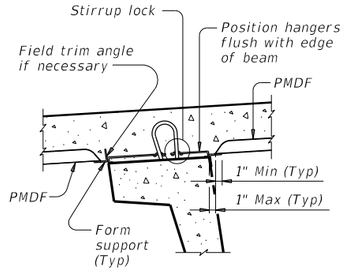


TYP LONGITUDINAL SLAB SECTION

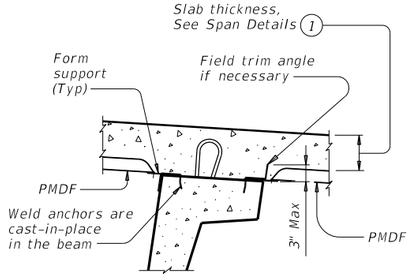


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

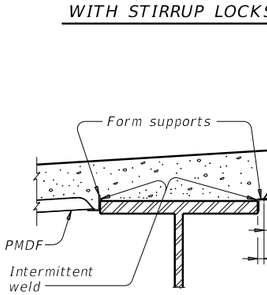
SECTION THRU CONSTRUCTION JOINT



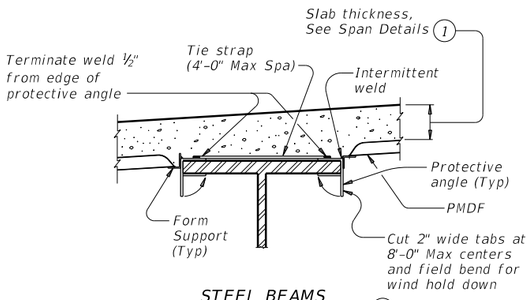
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

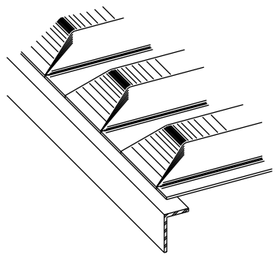


STEEL BEAMS AT COMPRESSION FLANGES

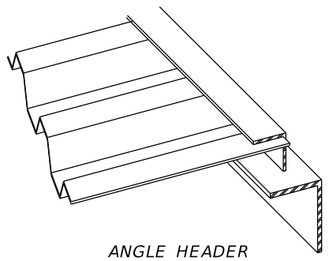


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



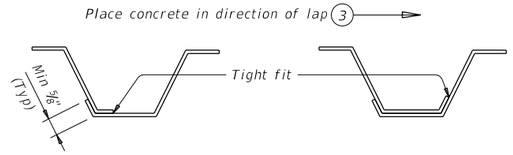
PRECLOSED



ANGLE HEADER

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

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

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

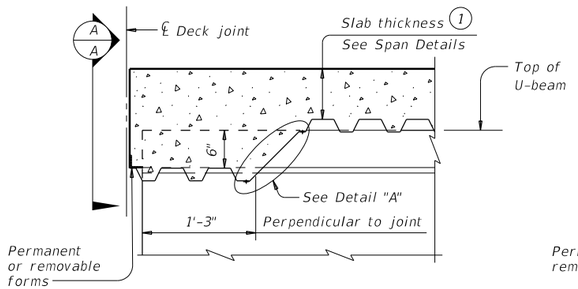
Bridge Division Standard

PERMANENT METAL DECK FORMS

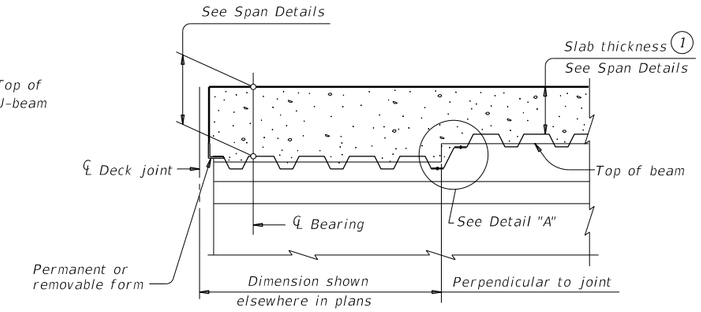
PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	FTW	TARRANT		168

DATE: 1/18/2023 1:47:25 PM
FILE: ...\Long Ave\894pmdfste1-21.dgn

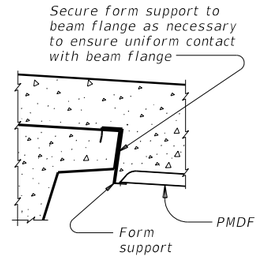


AT THICKENED SLAB END FOR U-BEAMS

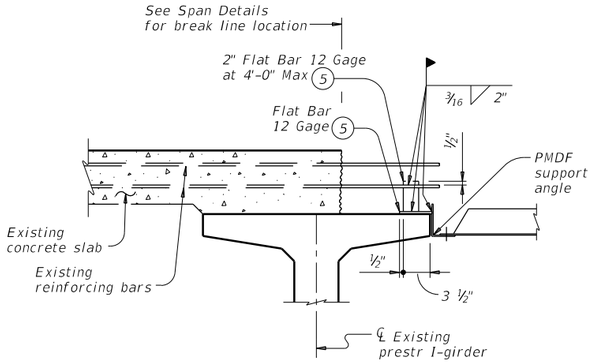


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

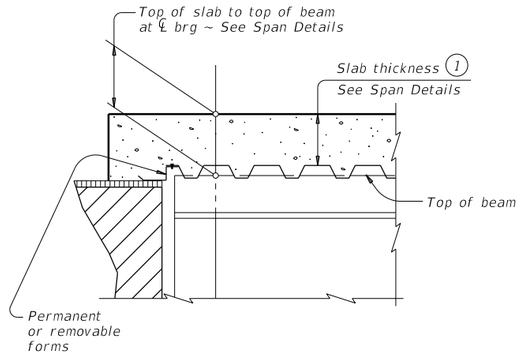
Showing I-beam block-out. No block-out for I-girders or steel beams.



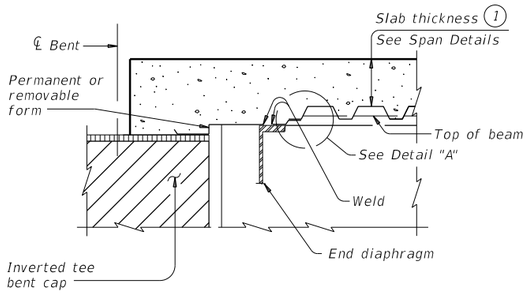
SECTION A-A



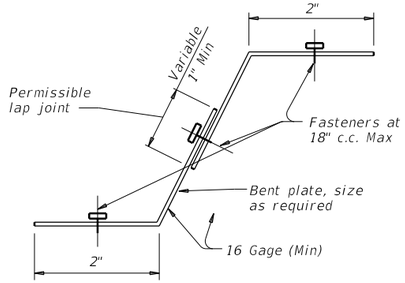
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



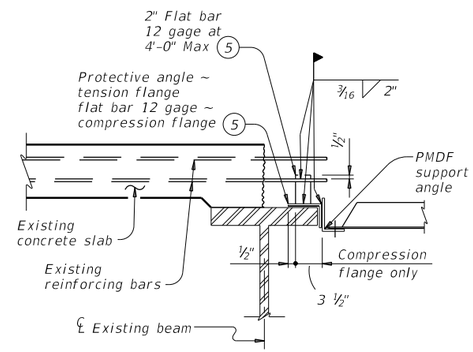
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



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

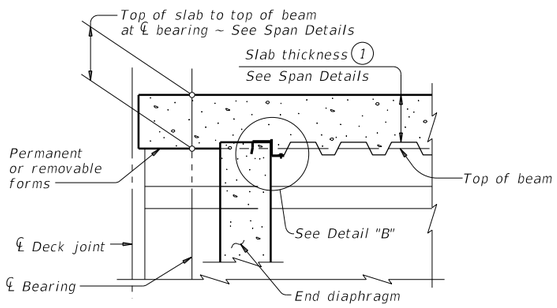


DETAIL "A"

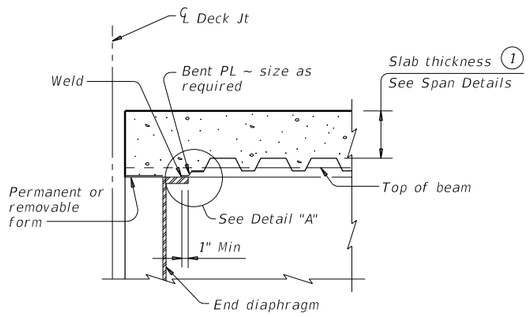


SHOWING STEEL BEAMS

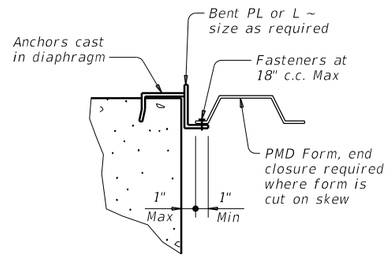
WIDENING DETAILS



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 5/8" 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

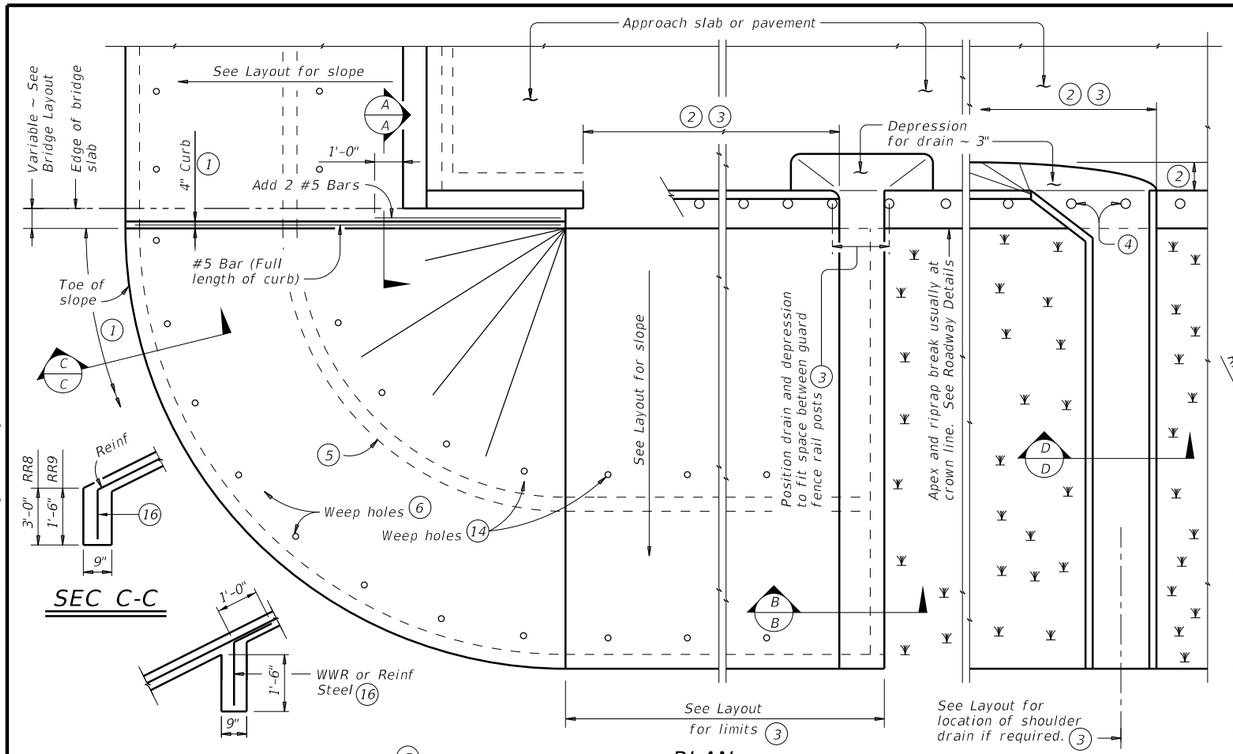
PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	FTW	TARRANT		169

DATE: 1/18/2023 1:47:26 PM
FILE: ...\Long Ave\894pmdfste1-21.dgn

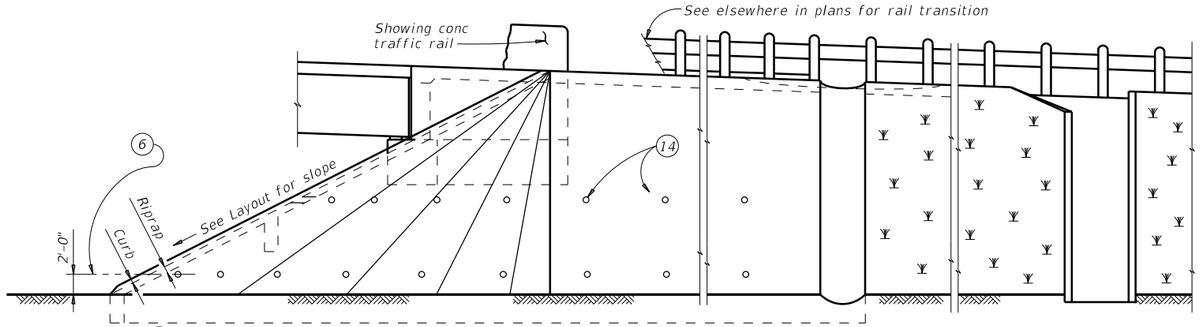
DATE: 1/18/2023 1:47:42 PM
FILE: ...\Long Ave\894crrstde1-19.dgn



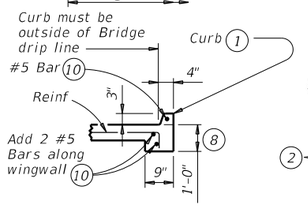
PLAN

SEC C-C

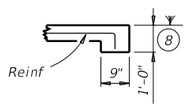
INTERMEDIATE TOEWALL (5)



ELEVATION

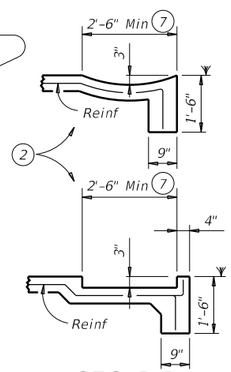


SEC A-A



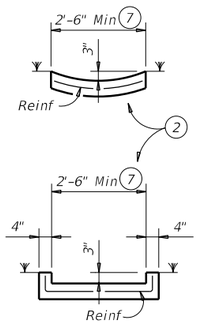
SEC B-B

(No drain)



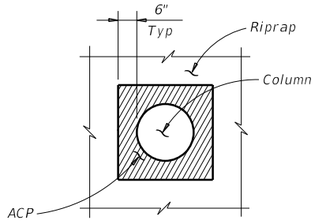
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

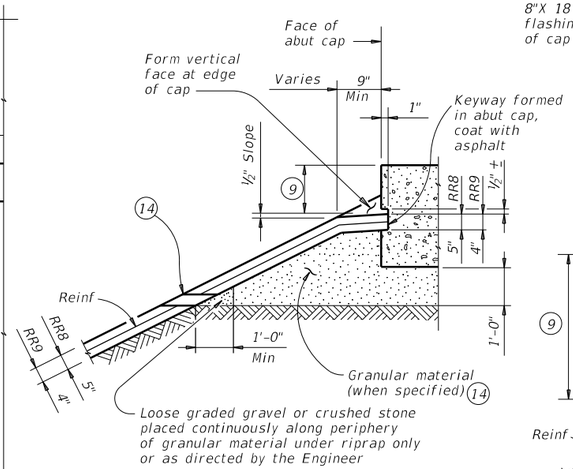
(Shoulder drain)



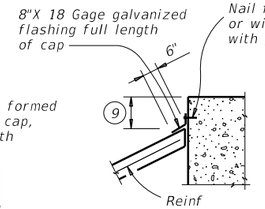
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

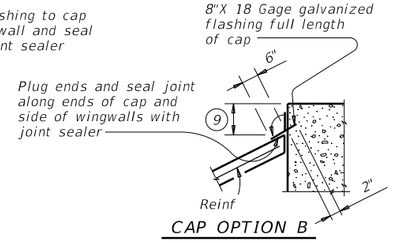
(As directed by the Engineer)



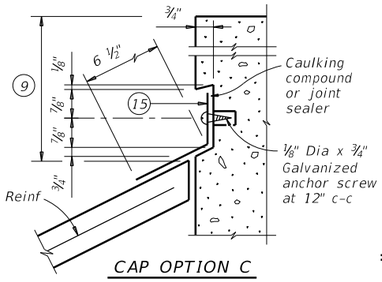
SHOWING KEYWAY OPTION



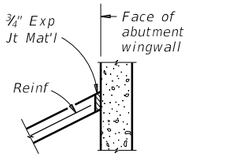
CAP OPTION A



CAP OPTION B

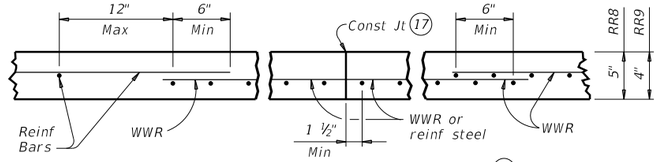


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

(1) When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.

(2) Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.

(3) Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.

(4) See details elsewhere in plans for installation of guard fence posts through concrete riprap.

(5) Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.

(6) Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.

(7) Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.

(8) Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.

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

(10) #5 bars shown are required even when synthetic fiber reinforcing option is selected.

(11) Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.

(12) Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.

(13) Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.

(14) If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.

(15) 8" x 18 Gage Galv Sheet Metal

(16) Provide WWR or #3 bars, with 1'-0" extension into slope.

(17) WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

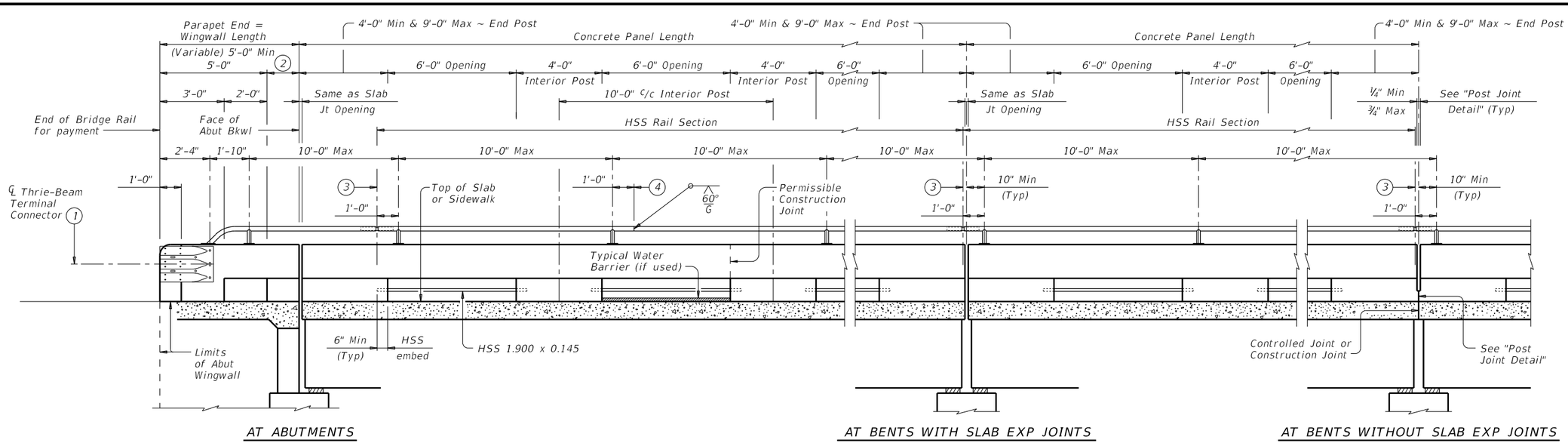
Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		170



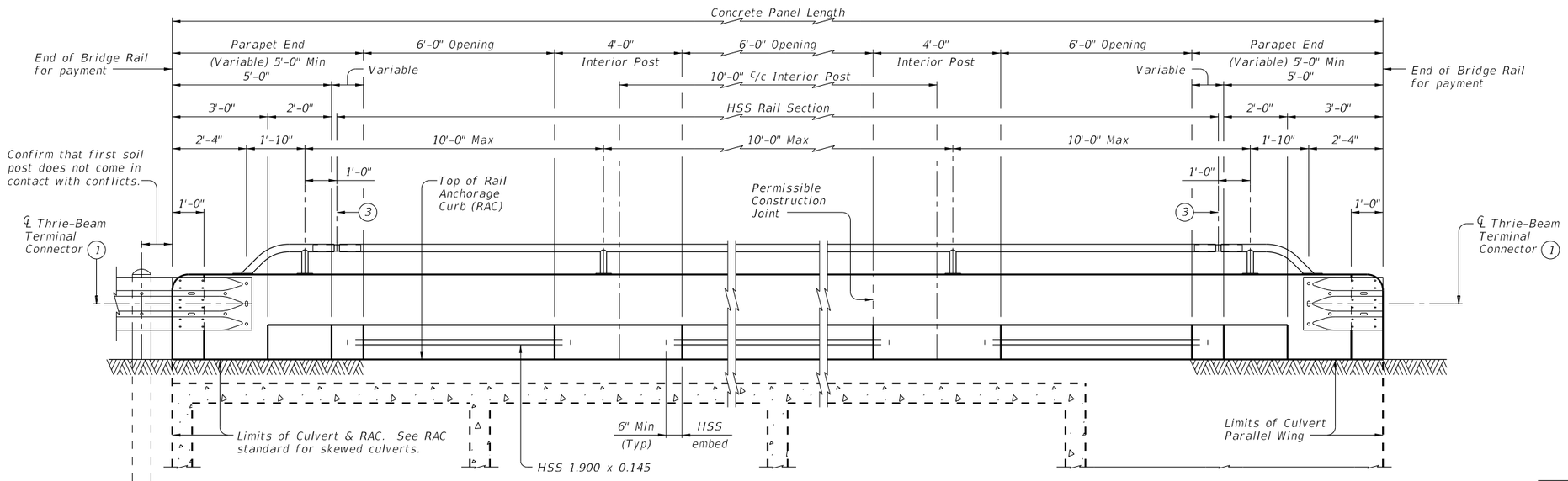
AT ABUTMENTS

AT BENTS WITH SLAB EXP JOINTS

AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE

(Showing without raised sidewalk)



AT STRAIGHT OR FLARED WINGS

AT PARALLEL WINGS

ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

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

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) ℄ Splice Jt or Exp Jt

(4) One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

DATE: 1/18/2023 1:47:55 PM
FILE: ...\Long Ave\894r1stdl019-19.dgn

SHEET 1 OF 4

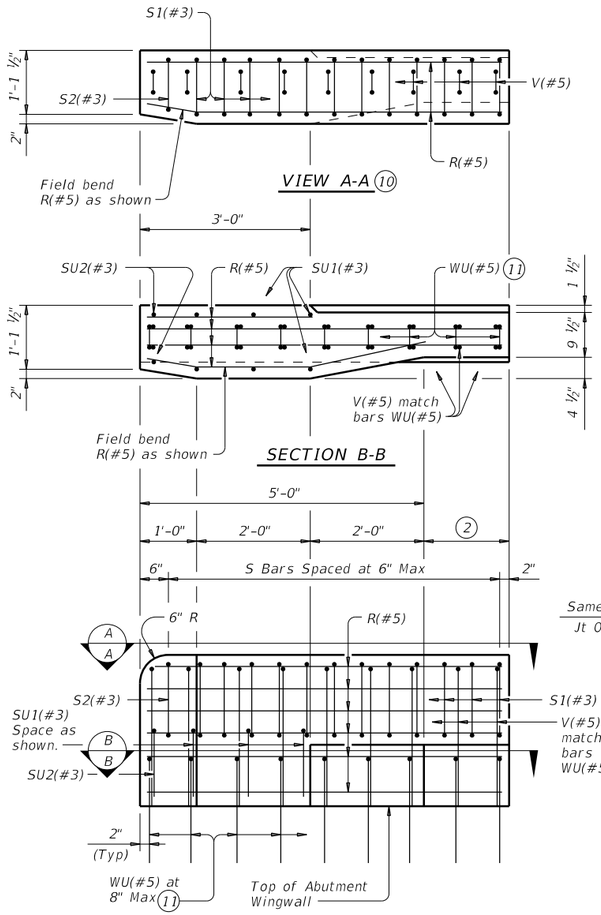
Texas Department of Transportation

Bridge Division Standard

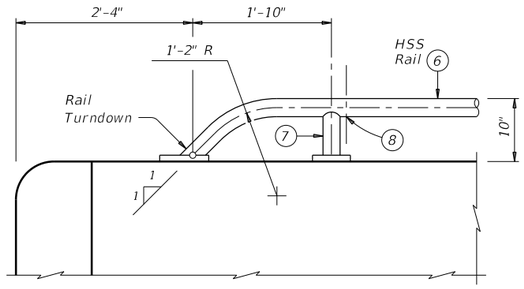
COMBINATION RAIL

TYPE C223

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		171

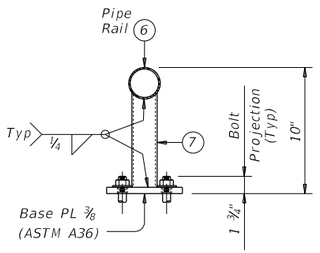


PARAPET END AT ABUT WINGWALL (11)

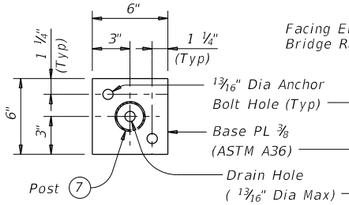


Note that at least two anchor points (as shown) are required for the Bridge Rail on the Abutment Wingwall. Longer Wingwalls may require more than two Rail anchorages.

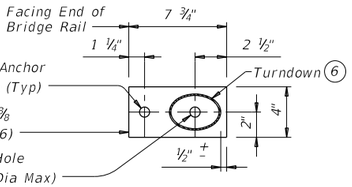
HSS RAIL TERMINAL DETAIL



TRANSVERSE SECTION

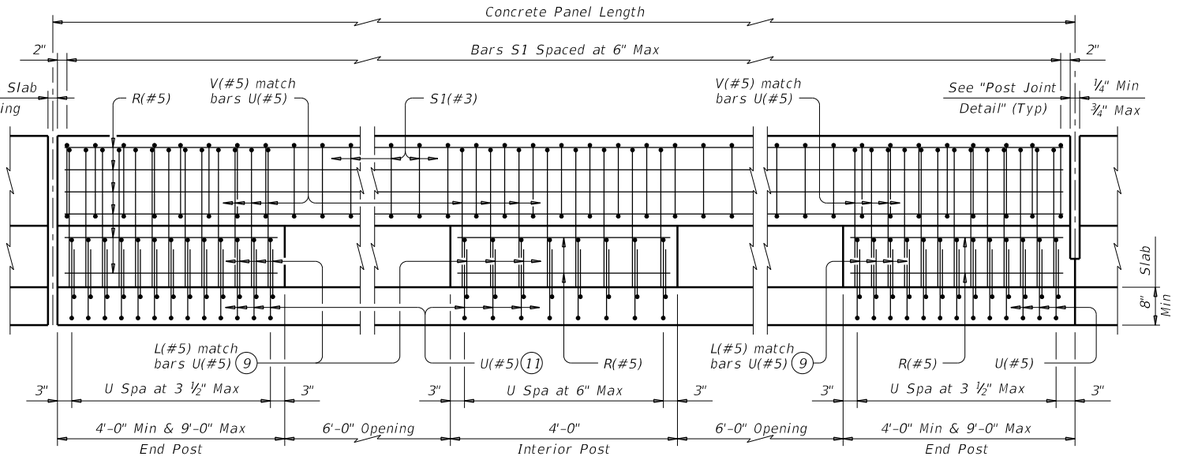


POST BASE PLATE PLAN



RAIL TURNDOWN BASE PLATE PLAN

HSS RAIL DETAILS



AT BENTS WITH SLAB EXP JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

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

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(5) Increase 2" for structures with overlay.

(6) HSS 2.875 x 0.203

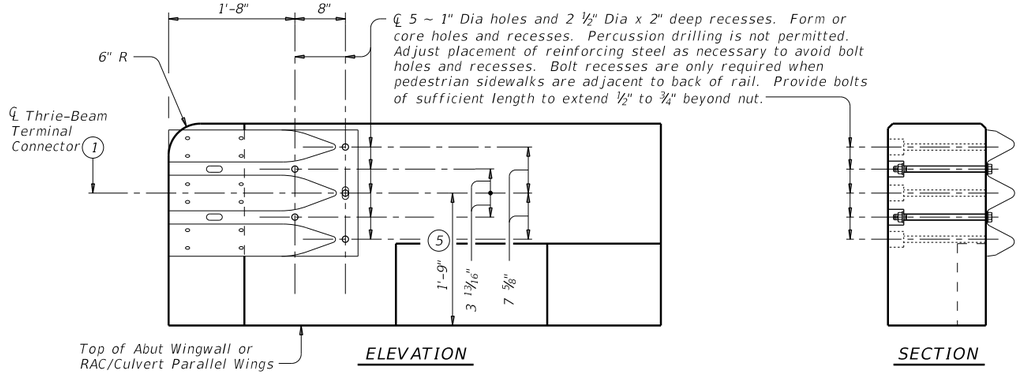
(7) HSS 2.375 x 0.154

(8) ⅜" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts ~ Typ)

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(10) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

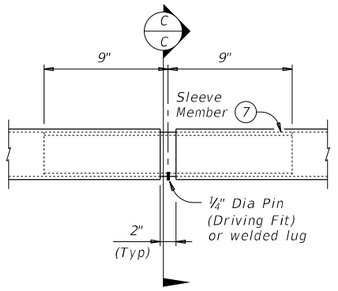
(11) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.



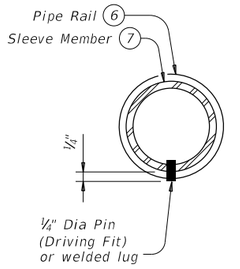
ELEVATION

SECTION

TERMINAL CONNECTION DETAILS



AT SPLICE OR EXP JTS



SECTION C-C

PIPE SPLICE DETAILS

SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

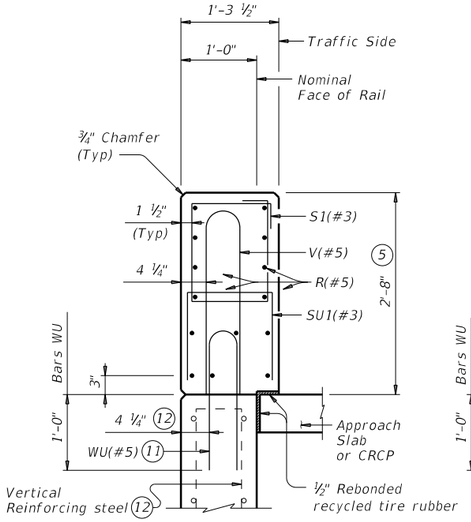
COMBINATION RAIL

TYPE C223

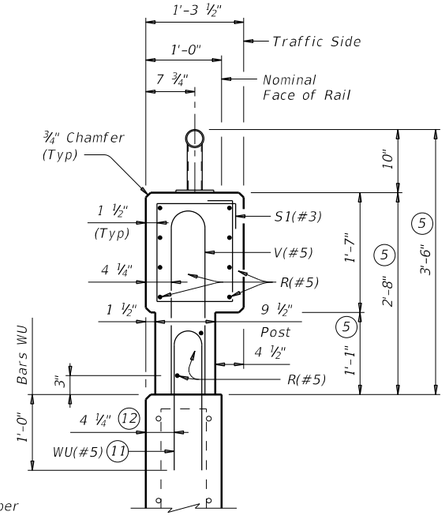
FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		172

DATE: 1/18/2023 1:47:55 PM
FILE: ...\Long Ave\894r1std019-19.dgn

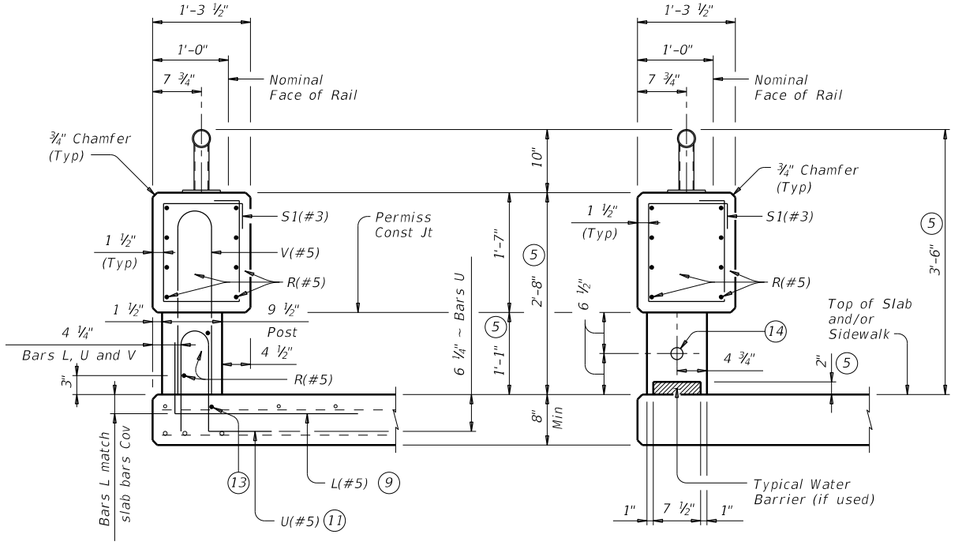
DATE: 1/18/2023 1:47:56 PM
FILE: ...\Long Ave\894rlstd019-19.dgn



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

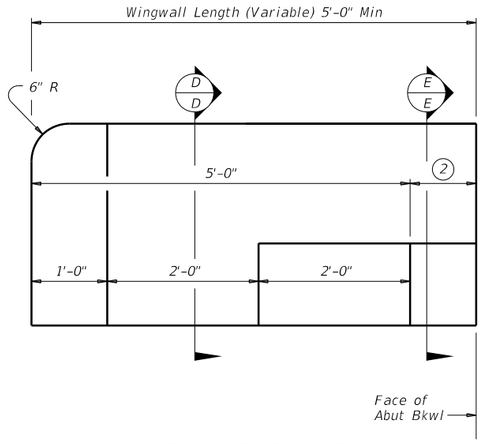


SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

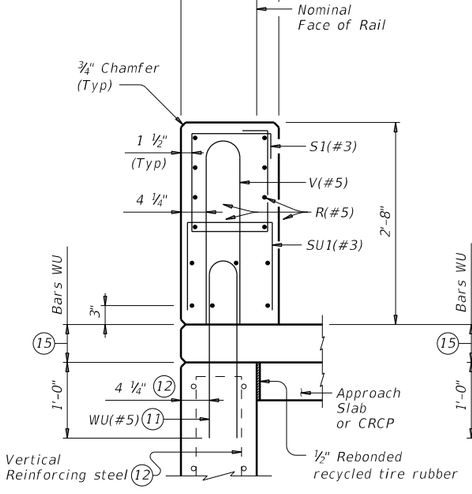


ELEVATION AT
ABUTMENT WINGWALL

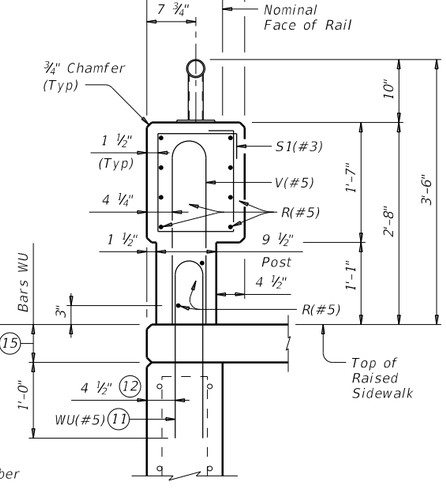
Box culvert parallel wings or rail anchorage curb similar.
HSS rail not shown for clarity.

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

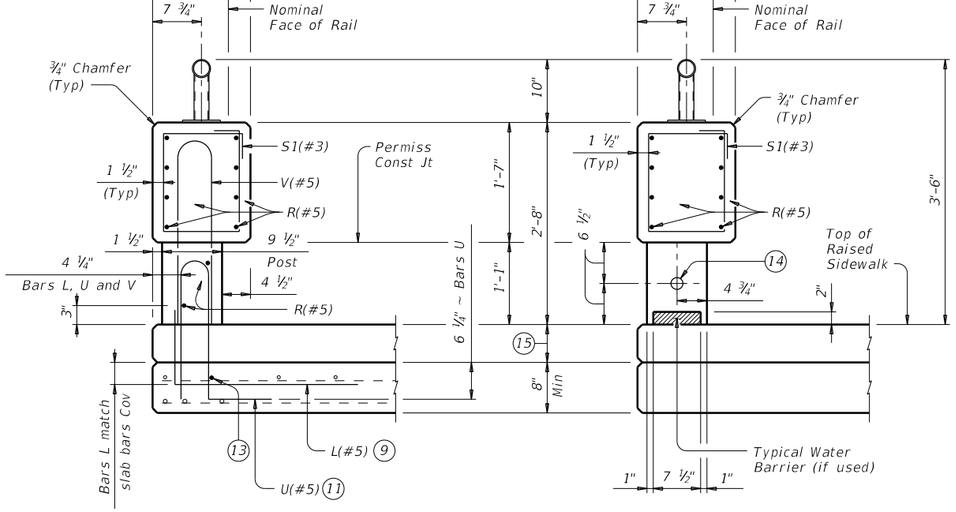
Sections on box culvert similar.



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

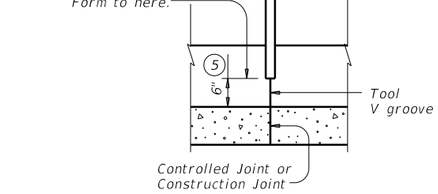


SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB



POST JOINT DETAIL

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

SECTIONS THRU RAIL WITH RAISED SIDEWALK

Sections on box culvert similar.

(2) Wingwall Length minus 5'-0" (Varies)

(5) Increase 2" for structures with overlay.

(9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(11) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(12) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

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

(14) HSS 1.900 x 0.145

(15) Raised Sidewalk.

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

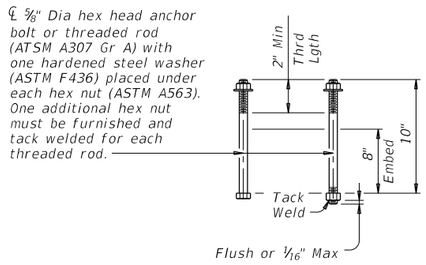
TYPE C223

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		173

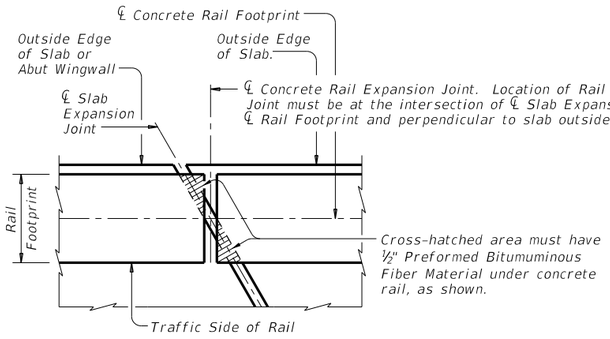
DATE: 1/18/2023 1:47:57 PM
FILE: ...\Long Ave\894rlstd019-19.dgn

RAIL DATA FOR HORIZONTAL CURVES

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



CAST-IN-PLACE ANCHOR BOLT OPTIONS (16)



PLAN OF RAIL AT EXPANSION JOINTS

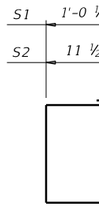
Example showing Slab Expansion Joints without breakbacks.

(5) Increase 2" for structures with overlay.

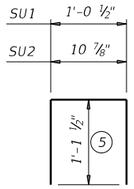
(16) See "Material Notes" for anchor bolt information.

(17) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.

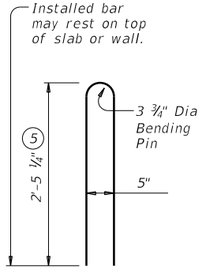
(18) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway/sidewalk surface without overlay.



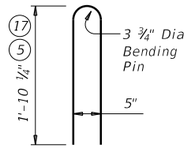
BARS S (#3)



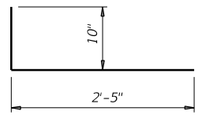
BARS SU (#3)



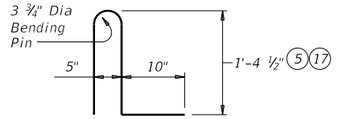
BARS V (#5) (18)



BARS WU (#5)



BARS L (#5)



BARS U (#5) (18)

CONSTRUCTION NOTES:

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

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

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

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

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

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

Chamfer all exposed corners.

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

Provide ASTM A1085, A500 Gr B or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over gavanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

Optional cast-in-place anchor bolts must be ⅝" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ASTM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

Provide bar laps, where required, as follows: Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

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

Rail anchorage details shown on this standard may require modification for select structure types.

See appropriate details elsewhere in plans for these modifications.

Submit erection drawings showing panel lengths, HSS rail post spacing, and anchor bolt setting to the Engineer for approval.

Average weight of railing with no overlay:
370 plf total
358 plf (Conc)
12 plf (Steel)

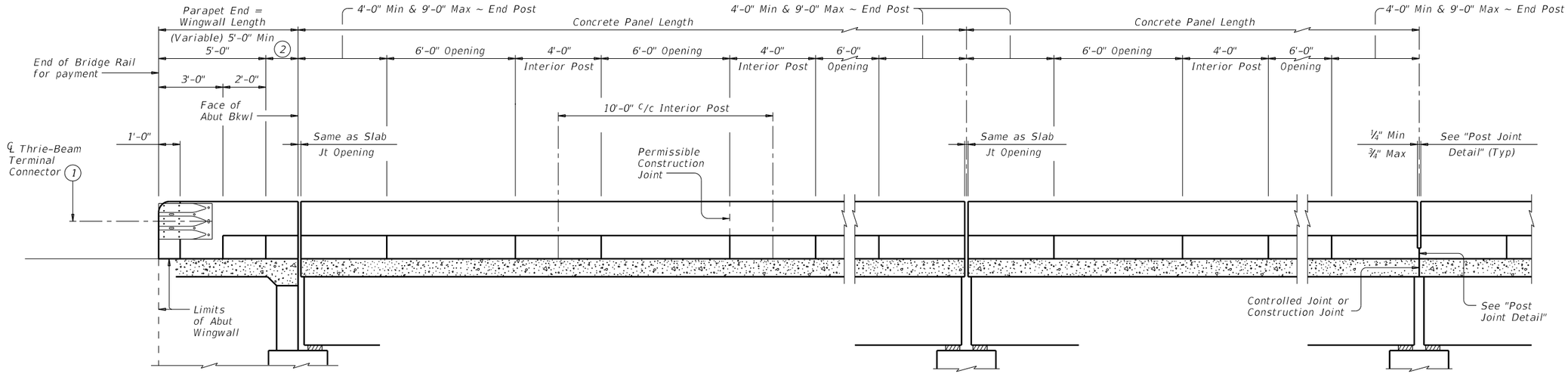
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation — Bridge Division Standard

COMBINATION RAIL

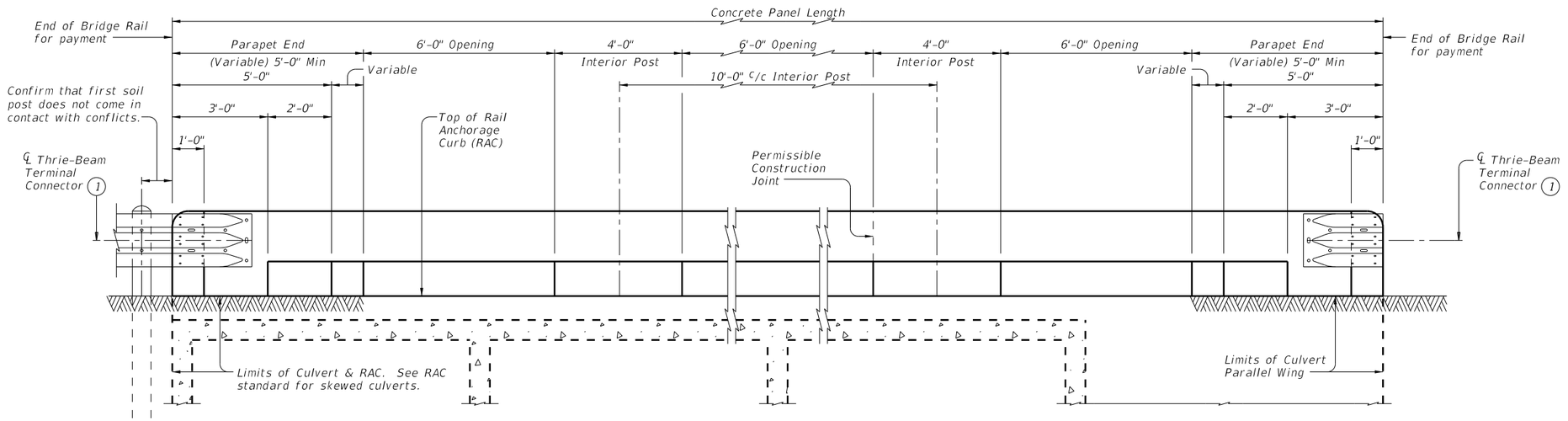
TYPE C223

FILE: rlstd019-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		174



AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE



AT STRAIGHT OR FLARED WINGS | AT PARALLEL WINGS

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)

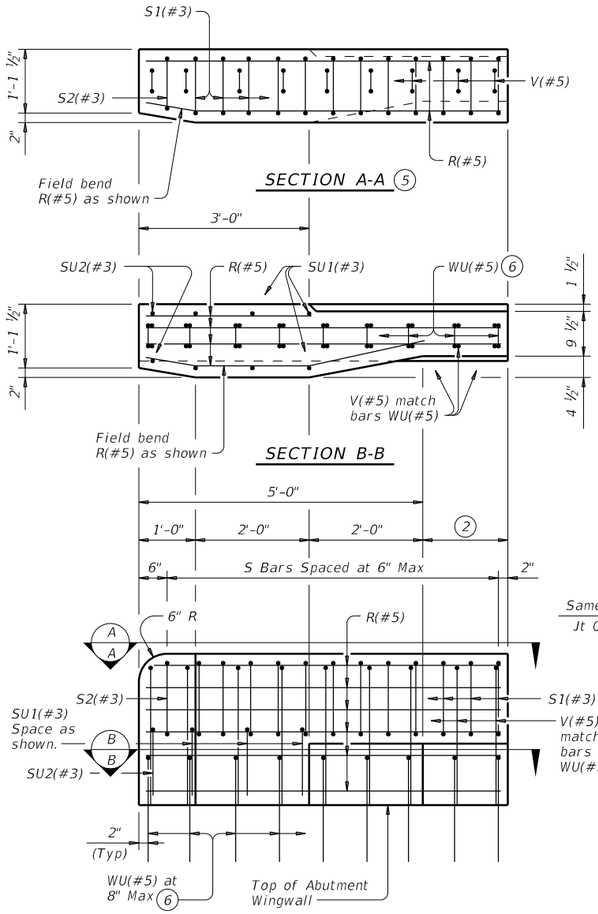
Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

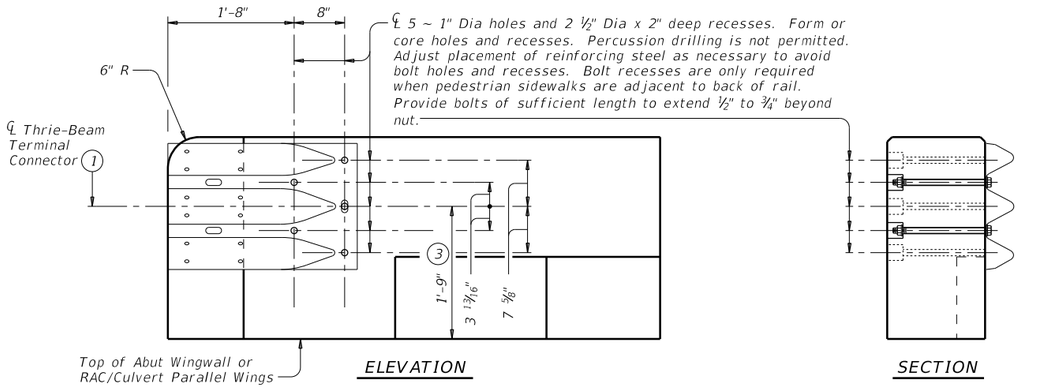
TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		175

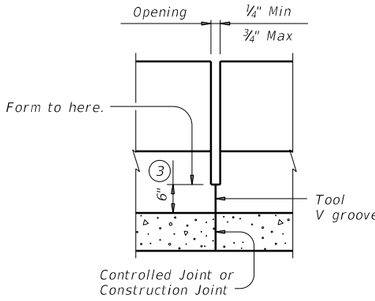
DATE: 1/18/2023 1:48:10 PM
FILE: ...\Long Ave\894rlstd005-19.dgn



PARAPET END AT ABUT WINGWALL (6)

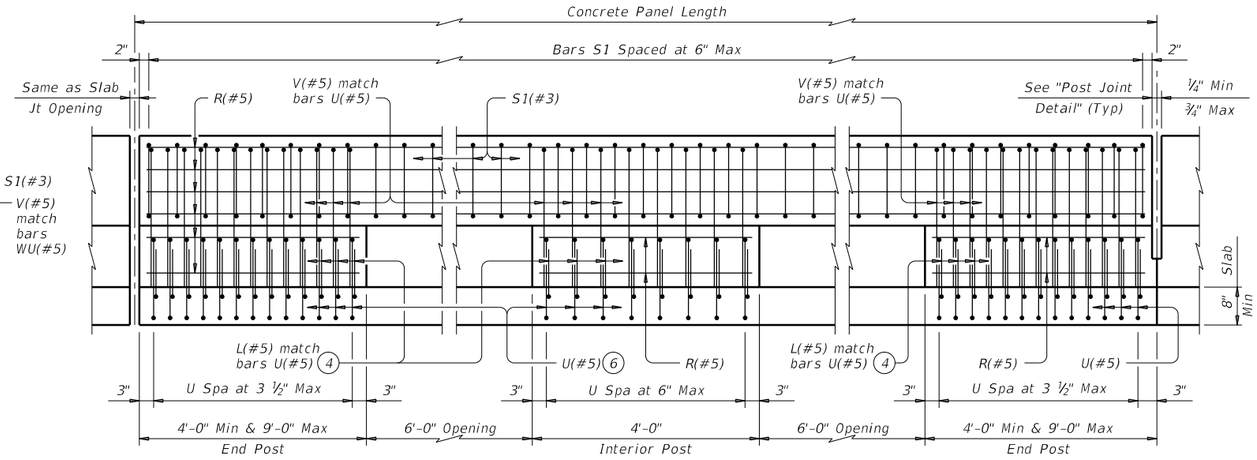


TERMINAL CONNECTION DETAILS



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

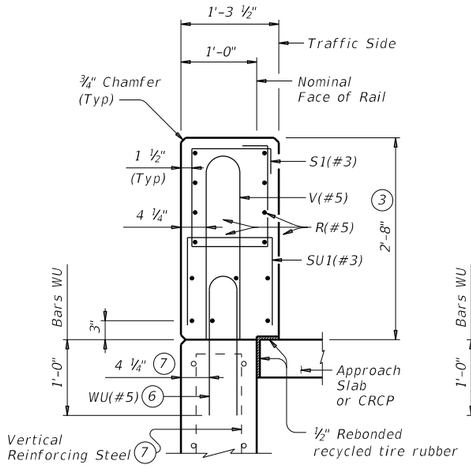
Bridge Division Standard

TRAFFIC RAIL

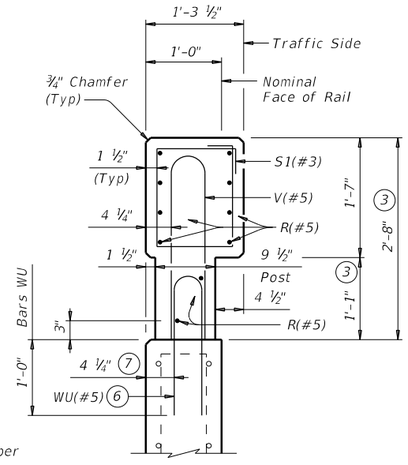
TYPE T223

FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		176

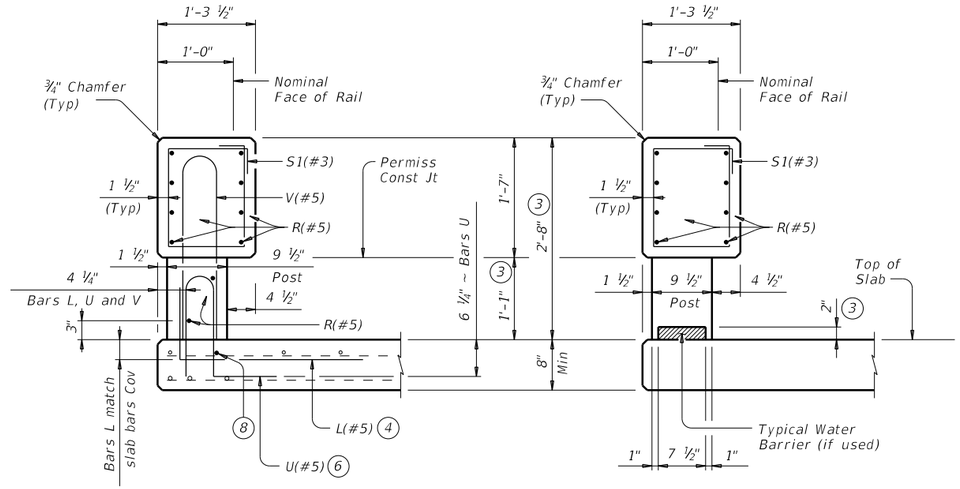
DATE: 1/18/2023 1:48:11 PM
FILE: ...\Long Ave\894r1std005-19.dgn



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

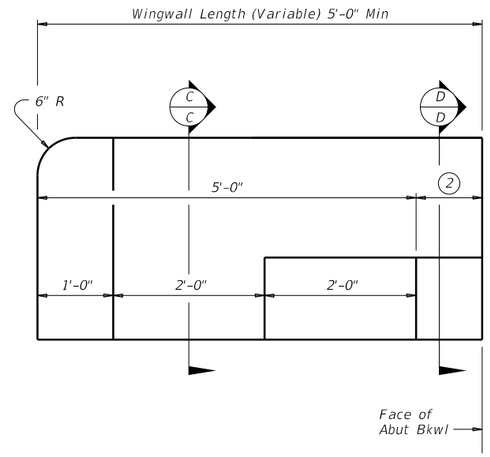


AT POST
ON BRIDGE SLAB

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.*

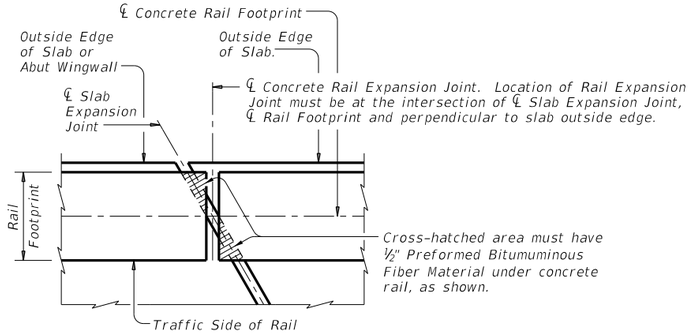
(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(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.*

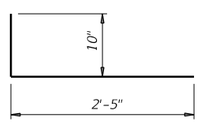
(8) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

(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.*

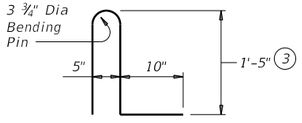


PLAN OF RAIL AT EXPANSION JOINTS

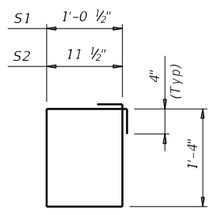
Example showing Slab Expansion Joints without breakbacks.



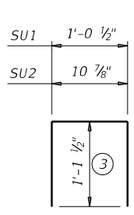
BARS L (#5)



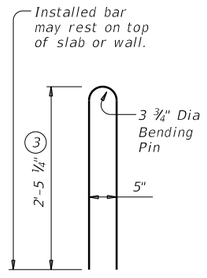
BARS U (#5) (9)



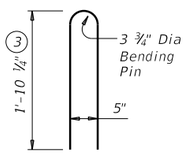
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

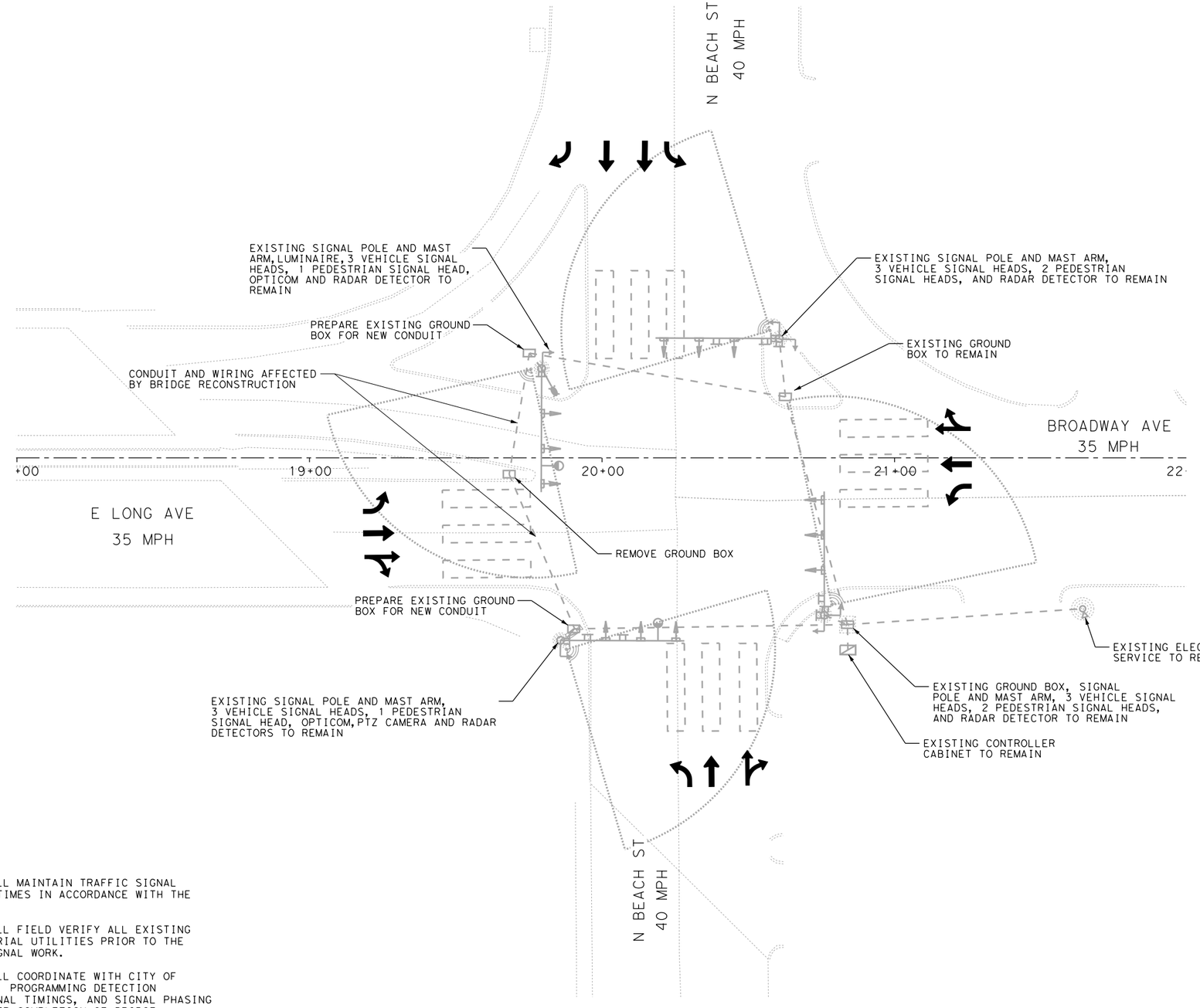
TRAFFIC RAIL

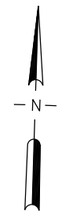
TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		177

DATE: 1/18/2023 1:48:12 PM
FILE: ...\Long Ave\894rlstd005-19.dgn

TIME: 2:34:26 PM
DATE: 2/2/2023





0 20 40
SCALE IN FEET

LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.

Jacobs Engineering Group
STATE OF TEXAS
EDWARD J. PULTORAK
93881
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/02/2023

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

Texas Department of Transportation

E. LONG AVENUE

TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
EXISTING LAYOUT

SCALE: 1"=40' (H) SHEET 1 OF 7

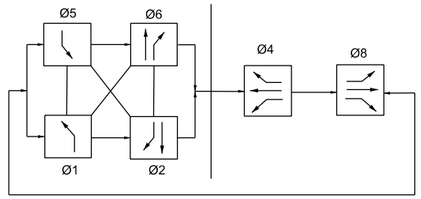
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
EP	TEXAS	FTW	TARRANT	178
GRAPHICS	CONTROL	SECTION	JOB	
AK	0902	48	894	
CHECK				
EP				

FILE: ...\TRAFFIC\894SGNL01.sht

SHEET SUMMARY			
ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL
618 6059	CONDT (PVC)(SCHD 80) (4")(BORE)	LF	100
620 6007	ELEC CONDR (NO 8) BARE	LF	100
620 6008	ELEC CONDR (NO 8) INSULATED	LF	200
684 6046	TRF SIG CBL (TY A) (14 AWG) (20 CONDR)	LF	225
684 6029	TRF SIG CBL (TY A) (14 AWG) (3 CONDR)	LF	225
690 6011*	INSTALL OF CABLES	LF	450
6004 6031	ITS COMM CBL (ETHERNET)	LF	225
6027 6008	GROUND BOX (PREPARE)	EA	2

* INCLUDE RADAR(225') AND OPTICOM (225') CABLES TO BE FURNISHED BY CITY OF FORT WORTH AND INSTALL PAID WITH ITEM 690-6011

PHASE DIAGRAM

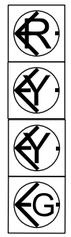


OVERLAP A = Ø1 (RA,YA,FYA)
OVERLAP B = Ø5 (RA,YA,FYA)

SPLIT

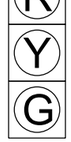
CABLE TERMINATION CHART		
CNDR NO.	CONDUCTOR COLOR	CABLE 1 FROM E-1 TO CNTRL 20 CNDR
1	WHITE	SIGNAL NEUTRAL
2	BLUE/WHITE	SH1:FY ARW
3	RED/GREEN	SPARE
4	WHITE/BLACK	SPARE
5	BLUE/BLACK	SPARE
6	WHITE/RED	SPARE
7	BLUE	SPARE
8	RED/BLACK	SPARE
9	GREEN/BLACK	SPARE
10	ORANGE/RED	PH W1: DW
11	ORANGE	PH W1: W
12	ORANGE/BLACK	SPARE
13	BLACK/RED	SPARE
14	GREEN/RED	SPARE
15	GREEN	SH 2,3:G
16	BLACK	SH 2,3:Y
17	RED	SH 2,3:R
18	BLACK/WHITE	SH1:Y ARW
19	GREEN/WHITE	SH1:G ARW
20	RED/WHITE	SH1:R ARW

TYPE V4L



1
(EXIST TO REMAIN)

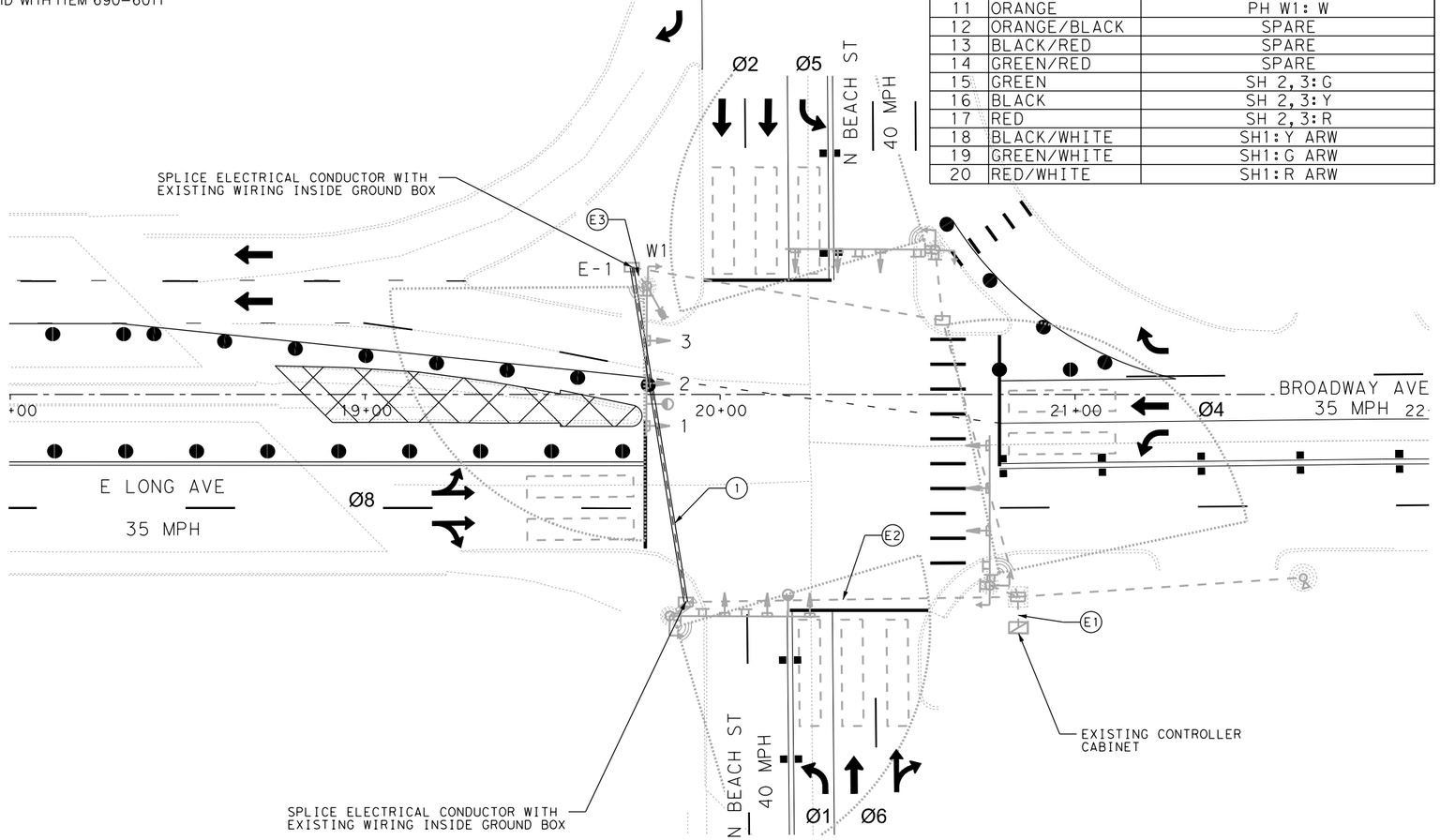
TYPE V3



2,3
(EXIST TO REMAIN)

TYPE PED

W1
(EXIST TO REMAIN)



N

0 20 40
SCALE IN FEET

LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- • • • CHANNELIZING DEVICES

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.

CONDUIT AND CABLE RUNS									
RUN NO.	TOTAL LENGTH OF RUN (LF)	CONDUIT	ELECTRICAL CNDR (WIRE)		TRAFFIC SIGNAL CABLE			OTHER CABLES	
		618 6059	620 6007	620 6008	684 6046	684 6029	6004 6031	690 6011	690 6011
		PVC-S80 (4")(BORE)	NO 8 BARE	NO 8 INSUL.	20 CNDR 14 AWG	3 CNDR 14 AWG	ITS COMM CBL (ETHERNET)	RADAR* CABLE	OPTICOM* CABLE
		QTY/RUN	QTY/RUN	QTY/RUN	QTY/RUN	QTY/RUN	QTY/RUN	QTY/RUN	QTY/RUN
E1	15				1	1	1	1	1
E2	95				1	1	1	1	1
1	100	1	1	2	1	1	1	1	1
E3	15				1	1	1	1	1
TOTAL (LF)		100	100	200	225	225	225	225	225

*RADAR AND OPTICOM CABLE TO BE FURNISHED BY CITY OF FORT WORTH AND INSTALL PAID WITH ITEM 690-6011

Jacobs Engineering Group
STATE OF TEXAS
EDWARD J. PULTORAK
93881
LICENSED
PROFESSIONAL ENGINEER
F-2966
02/02/2023

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

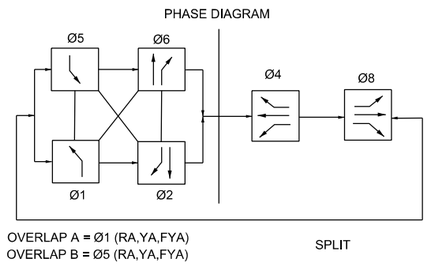
Texas Department of Transportation

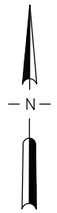
E. LONG AVENUE

TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
TEMP LAYOUT - TCP PHASE 1

SCALE: 1"=40' (H) SHEET 2 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
EP	TEXAS	FTW	TARRANT	179
GRAPHICS	CONTROL	SECTION	JOB	
AK	0902	48	894	
CHECK				
EP				





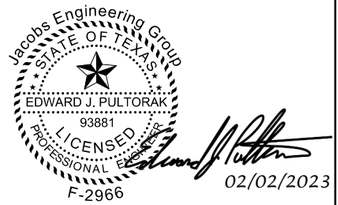
0 20 40
SCALE IN FEET

LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.
4. SIGNAL MODIFICATION IS ONLY REQUIRED IN TCP PHASE 1. MODIFICATION IN PHASE 1 CONTINUE TO THIS PHASE.



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

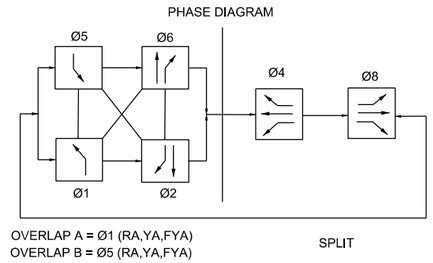
Texas Department of Transportation

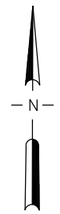
E. LONG AVENUE

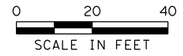
TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
TEMP LAYOUT - TCP PHASE 2

SCALE: 1"=40' (H) SHEET 3 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
EP	TEXAS	FTW	TARRANT	180
GRAPHICS	CONTROL	SECTION	JOB	
AK	0902	48	894	
CHECK				
EP				







LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.
4. SIGNAL MODIFICATION IS REQUIRED ONLY IN THE TCP PHASE 1. MODIFICATION IN PHASE 1 CONTINUE TO THIS PHASE.

02/02/2023

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

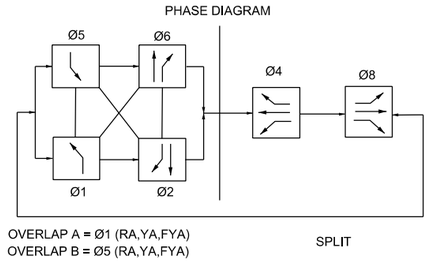
Texas Department of Transportation

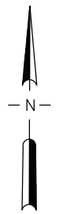
E. LONG AVENUE

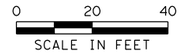
TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
TEMP LAYOUT - TCP PHASE 3 STAGE 1

SCALE: 1"=40' (H) SHEET 4 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
EP	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	181
AK				
CHECK	0902	48	894	
EP				







LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.
4. SIGNAL MODIFICATION IS REQUIRED ONLY IN THE TCP PHASE 1. MODIFICATION IN PHASE 1 CONTINUE TO THIS PHASE.

02/02/2023

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

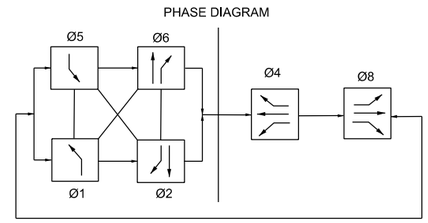
Texas Department of Transportation

E. LONG AVENUE

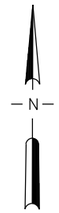
TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
TEMP LAYOUT - TCP PHASE 3 STAGE 2

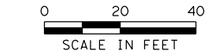
SCALE: 1"=40' (H) SHEET 5 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK: EP	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS: AK	TEXAS	FTW	TARRANT	182
CHECK: EP	CONTROL	SECTION	JOB	
	0902	48	894	



OVERLAP A = Ø1 (RA,YA,FYA)
OVERLAP B = Ø5 (RA,YA,FYA)



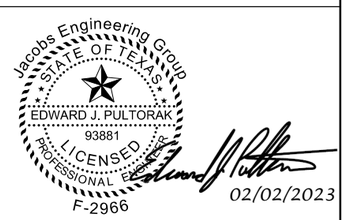


LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA
- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT THIS PHASE
- COMPLETED PERMANENT CONSTRUCTION
- COMPLETED TEMPORARY PAVEMENT
- CHANNELIZING DEVICES

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.
4. SIGNAL MODIFICATION IS REQUIRED ONLY IN THE TCP PHASE 1. MODIFICATION IN PHASE 1 CONTINUE TO THIS PHASE.



02/02/2023

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

Texas Department of Transportation

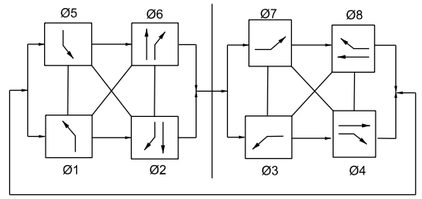
E. LONG AVENUE

TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
TEMP LAYOUT - TCP PHASE 4

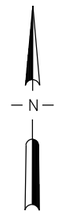
SCALE: 1"=40' (H) SHEET 6 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
EP	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	183
AK	0902	48	894	
CHECK				
EP				

PHASE DIAGRAM



OVERLAP A = Ø1 (RA,YA,FYA)
OVERLAP B = Ø5 (RA,YA,FYA)
OVERLAP C = Ø3 (RA,YA,FYA)
OVERLAP D = Ø7 (RA,YA,FYA)



0 20 40
SCALE IN FEET

LEGEND

- EX. TRAFFIC CONTROLLER
- EX. ELECTRICAL SERVICE
- E-1 EX. SIGNAL POLE NUMBER
- EX. SIGNAL POLE & MAST ARM
- 1 2 3 EX. SIGNAL HEAD
- A EX. SMALL SIGN MOUNTED ON POLE/MAST ARM
- W1 EX. PEDESTRIAN SIGNAL HEAD
- EX. TYPE C GROUND BOX
- EX. CONDUIT RUN
- EX. LUMINAIRE
- EX. VEHICLE LOOP DETECTOR
- EX. RADAR SENSOR
- EX. OPTICOM DETECTOR
- EX. PTZ CAMERA
- PROPOSED BORE CONDUIT RUN

NOTES:

1. THE CONTRACTOR SHALL MAINTAIN TRAFFIC SIGNAL OPERATIONS AT ALL TIMES IN ACCORDANCE WITH THE CURRENT TMUTCD.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UNDERGROUND AND AERIAL UTILITIES PRIOR TO THE COMMENCEMENT OF SIGNAL WORK.
3. THE CONTRACTOR SHALL COORDINATE WITH CITY OF THE FORT WORTH FOR PROGRAMMING DETECTION ZONES, TRAFFIC SIGNAL TIMINGS, AND SIGNAL PHASING DURING TCP AND AFTER COMPLETION OF BRIDGE RECONSTRUCTION.
4. SIGNAL MODIFICATION DONE AS PART OF THE TCP PHASE 1 CONTINUE AS PART OF THE PROPOSED SIGNAL. NO ADDITIONAL MODIFICATION REQUIRED.

Jacobs Engineering Group
STATE OF TEXAS
EDWARD J. PULTORAK
93881
LICENSED
PROFESSIONAL ENGINEER
F-2966

02/02/2023

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

Texas Department of Transportation

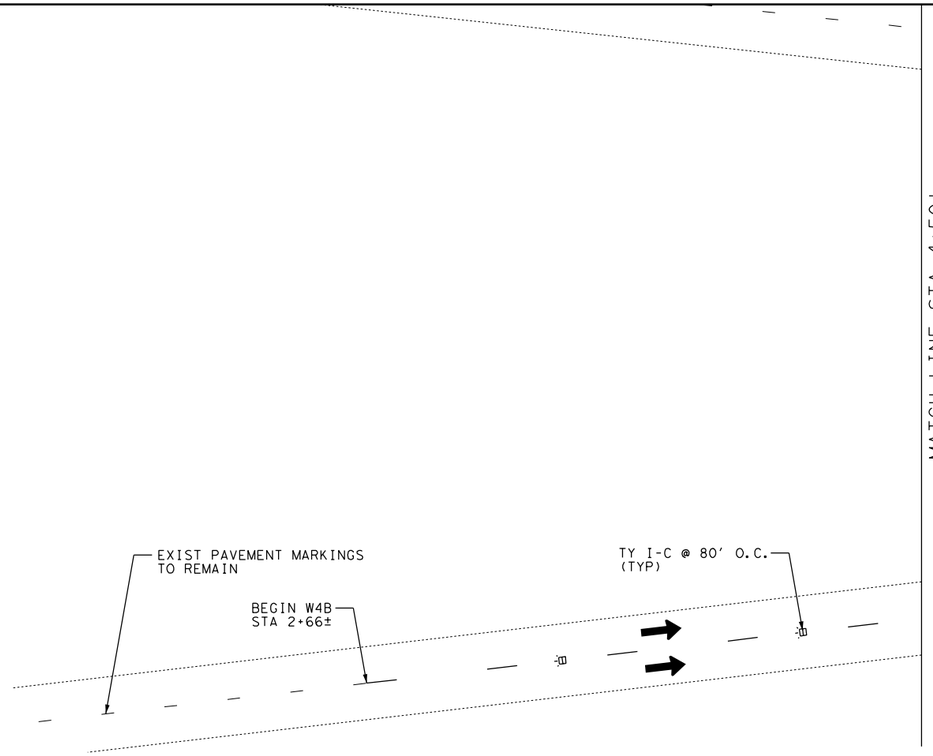
E. LONG AVENUE

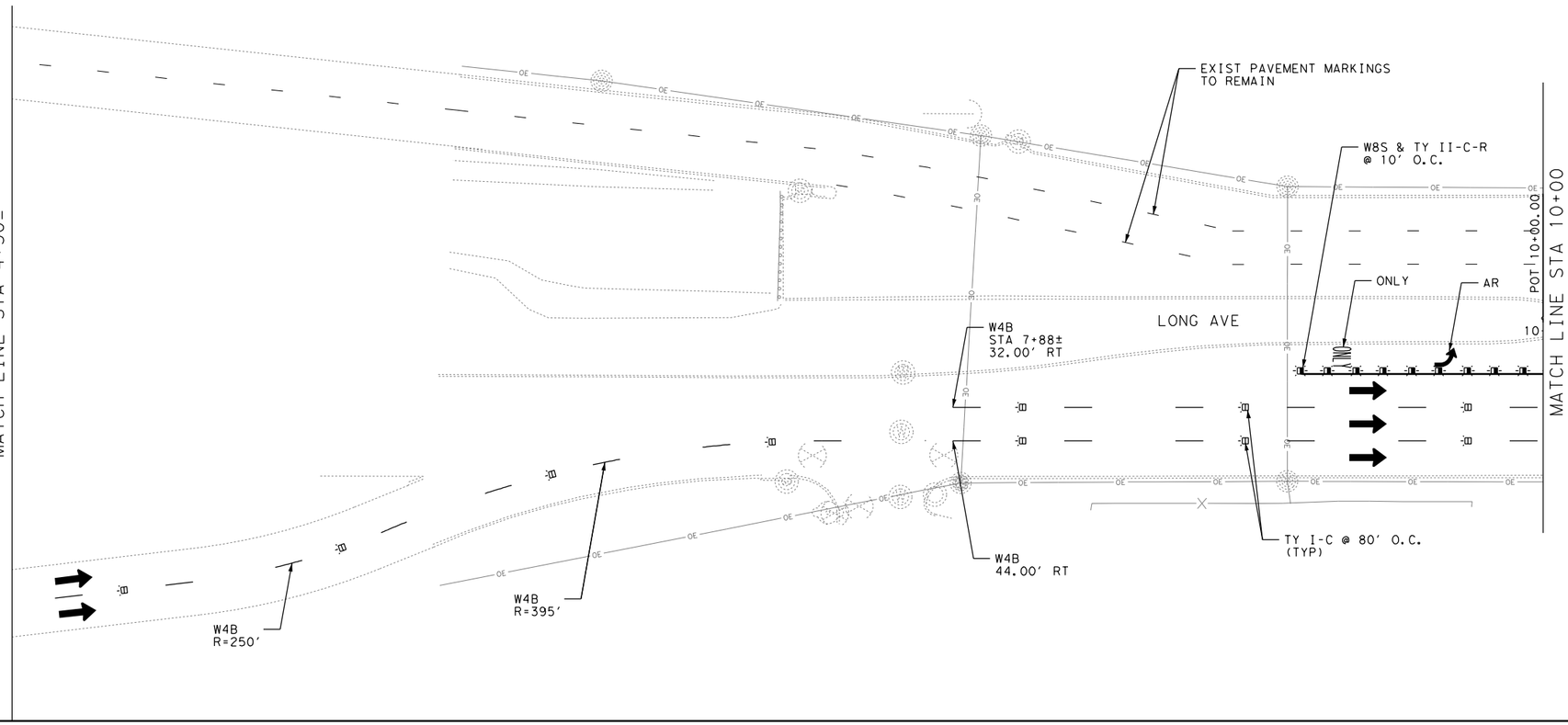
TRAFFIC SIGNAL LAYOUT
E LONG AVE AND N BEACH ST
PROPOSED LAYOUT

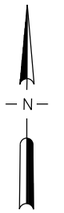
SCALE: 1"=40' (H) SHEET 7 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
AK	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
EP	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	184
AK	0902	48	894	
CHECK				
EP				

TIME: 1:25:20 PM
DATE: 1/23/2023







0 25 50
SCALE IN FEET

LEGEND

W4B	REFL PAV MRK TY II (W)4"(BRK)
W4D	REFL PAV MRK TY II (W)4"(DOT)
W4S	REFL PAV MRK TY II (W)4"(SLD)
W8D	REFL PAV MRK TY II (W)8"(DOT)
W8S	REFL PAV MRK TY II (W)8"(SLD)
W24S	REFL PAV MRK TY II (W)24"(SLD)
Y4S	REFL PAV MRK TY II (Y)4"(SLD)
AR	REFL PAV MRK TY II (W)(ARROW)
ONLY	REFL PAV MRK TY II (W)(WORD)
T18	REFL PAV MRK TY II (W)18"(YIELD TRI)
	REFLECTIVE PAVEMENT MARKER TY II-C-R
	REFLECTIVE PAVEMENT MARKER TY I-C
	DEL ASSM (D-SW) SZ 1 (BRF) GF2
	DEL ASSM (D-SW) SZ 1 (BRF) CTB
	DEL ASSM (D-DY) SZ 2 (WC) GND
(#)	PROPOSED SMALL SIGN & SIGN NUMBER
	EXISTING SMALL SIGN
	REFLECTIVE SHEETING AT TERMINAL END (SEE D&OM(6)-20 & D&OM(VIA)-20)
	PROPOSED PAVEMENT/BRIDGE

NOTES:

1. REFER TO STANDARDS FOR ADDITIONAL DETAILS.
2. ADDITIONAL PAY ITEMS FOR REFL PAV MRK TY II INCLUDE PAV SURF PREP FOR MRK AND PAVEMENT SEALER. SEAL ALL TY II PAVEMENT MARKINGS.
3. ADDITIONAL PAY ITEMS FOR REFL PAV MRKR INCLUDE PAV SURF PREP FOR MRK. SURFACE PREP FOR ALL MARKINGS ON CONCRETE.

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED
PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

E. LONG AVENUE

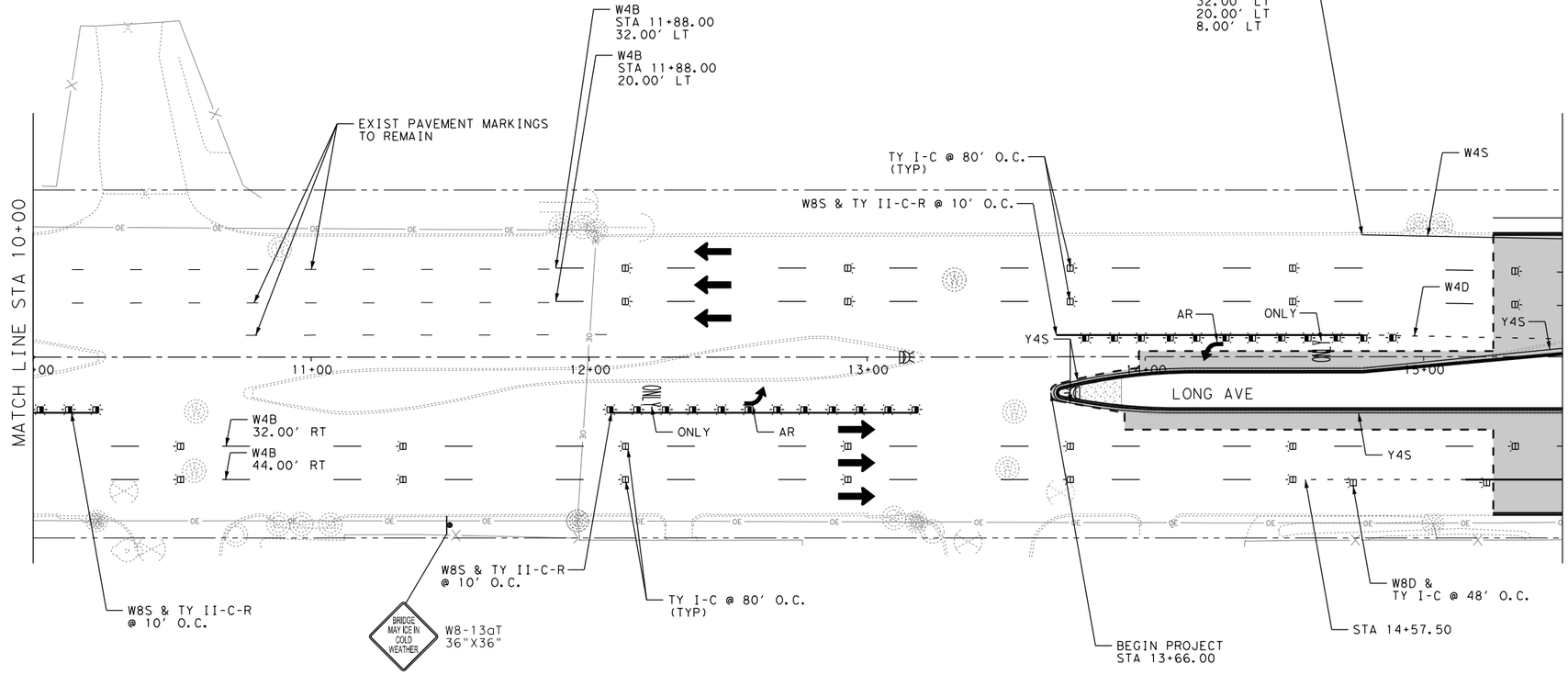
SIGNING AND PAVEMENT MARKINGS

SCALE: 1"=50' (H) SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	
GRAPHICS	CONTROL	SECTION	JOB	185
MBT				
CHECK	0902	48	894	
PKC				

FILE: ...\TRAFFIC\894RSPMOI.sht

TIME: 1:25:32 PM
DATE: 1/23/2023



0 25 50
SCALE IN FEET

N

LEGEND

W4B	REFL PAV MRK TY II (W)4"(BRK)
W4D	REFL PAV MRK TY II (W)4"(DOT)
W4S	REFL PAV MRK TY II (W)4"(SLD)
W8D	REFL PAV MRK TY II (W)8"(DOT)
W8S	REFL PAV MRK TY II (W)8"(SLD)
W24S	REFL PAV MRK TY II (W)24"(SLD)
Y4S	REFL PAV MRK TY II (Y)4"(SLD)
AR	REFL PAV MRK TY II (W)(ARROW)
ONLY	REFL PAV MRK TY II (W)(WORD)
T18	REFL PAV MRK TY II (W)18"(YIELD TRI)
	REFLECTIVE PAVEMENT MARKER TY II-C-R
	REFLECTIVE PAVEMENT MARKER TY I-C
	DEL ASSM (D-SW) SZ 1 (BRF) GF2
	DEL ASSM (D-SW) SZ 1 (BRF) CTB
	DEL ASSM (D-DY) SZ 2 (WC) GND
(#)	PROPOSED SMALL SIGN & SIGN NUMBER
	EXISTING SMALL SIGN
	REFLECTIVE SHEETING AT TERMINAL END (SEE D&OM(6)-20 & D&OM(VIA)-20)
	PROPOSED PAVEMENT/BRIDGE

NOTES:

1. REFER TO STANDARDS FOR ADDITIONAL DETAILS.
2. ADDITIONAL PAY ITEMS FOR REFL PAV MRK TY II INCLUDE PAV SURF PREP FOR MRK AND PAVEMENT SEALER. SEAL ALL TY II PAVEMENT MARKINGS.
3. ADDITIONAL PAY ITEMS FOR REFL PAV MRKR INCLUDE PAV SURF PREP FOR MRK. SURFACE PREP FOR ALL MARKINGS ON CONCRETE.

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

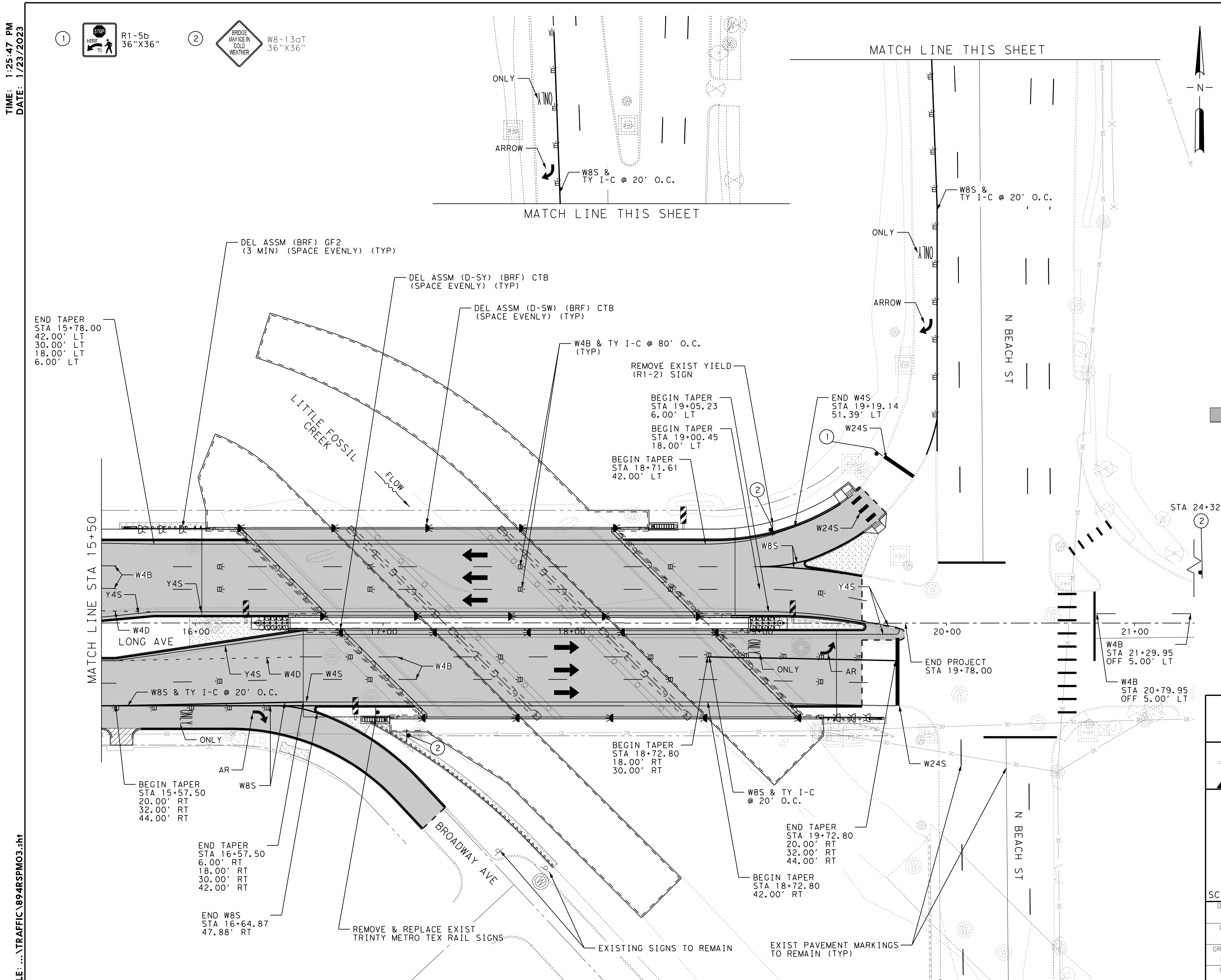
E. LONG AVENUE

SIGNING AND PAVEMENT MARKINGS

SCALE: 1"=50' (H) SHEET 2OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK: REL	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS: MBT	TEXAS	FTW	TARRANT	186
CHECK: PKC	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\TRAFFIC\894RSPM02.sht



0 25 50
SCALE IN FEET

LEGEND

W4B	REFL PAV MRK TY II (W)4"(BRK)
W4D	REFL PAV MRK TY II (W)4"(DOT)
W4S	REFL PAV MRK TY II (W)4"(SLD)
W8D	REFL PAV MRK TY II (W)8"(DOT)
W8S	REFL PAV MRK TY II (W)8"(SLD)
W24S	REFL PAV MRK TY II (W)24"(SLD)
Y4S	REFL PAV MRK TY II (Y)4"(SLD)
AR	REFL PAV MRK TY II (W)(ARROW)
ONLY	REFL PAV MRK TY II (W)(WORD)
T18	REFL PAV MRK TY II (W)18"(YIELD TRI)
	REFLECTIVE PAVEMENT MARKER TY II-C-R
	REFLECTIVE PAVEMENT MARKER TY I-C
	DEL ASSM (D-SW) SZ 1 (BRF) GF2
	DEL ASSM (D-SW) SZ (BRF) CTB - RT OR DEL ASSM (D-SY) SZ (BRF) CTB - LT
	DEL ASSM (D-DY) SZ 2 (WC) GND
(#)	PROPOSED SMALL SIGN & SIGN NUMBER
	EXISTING SMALL SIGN
	REFLECTIVE SHEETING AT TERMINAL END (SEE D&OM(6)-20 & D&OM(VIA)-20)
	PROPOSED PAVEMENT/BRIDGE

NOTES:

1. REFER TO STANDARDS FOR ADDITIONAL DETAILS.
2. ADDITIONAL PAY ITEMS FOR REFL PAV MRK TY II INCLUDE PAV SURF PREP FOR MRK AND PAVEMENT SEALER. SEAL ALL TY II PAVEMENT MARKINGS.
3. ADDITIONAL PAY ITEMS FOR REFL PAV MRKR INCLUDE PAV SURF PREP FOR MRK. SURFACE PREP FOR ALL MARKINGS ON CONCRETE.

Jacobs Engineering Group
STATE OF TEXAS
ROBYN LANCASTER
138460
LICENSED PROFESSIONAL ENGINEER
F-2966
2/7/2023

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

Texas Department of Transportation

E. LONG AVENUE

SIGNING AND PAVEMENT MARKINGS

SCALE: 1"=50' (H) SHEET 3 OF 3

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
MBT	6	(See Title Sheet)		CS
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
REL	TEXAS	FTW	TARRANT	187
GRAPHICS	CONTROL	SECTION	JOB	
MBT	0902	48	894	
CHECK				
PKC				

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"	MOUNTING DESIGNATION 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
187	1	R1-5b		36"X36"	X		10BWG	1	SA	P		
186	2	W8-13aT		36"x36"	X		10BWG	1	SA	P		
187	3	W8-13aT		36"x36"	X		10BWG	1	SA	P		
187	4	W8-13aT		36"x36"	X		10BWG	1	SA	P		

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).

DATE: 1/23/2023, 1:26:10 PM
FILE: ...\Traffic\Long Ave\894SOSS.dgn

Texas Department of Transportation

Traffic Operations Division Standard

E LONG AVENUE
SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	48	894	CS
4-16		DIST	COUNTY		SHEET NO.
8-16		FTW	TARRANT		188

18

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

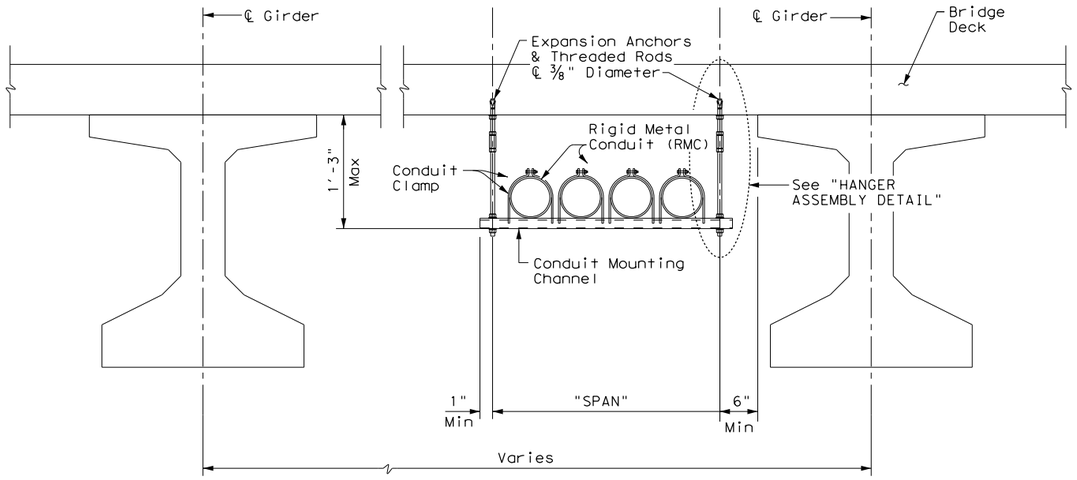
Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	48	894	CS
		DIST	COUNTY		SHEET NO.
		FTW	TARRANT		189

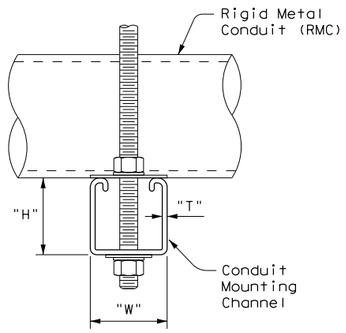
71A

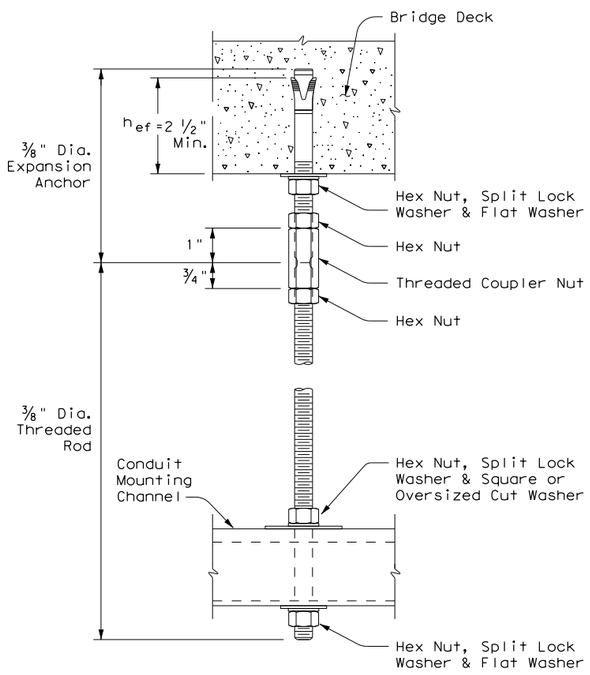


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

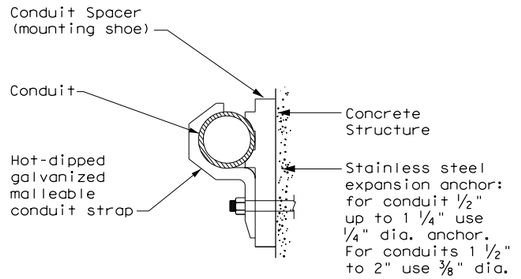
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

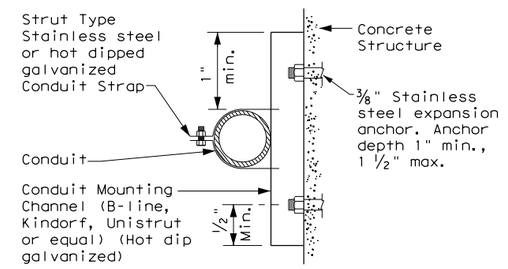




HANGER ASSEMBLY DETAIL

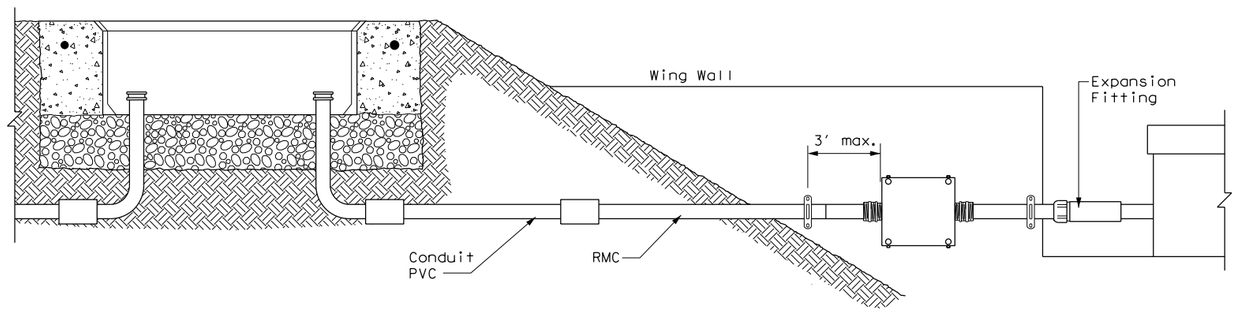
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef}) as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUIT SUPPORTS

ED(2)-14

FILE: ed2-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	90	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		190

71B

DATE: 1/18/2023 4:30:42 PM
FILE: ...\Traffic\Long Ave\894SGNL_2.dgn

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

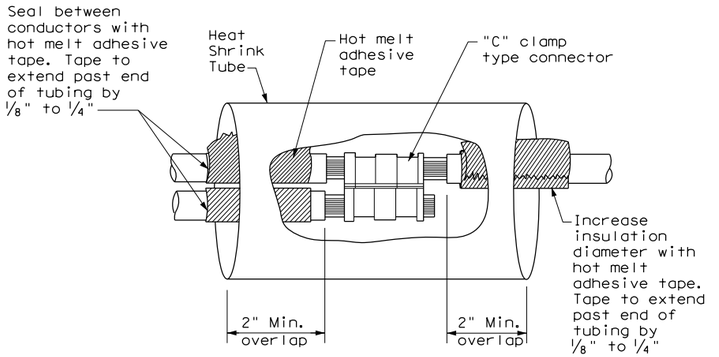
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

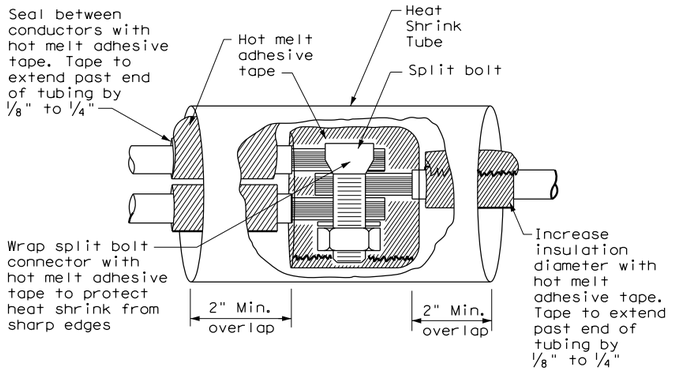
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

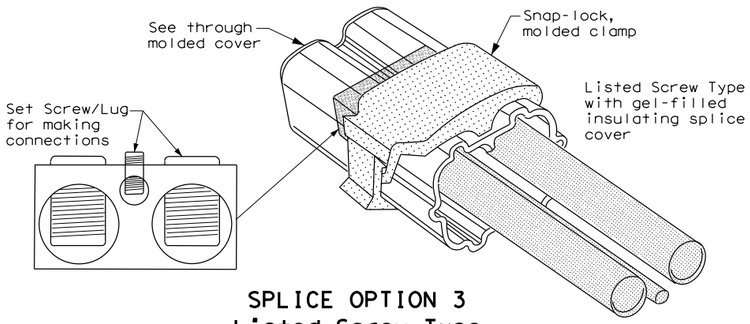
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

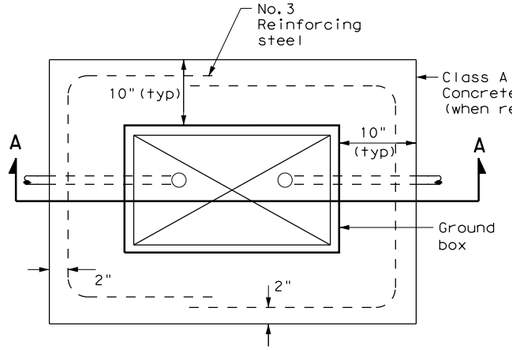
ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

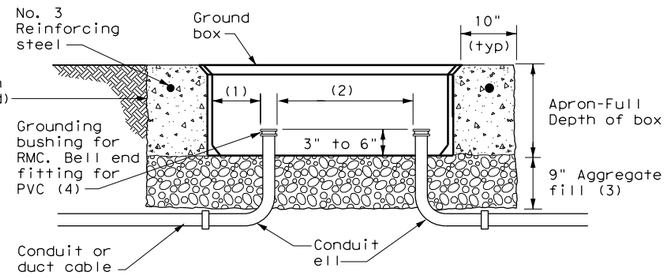
FILE:	ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0902	48	894	CS
		DIST	COUNTY		SHEET NO.
		FTW	TARRANT		191

71C

DATE: 1/18/2023, 4:31:04 PM
FILE: ...\Traffic\Long Ave\894SGNL_3.dgn



PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

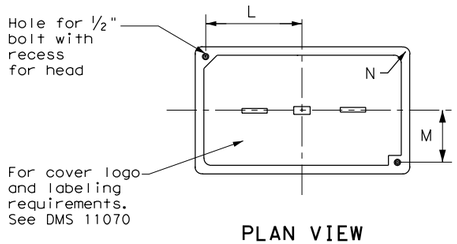
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

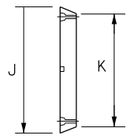
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

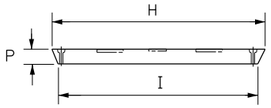
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

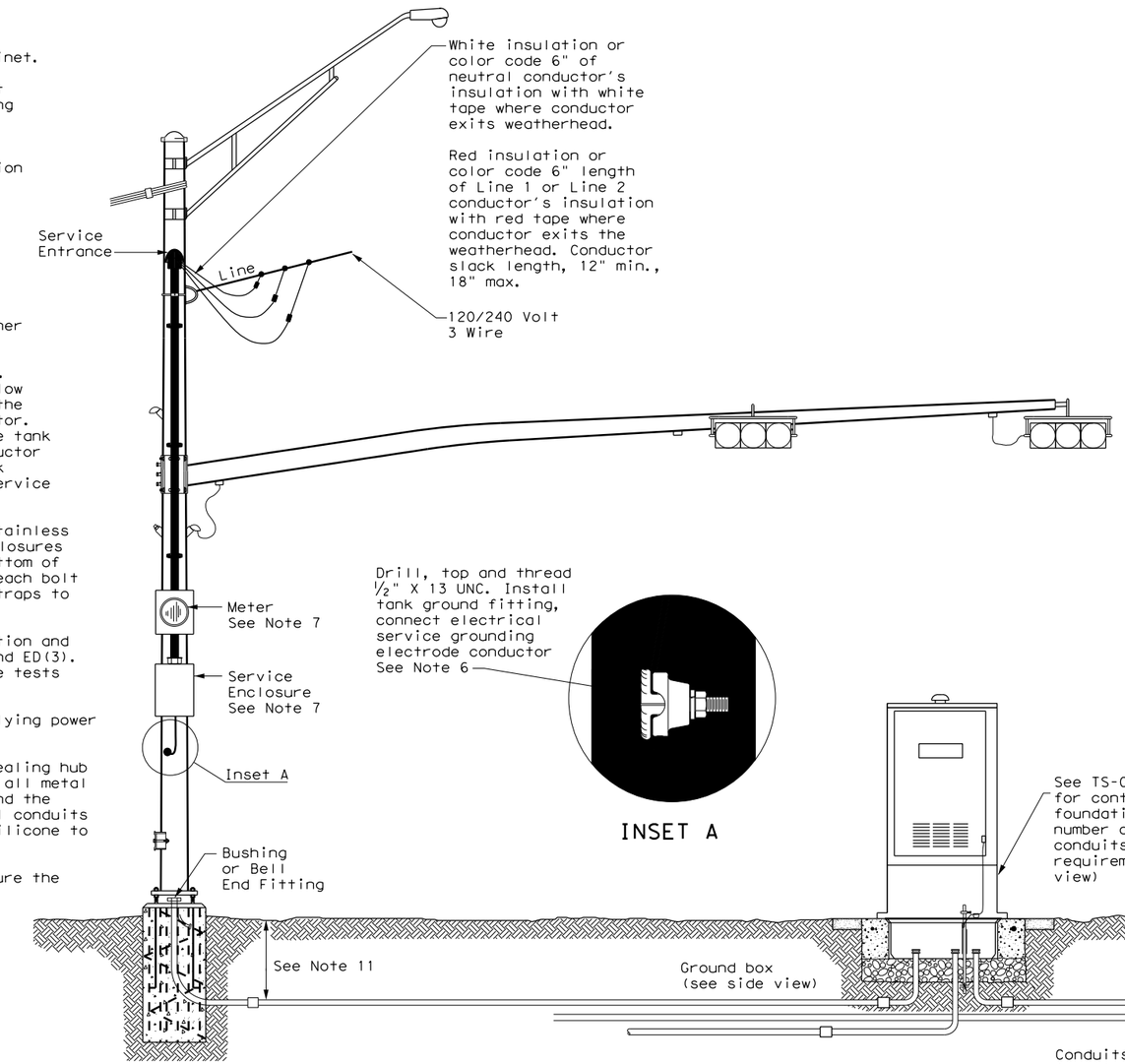
FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		192

71D

DATE: 1/18/2023 4:31:26 PM
FILE: ...\Traffic\Long Ave\8945GNL_4.dgn

TRAFFIC SIGNAL NOTES

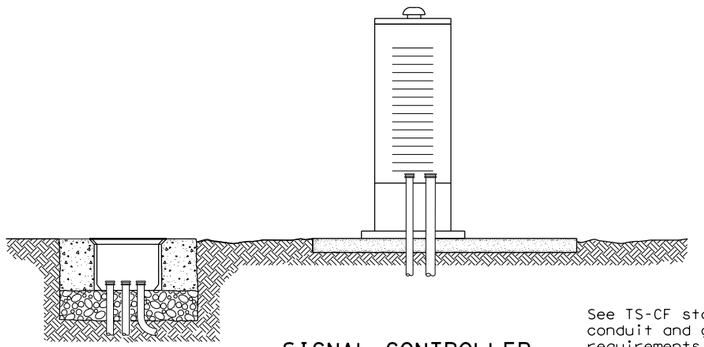
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



SIGNAL POLE WITH SERVICE

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

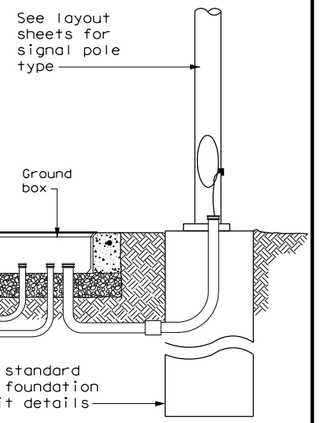
INSET A



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

SIGNAL CONTROLLER FRONT VIEW



SIGNAL POLE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

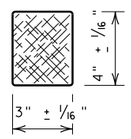
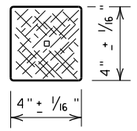
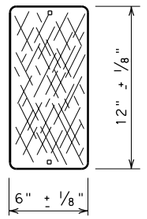
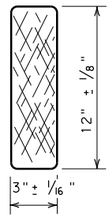
ED(8)-14

FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		193

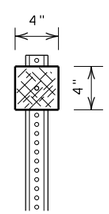
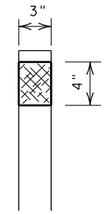
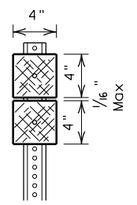
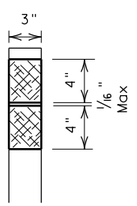
71H

DATE: 1/18/2023 4:31:46 PM
FILE: ...\Traffic\Long Ave\894SGNL_5.dgn

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

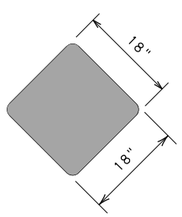
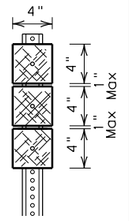
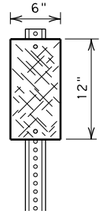
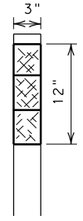
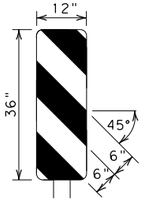
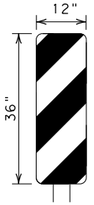
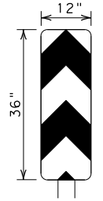
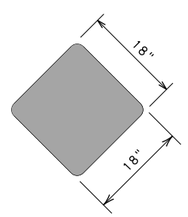
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker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

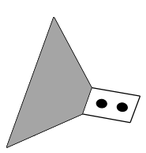
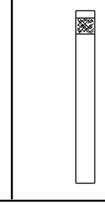
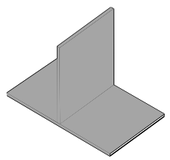
DIRECTION
If Required
- BI = Bi-Directional

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

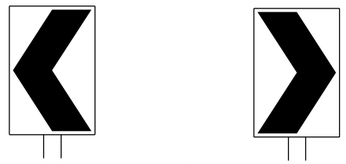
DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	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



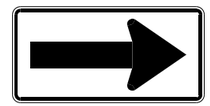
W1-8

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"	

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	0902	48	894	CS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	TARRANT		196

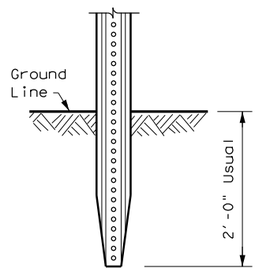
20A

DATE: 1/18/2023 4:32:26 PM
FILE: ...\Long Ave\894dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

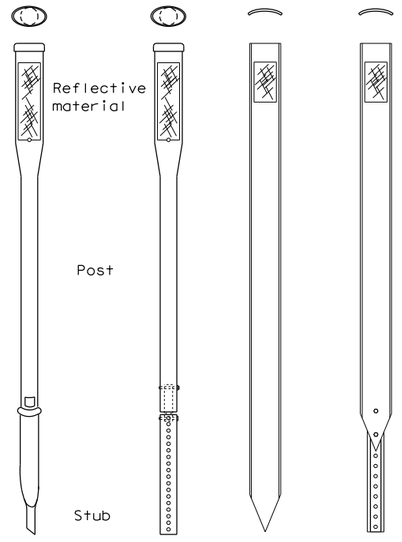


NOTES

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.

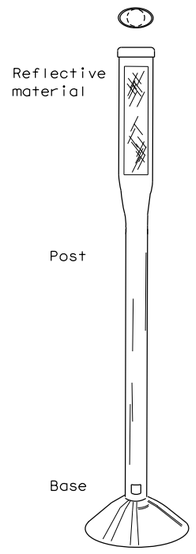
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



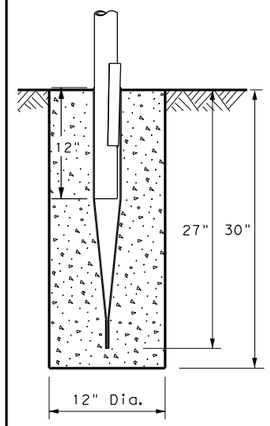
SURFACE MOUNT

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.

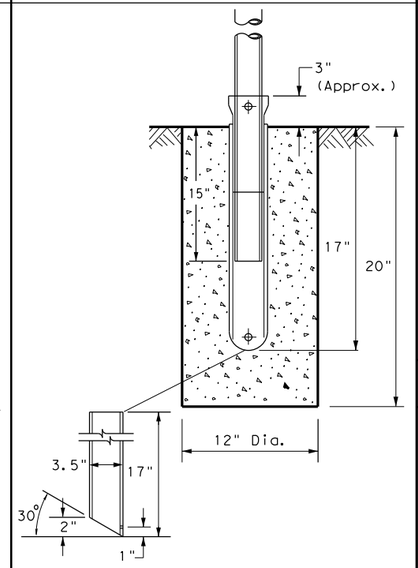
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

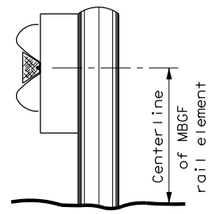
NOTE

1. Install per manufacturer's recommendations.

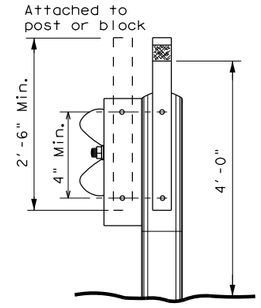
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

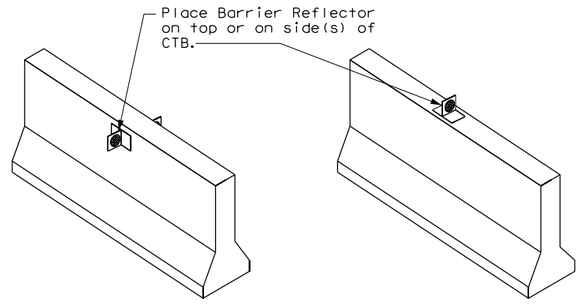
GF1



GF2



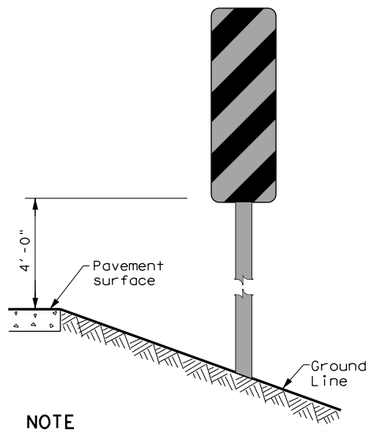
CONCRETE TRAFFIC BARRIER (CTB)



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.

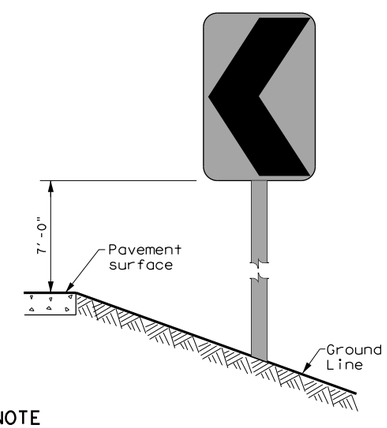
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

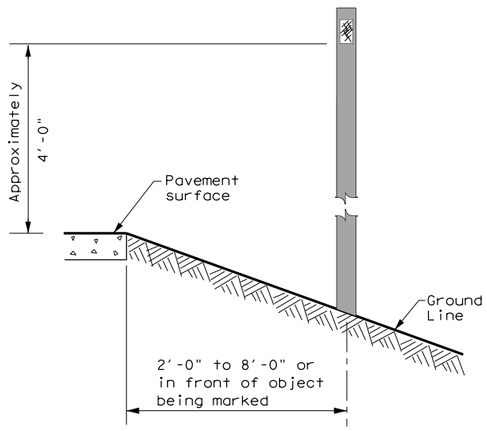
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0902	48	894	CS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	TARRANT		197

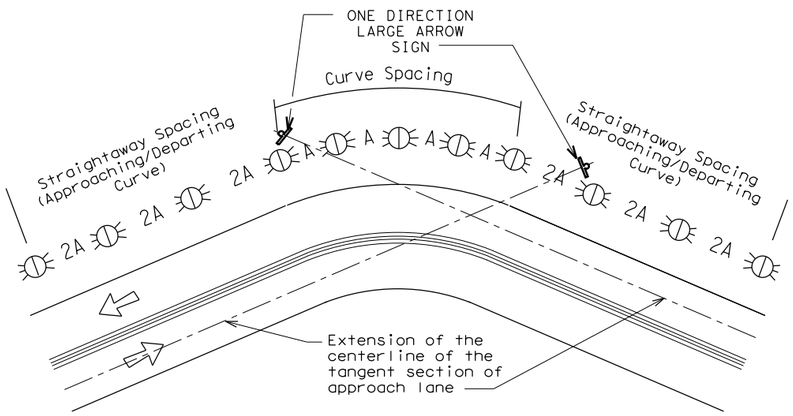
20B

DATE: 1/18/2023 4:32:39 PM
FILE: ...\Long Ave\894dom2-20.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

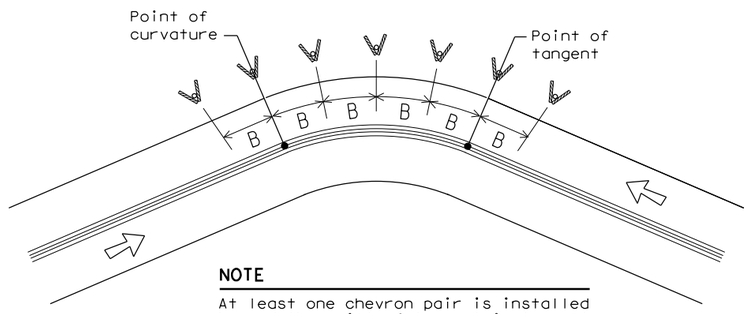
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

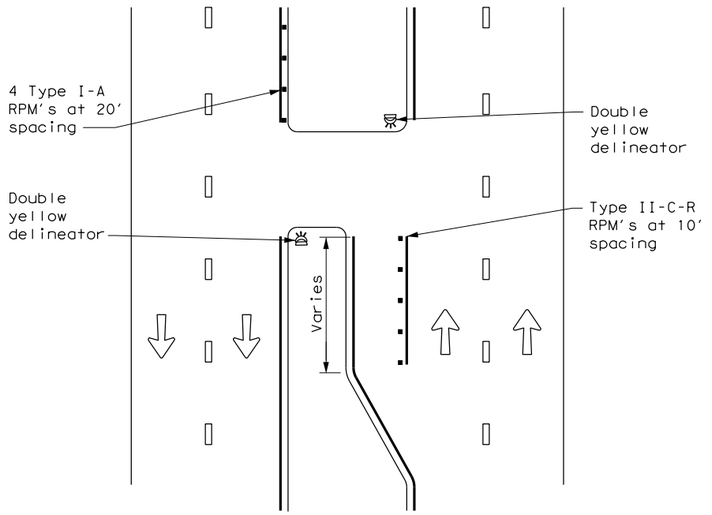
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	FTW	TARRANT		198

20C

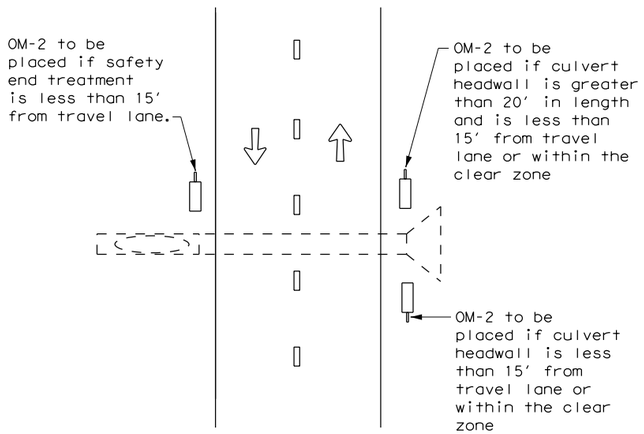
DATE: 1/18/2023 4:32:52 PM
FILE: ...\Long Ave\894dom3-20.dgn

CROSSOVERS



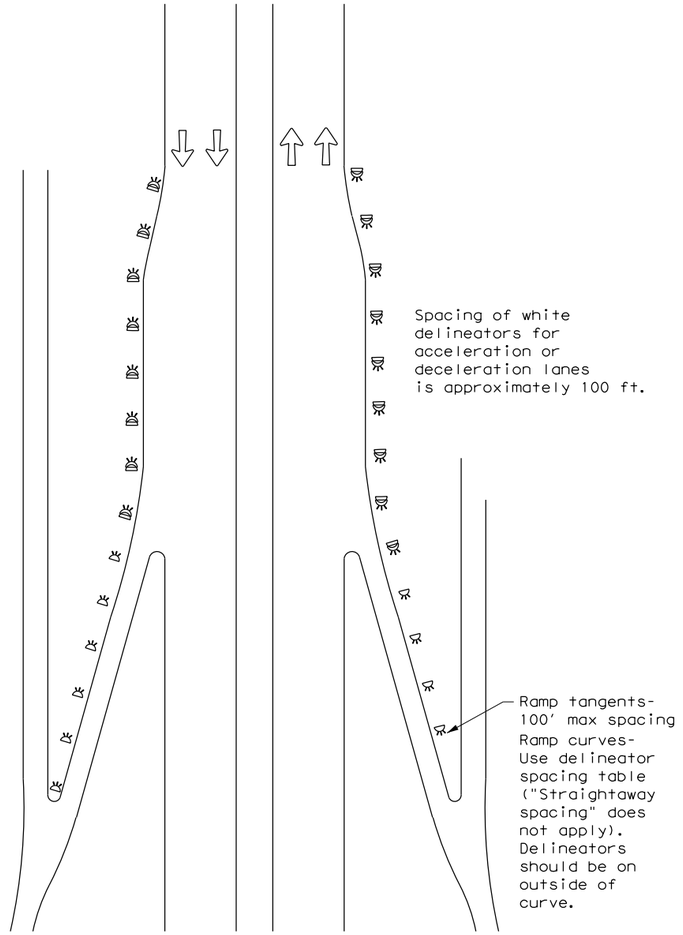
DETAIL 1

FOR CULVERTS WITHOUT MBGF



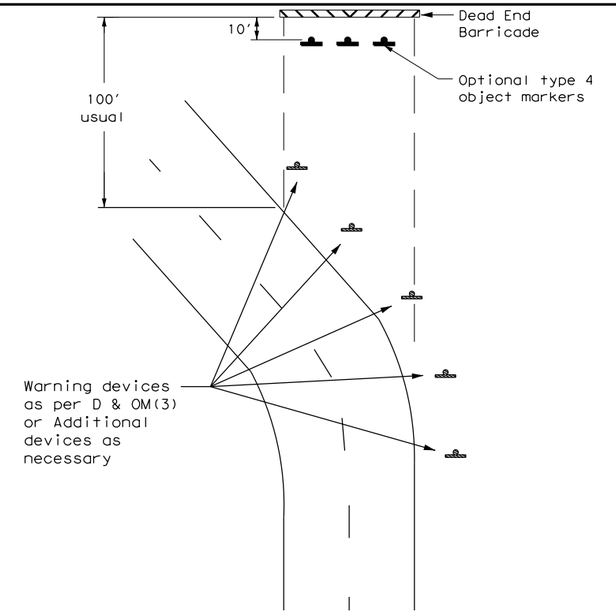
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



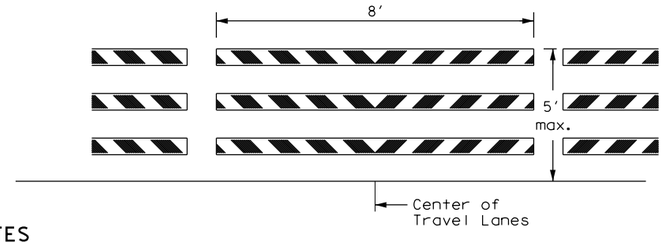
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

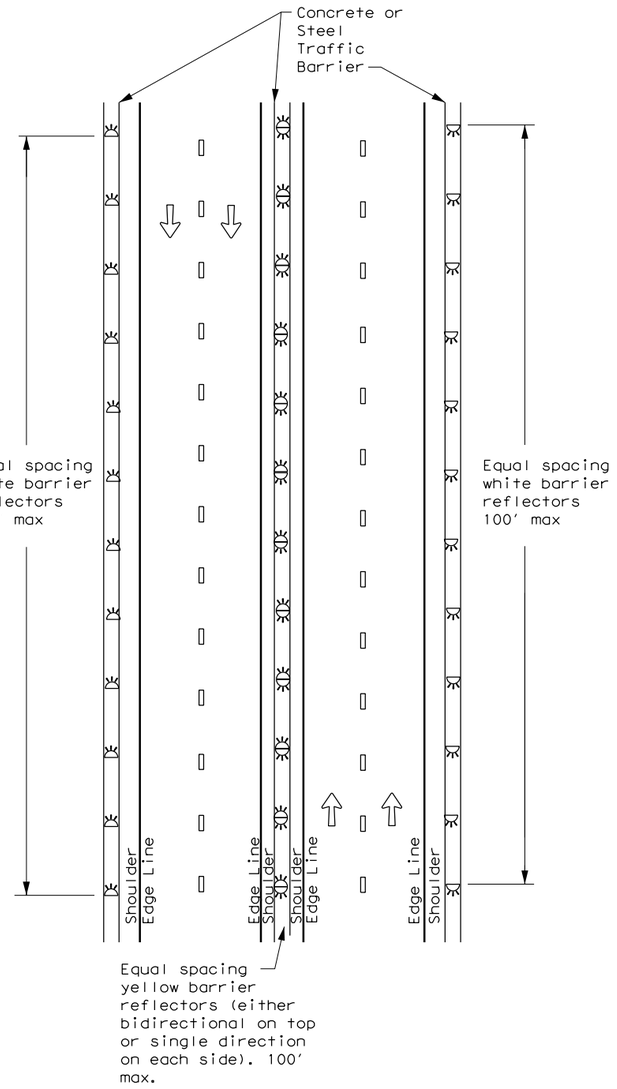
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
3-15 7-20	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		199
20D				

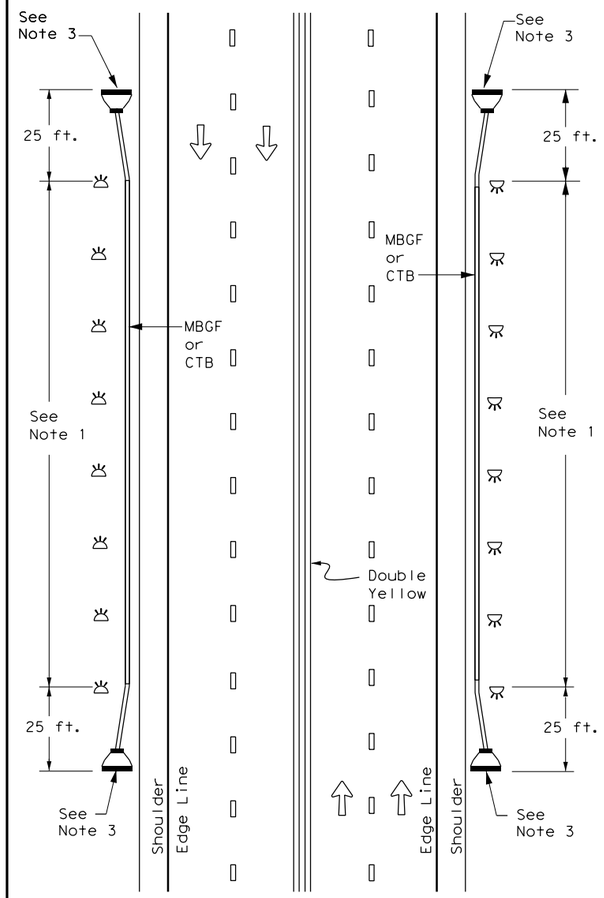
DATE: 1/18/2023 4:33:05 PM
FILE: ...\Long Ave\894dom4-20.dgn

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

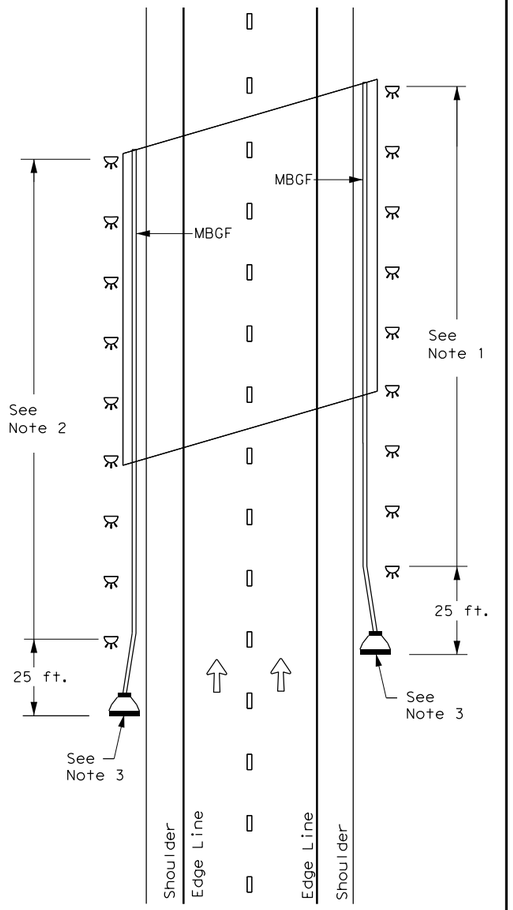
CONTINUOUS CONCRETE OR STEEL BARRIER



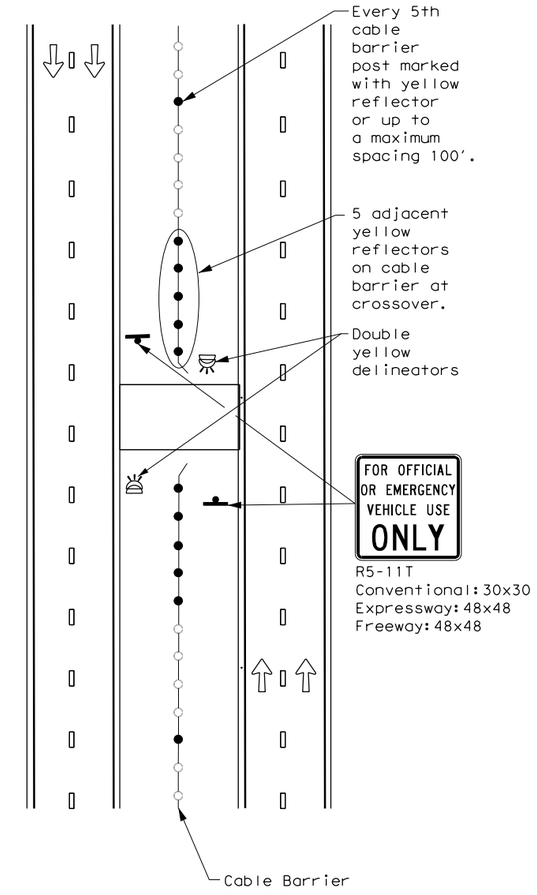
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. 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.

LEGEND

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

Texas Department of Transportation

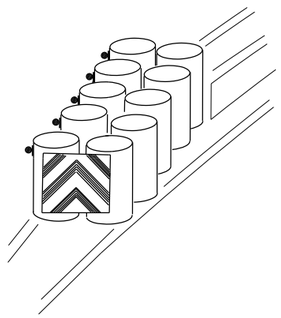
Traffic Safety Division Standard

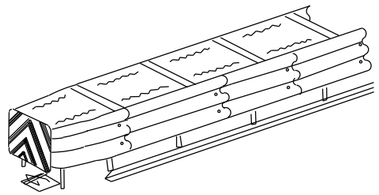
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

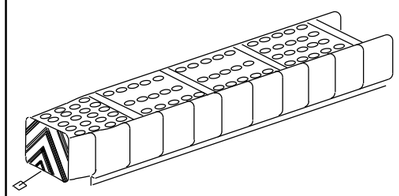
D & OM(6)-20

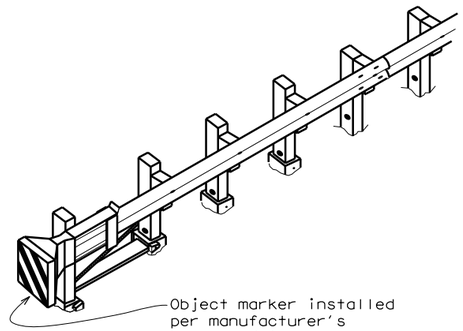
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
7-20	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		200

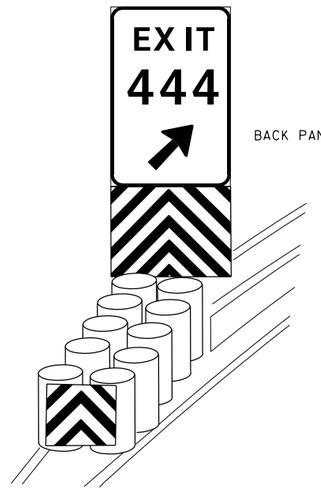
DATE: 1/18/2023 4:33:17 PM
FILE: ...\Long Ave\894dom6-20.dgn

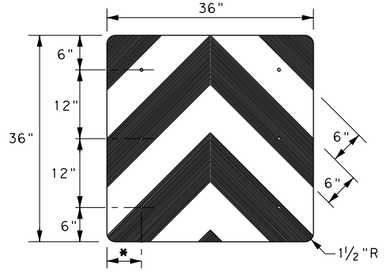


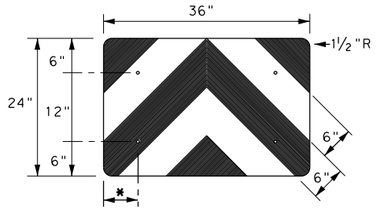




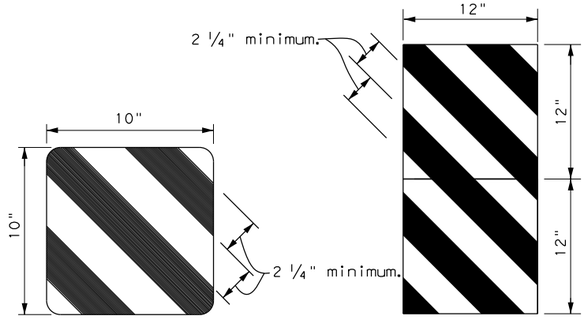




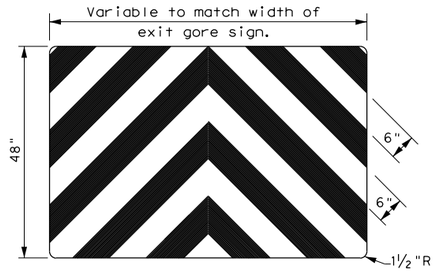


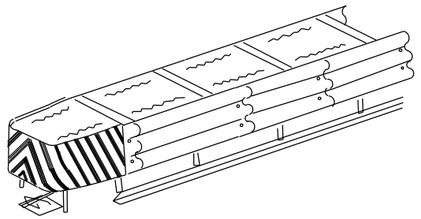


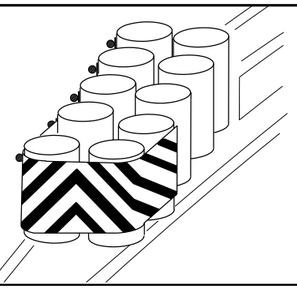
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

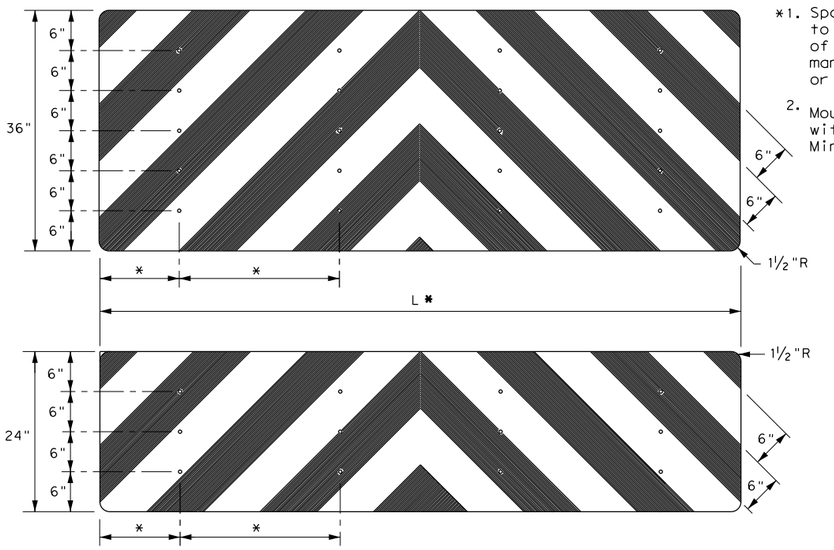


OBJECT MARKERS SMALLER THAN 3 FT^2









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	0902	48	894	CS
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	FTW	TARRANT		201
4-98 7-20				

20G

DATE: 1/18/2023 4:33:30 PM
FILE: ...\Long Ave\894domvia-20.dgn

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)

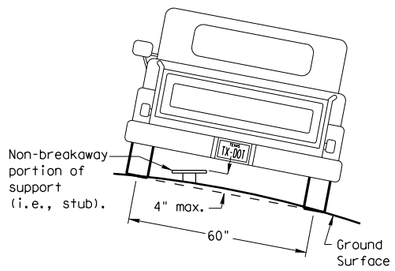
Anchor Type

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-1))

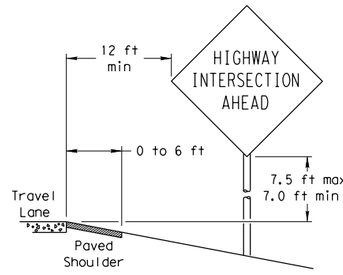
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

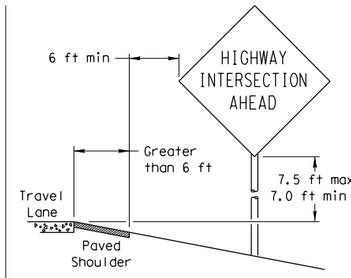
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

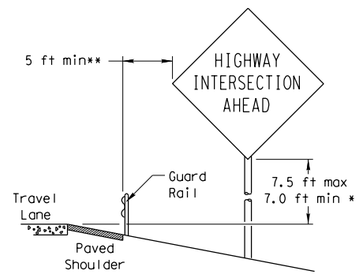
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



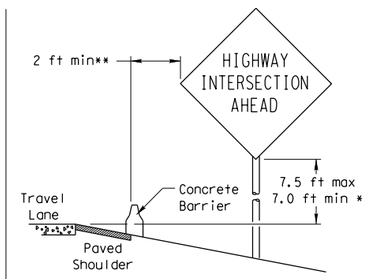
GREATER THAN 6 FT. WIDE

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



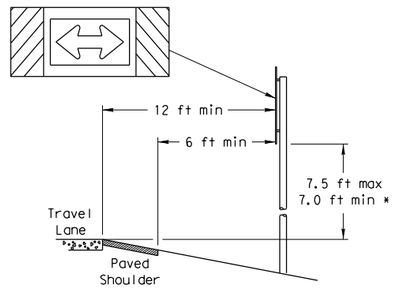
BEHIND GUARDRAIL



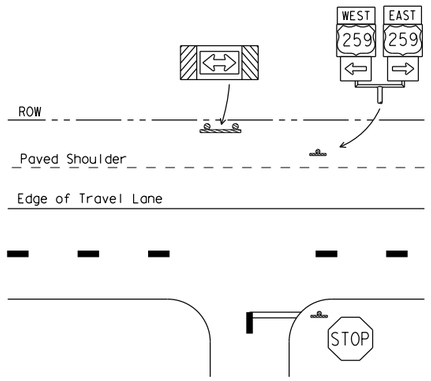
BEHIND CONCRETE BARRIER

**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:

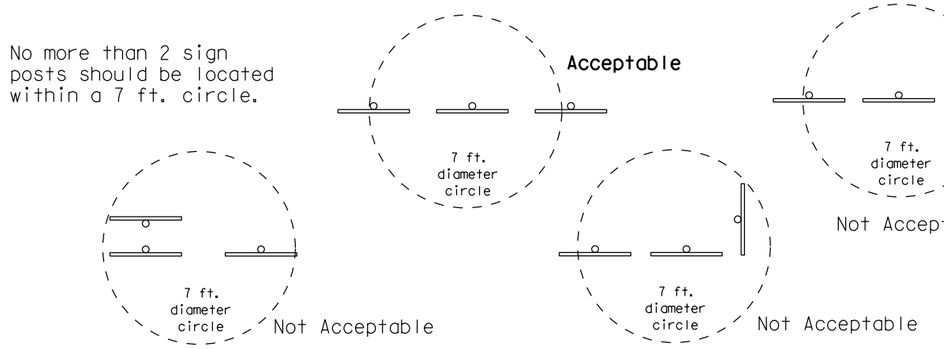
(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(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.

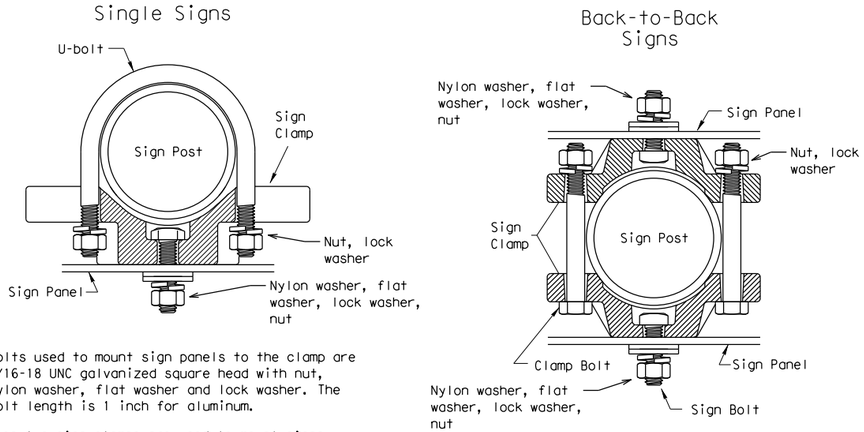
The maximum values may be increased when directed by the Engineer.

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



TYPICAL SIGN ATTACHMENT DETAIL



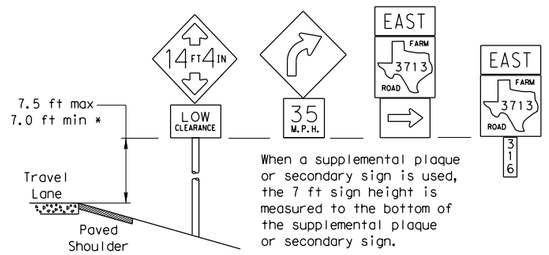
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

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

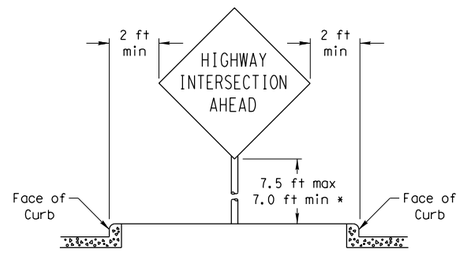
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



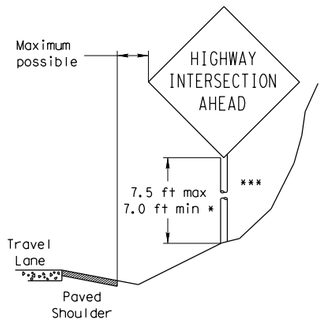
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

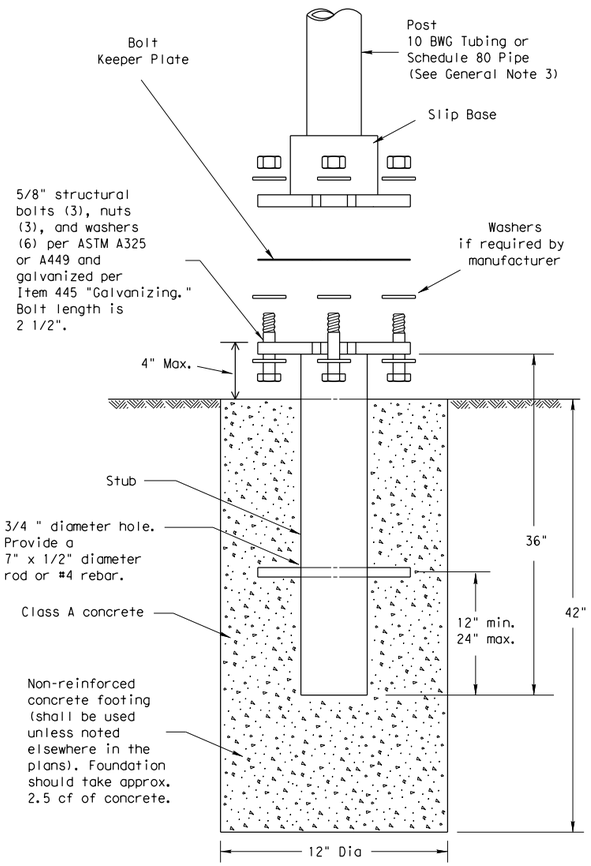
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		202

DATE: 1/18/2023 4:33:43 PM
FILE: ...\Traffic\Long Ave\894smdgen.dgn

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.

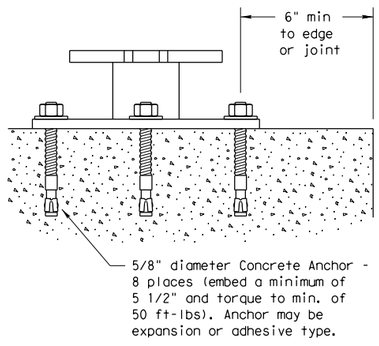
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

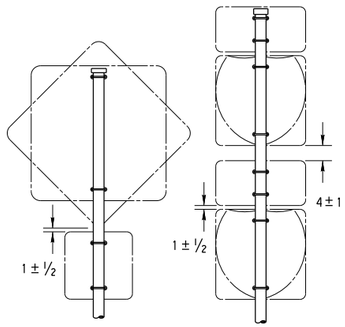
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

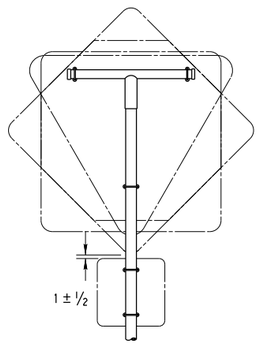
CONT	SECT	JOB	HIGHWAY
0902	48	894	CS

DIST	COUNTY	SHEET NO.
FTW	TARRANT	203

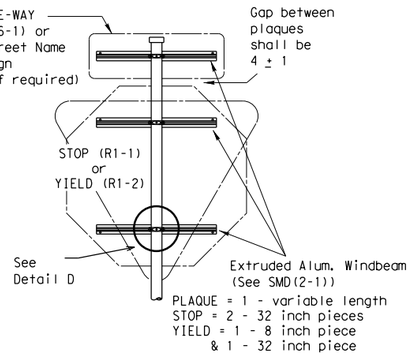
DATE: 1/18/2023 4:33:58 PM
FILE: ...\Traffic\Long Ave\894smds1.dgn



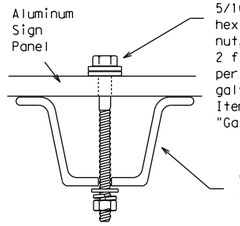
SM RD SGN ASSM TY XXXXX(1)XX(P)



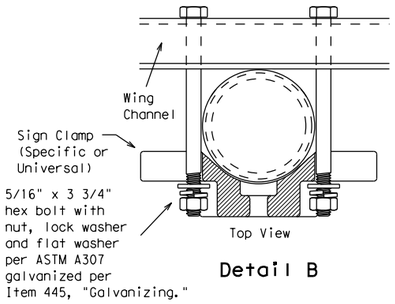
SM RD SGN ASSM TY XXXXX(1)XX(T)



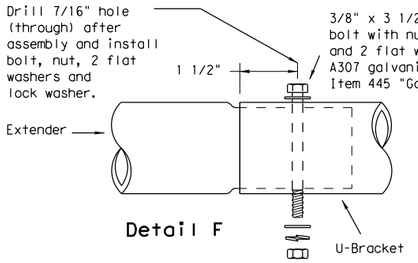
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A

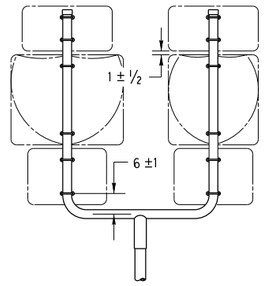


Detail B

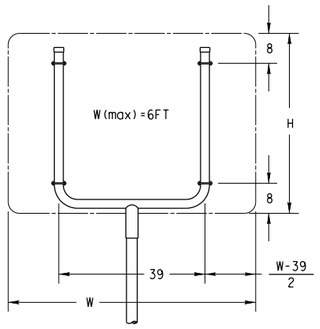


Detail F

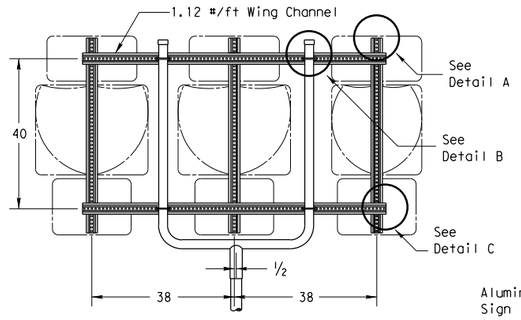
Splices shall only be allowed behind the sign substrate.



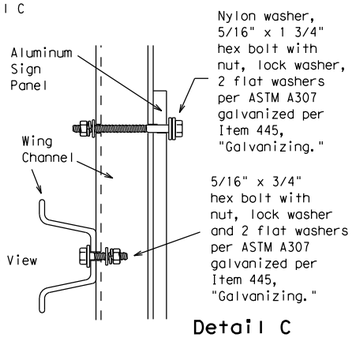
SM RD SGN ASSM TY XXXXX(1)XX(U)



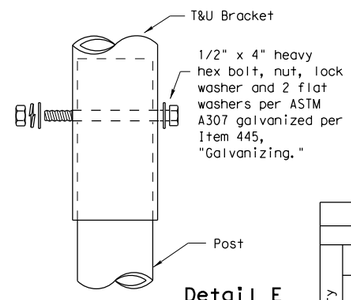
SM RD SGN ASSM TY XXXXX(1)XX(U)



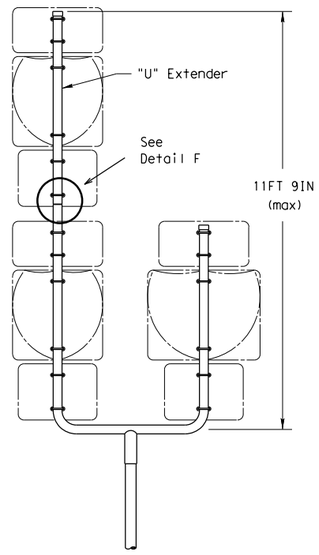
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



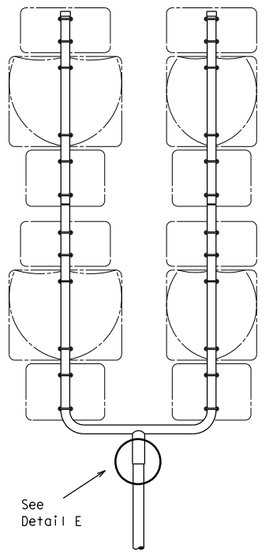
Detail C



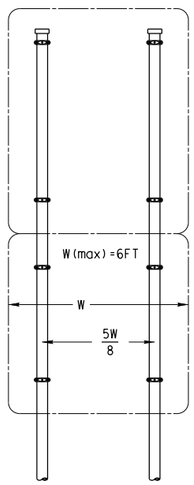
Detail E



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

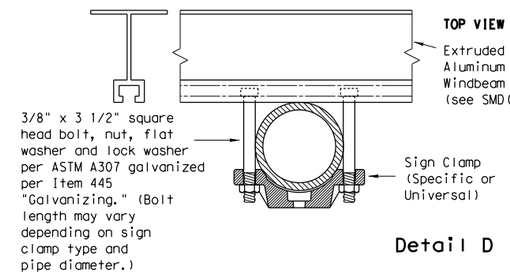


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

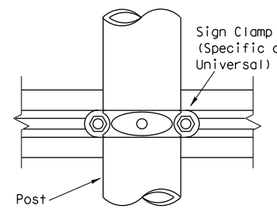


SM RD SGN ASSYM TY XXXXX(2)XX(P)

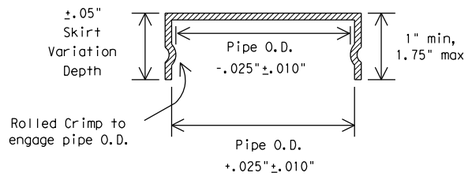
SIDE VIEW



Detail D



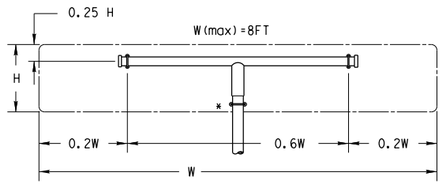
FRICTION CAP DETAIL



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.



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

All dimensions are in english unless detailed otherwise.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	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

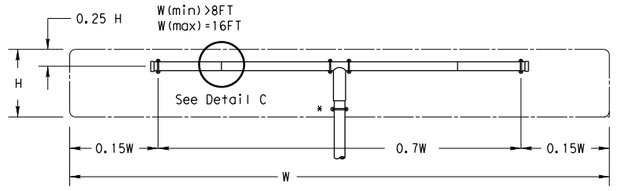
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		204

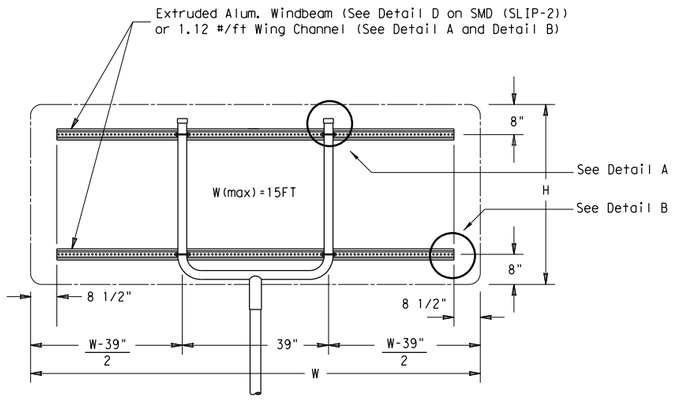
26C

DATE: 1/18/2023 4:34:11 PM
FILE: ...\Traffic\Long Ave\894smds2.dgn

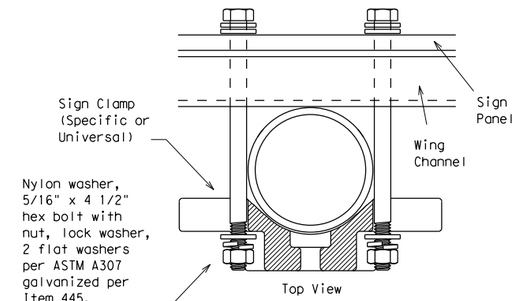


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

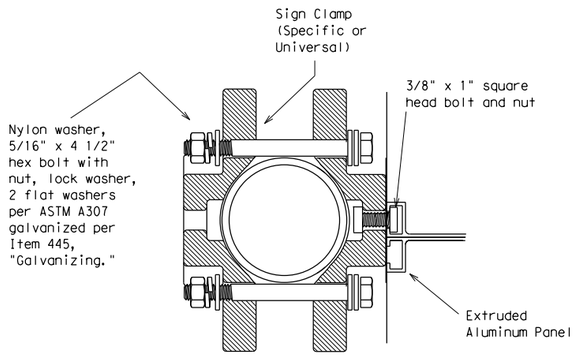
(* - See Note 12)



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

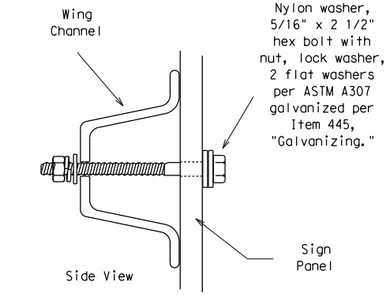


Detail A

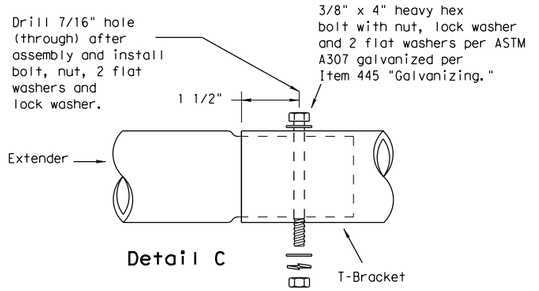


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

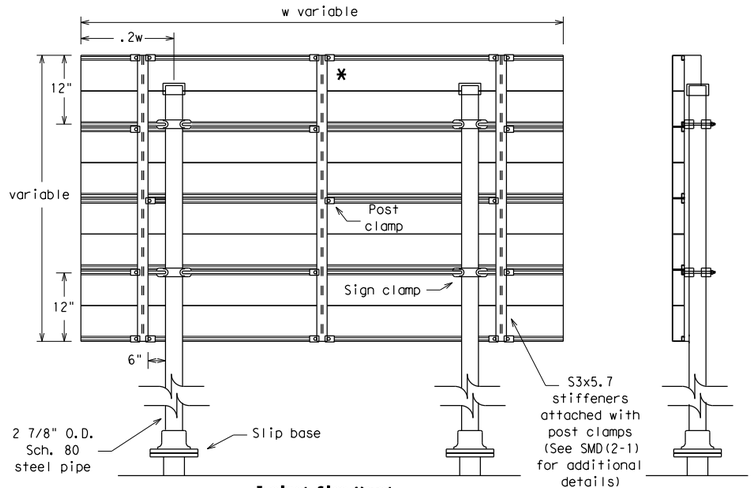


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

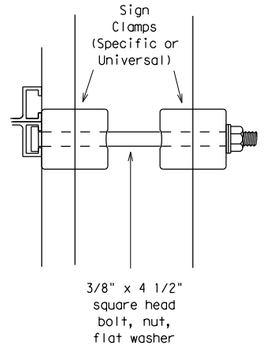


Typical Sign Mount

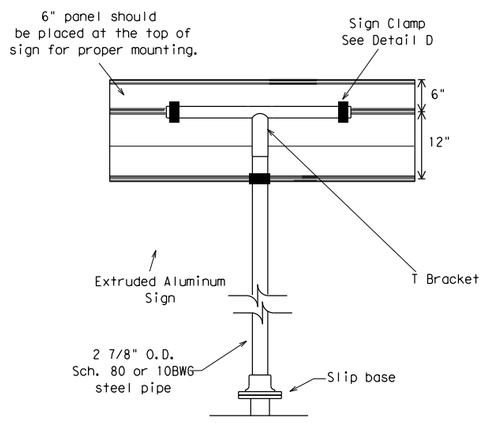
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

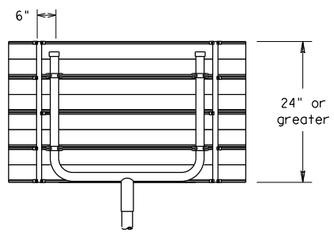
See Detail E
for clamp installation



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. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. 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.
11. 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

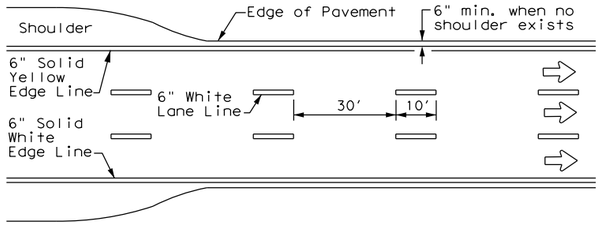
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

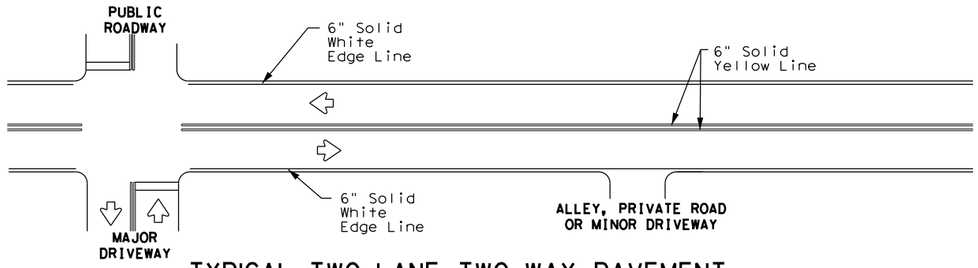
CONT	SECT	JOB	HIGHWAY
0902	48	894	CS

DIST	COUNTY	SHEET NO.
FTW	TARRANT	205

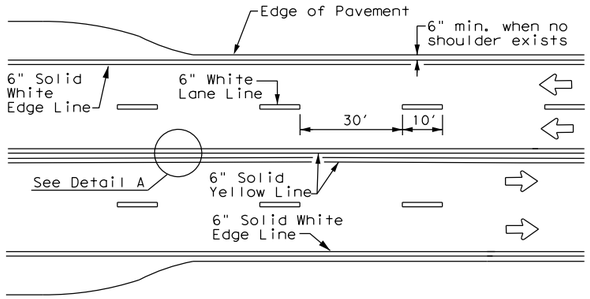
DATE: 1/18/2023 4:34:24 PM
FILE: ...\Traffic\Long Ave\894smds3.dgn

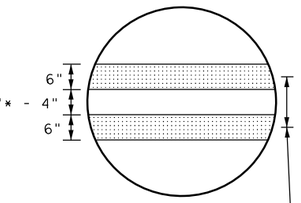


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





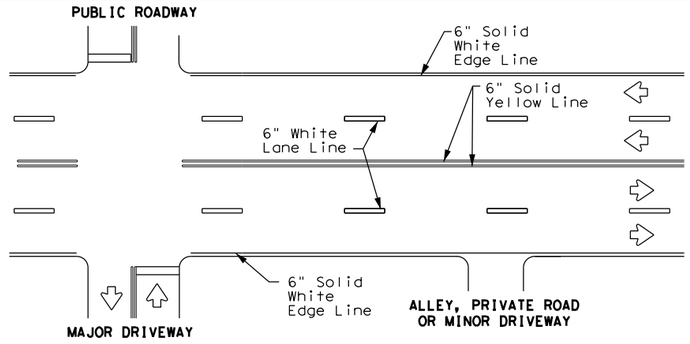
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

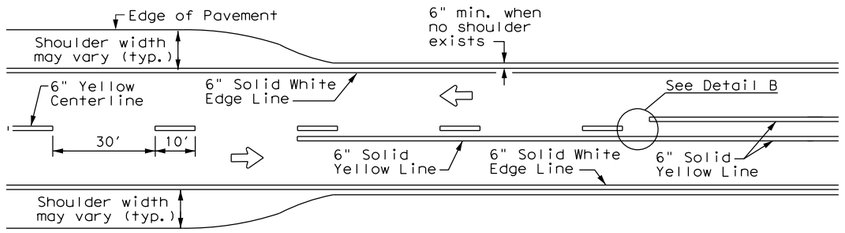
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

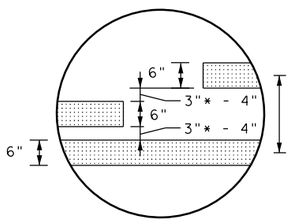
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

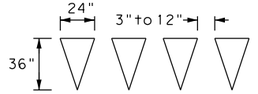


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



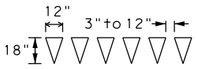
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

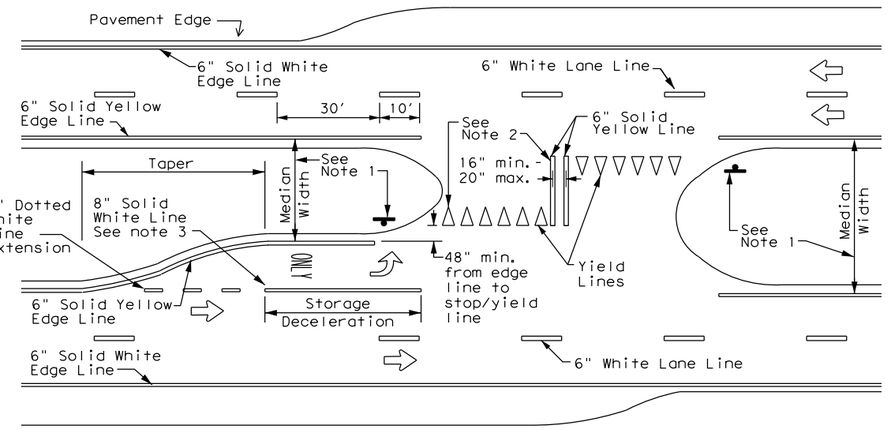


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

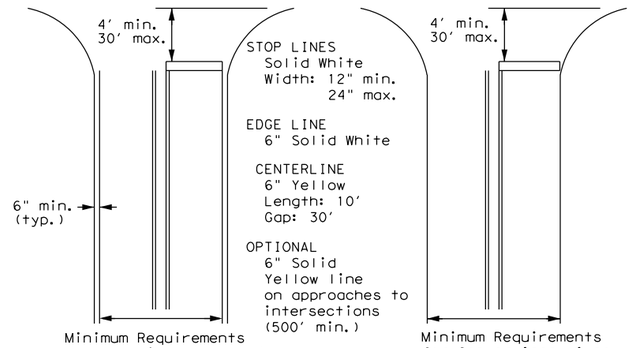
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

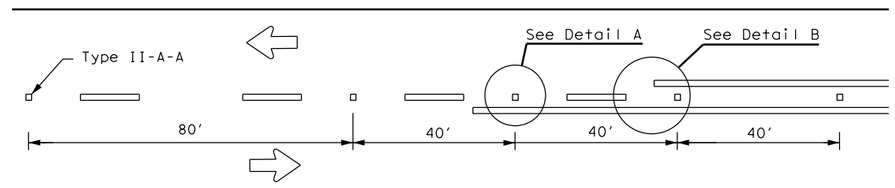
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0902	48	894	CS
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	FTW	TARRANT		206

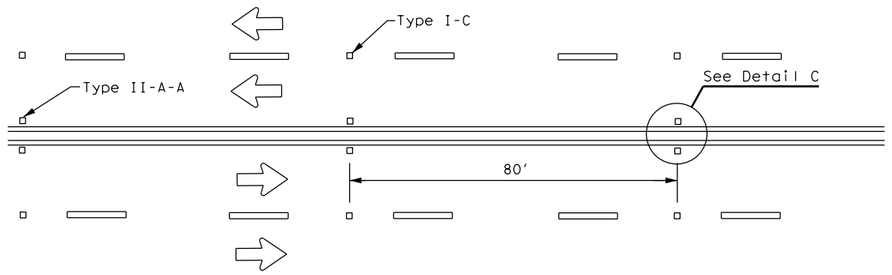
22A

DATE: 1/18/2023 4:34:37 PM
FILE: ...\Traffic\Long Ave\894pm1-22.dgn

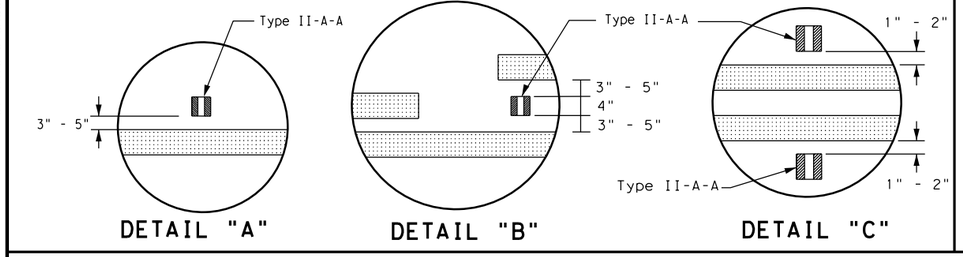
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

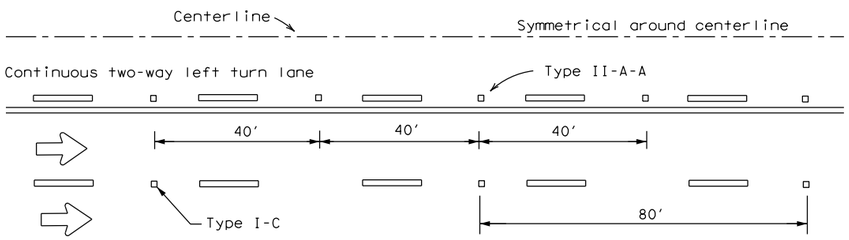


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

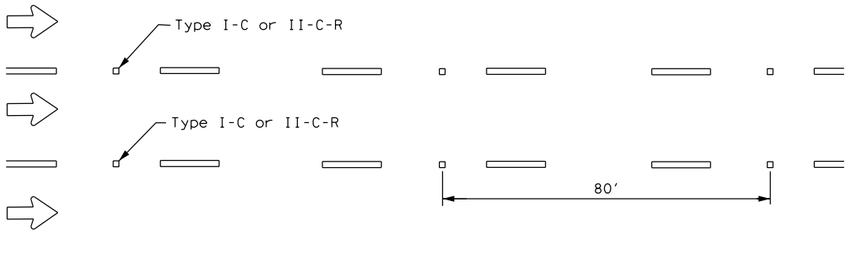


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



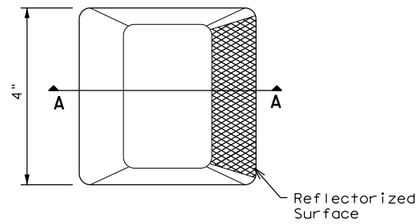
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

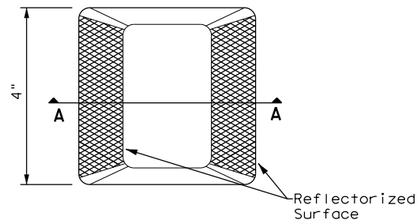
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

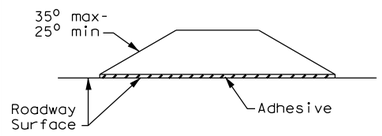
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

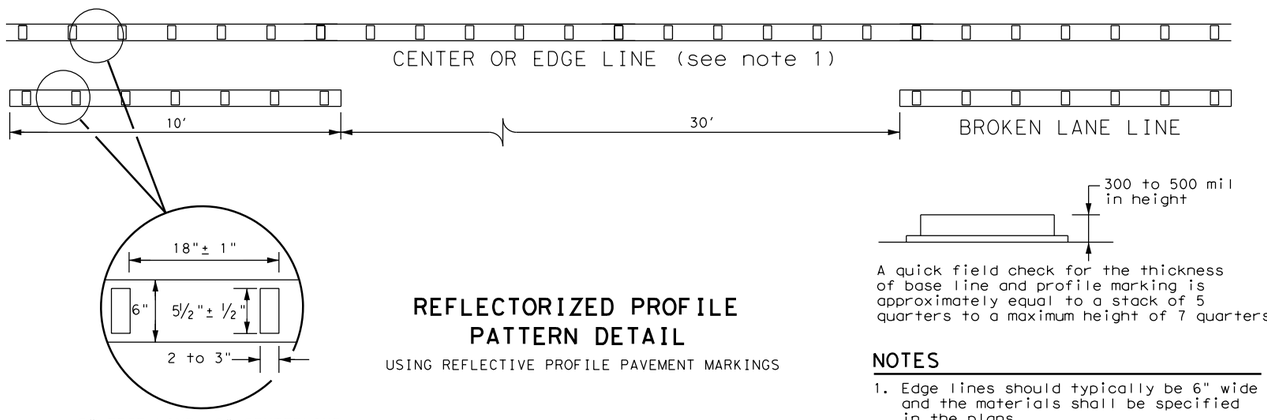


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

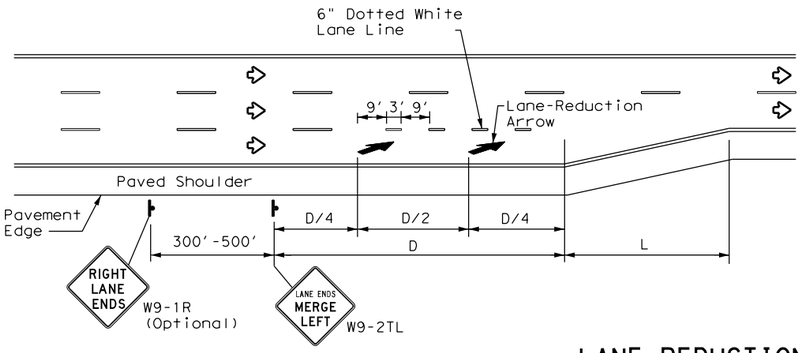
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	FTW	TARRANT		207
5-00 2-12				

22B

DATE: 1/18/2023 4:34:52 PM
FILE: ...\Traffic\Long Ave\894pm2-22.dgn



LANE REDUCTION

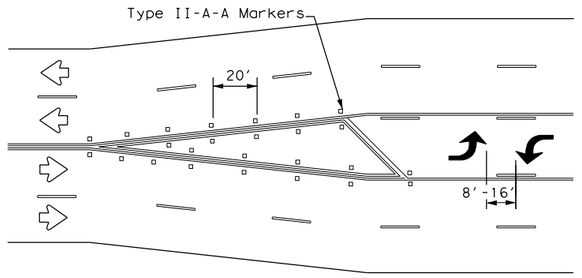
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

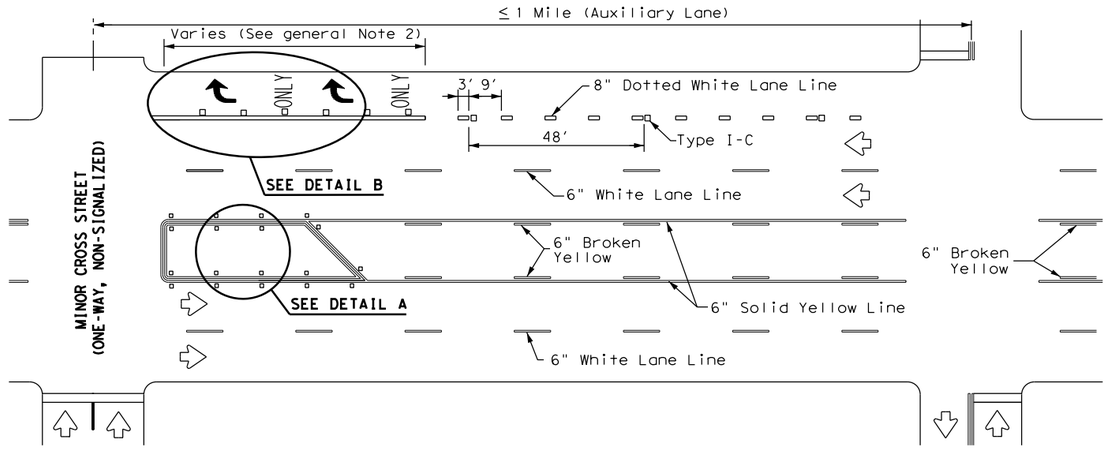


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

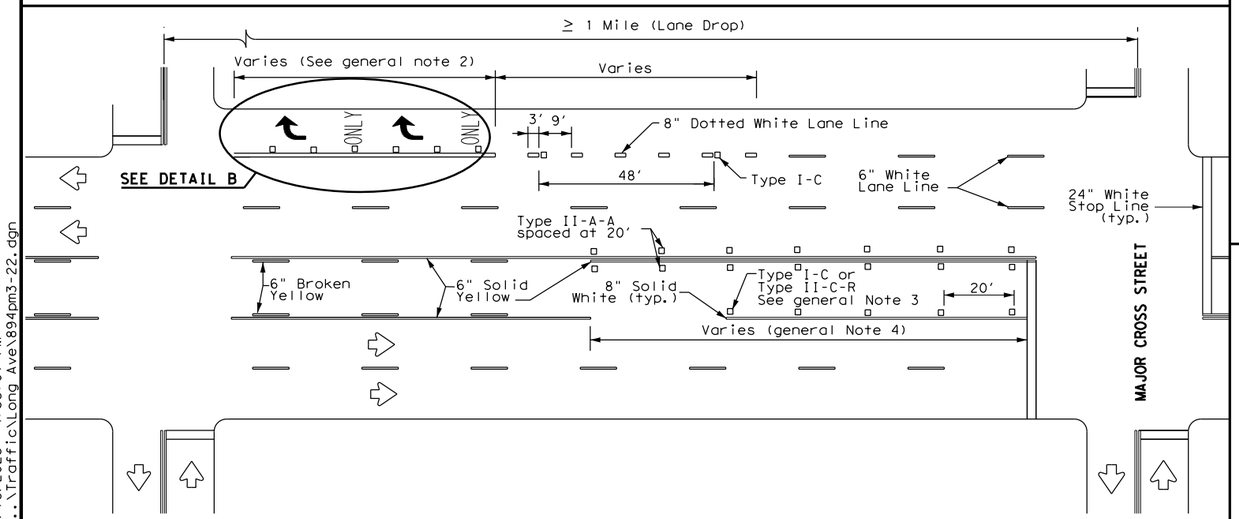
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

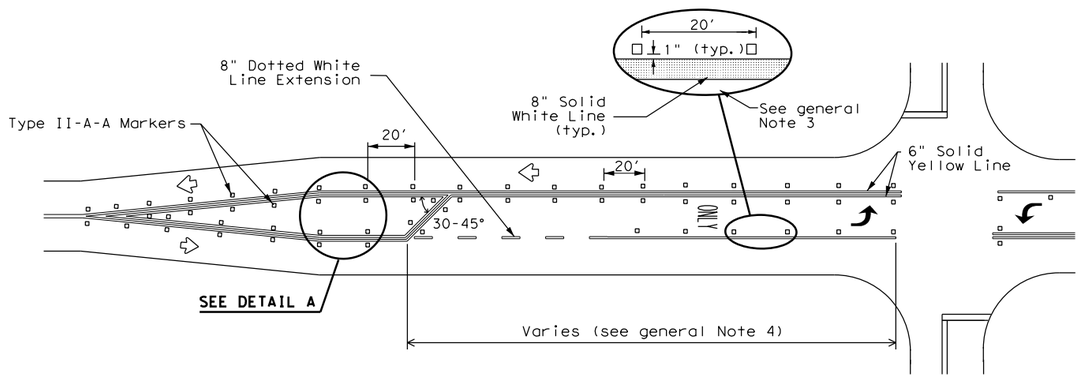
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



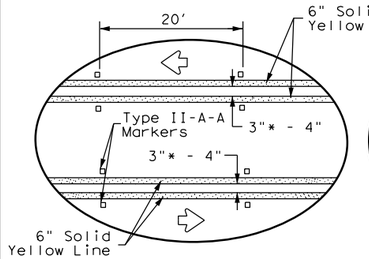
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



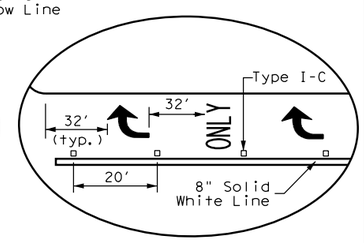
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

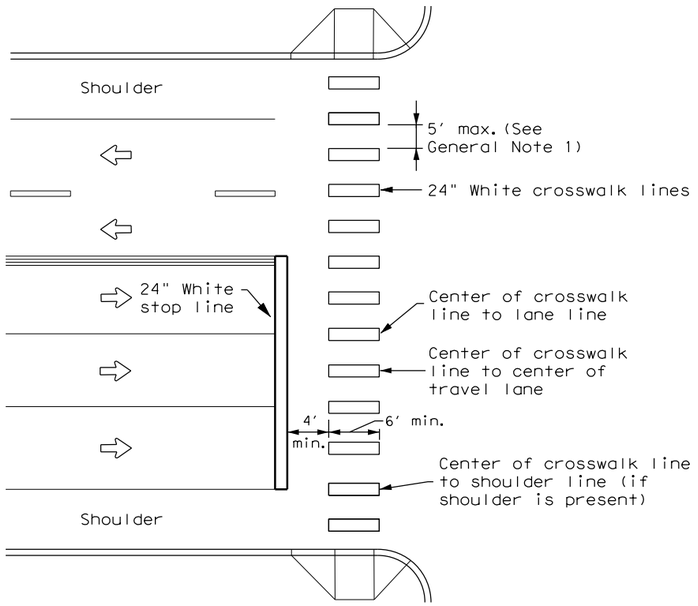
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		208

22C

DATE: 1/18/2023, 4:35:07 PM
FILE: ...\Traffic\Long Ave\894pm3-22.dgn



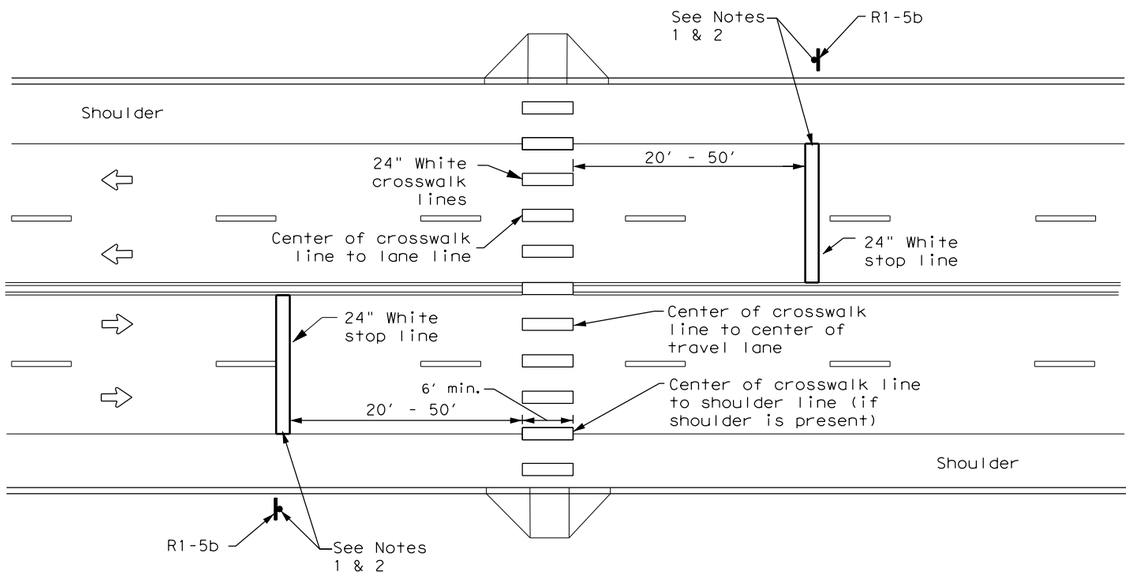
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6′ wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
6-20	DIST	COUNTY		SHEET NO.
6-22	FTW	TARRANT		209
12-22				

22D

DATE: 1/18/2023 4:35:20 PM
FILE: ...\Long Ave\894pm4-22a.dgn

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

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

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0902-48-894

1.2 PROJECT LIMITS:
AT LITTLE FOSSIL CREEK

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32° 48' 35.13", (Long) -97° 17' 33.78"
END: (Lat) 32° 48' 35.21", (Long) -97° 17' 26.50"

1.4 TOTAL PROJECT AREA (Acres): 2.53

1.5 TOTAL AREA TO BE DISTURBED (Acres): 2.09

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Replace bridge and approaches
Grading and replacing bridge approach pavement

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Sand	Clayey with gravel, dry, brown, fine to course grained (SC)
Clay	Sandy fat, stiff, moist, dark brown, few gravel, trace calcareous deposits, dark brown and brown gravelly CL with sand below 8' (CH)
Sand	Clayey, moist, brown, fine to course grained, few gravel (SC)
Clay	Sandy fat, stiff, moist, dark brown, few gravel (CH)

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

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

Type	Sheet #s

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

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

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

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody
Little Fossil Creek	
Big Fossil Creek	
West Fork Trinity River	

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
None

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	(See Title Sheet)		210
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0902	48	894	CS

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☒ ☐ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☒ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☒ ☐ Sediment Control Fence
- ☒ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

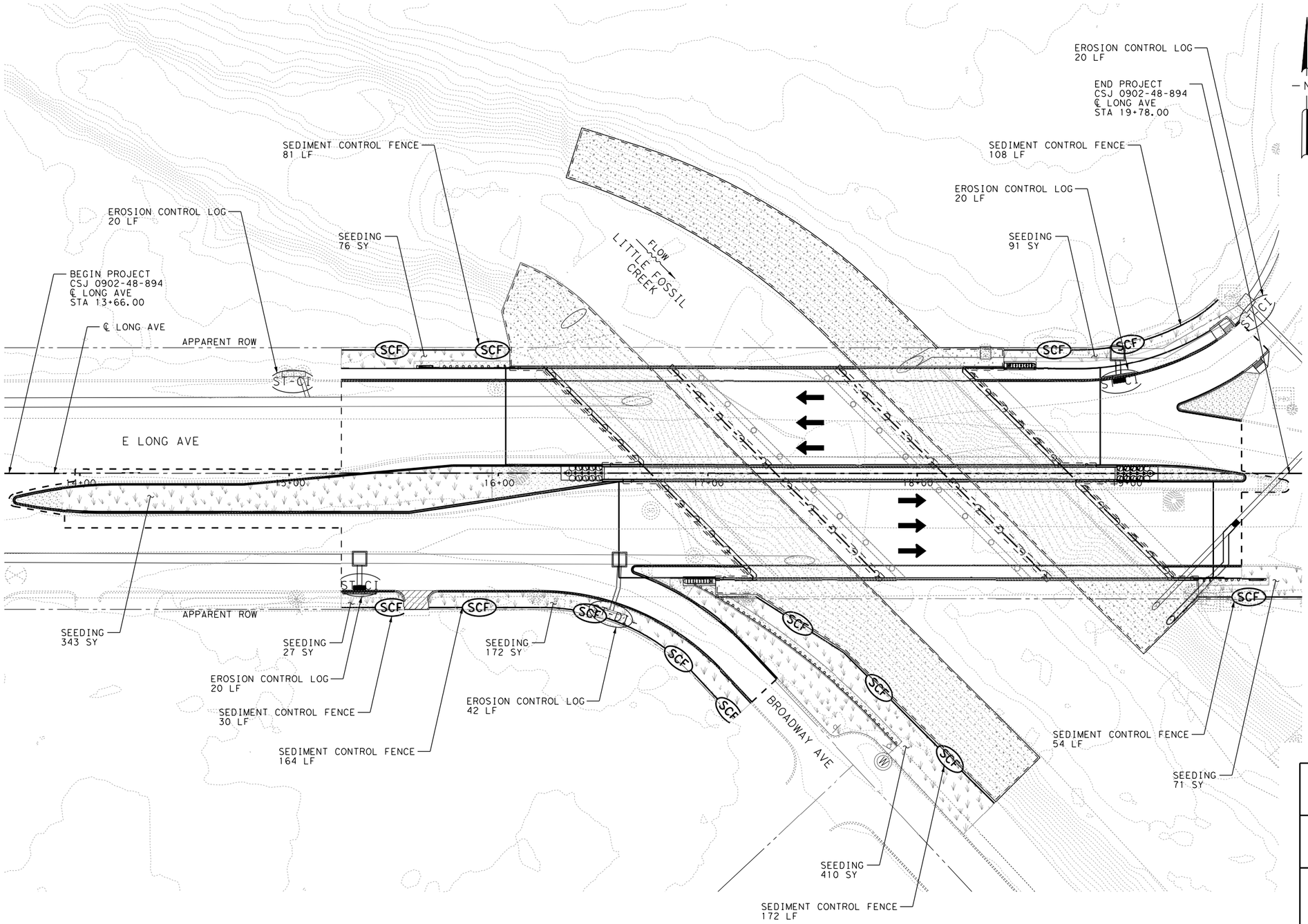
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	(See Title Sheet)		211
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0902	48	894	CS

TIME: 4:36:09 PM
DATE: 1/18/2023



LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ST-DI — EROSION CONTROL LOG DROP INLET
- ST-CI — EROSION CONTROL LOG CURB INLET
- CONC RIPRAP
- CONC MOWSTRIP
- SEEDING

NOTES:

1. CONSTRUCTION EXIT LOCATIONS TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
2. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF BMPS SHOWN AND ALTER LOCATIONS AS NEEDED TO ACHIEVE INTENDED PURPOSE AS APPROVED BY THE ENGINEER.

2/7/2023

Jacobs Engineering Group
STATE OF TEXAS
PAUL K. CLARK
99509
LICENSED PROFESSIONAL ENGINEER
F-2966

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

Texas Department of Transportation

E. LONG AVENUE

EROSION CONTROL PLAN

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

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NUMBER		HIGHWAY NO.
JDB	6	(See Title Sheet)		CS
CHECK JTB	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS BHK	TEXAS	FTW	TARRANT	212
CHECK PKC	CONTROL	SECTION	JOB	
	0902	48	894	

FILE: ...\ENV Shts\894SW3POI.sht

DATE: 1/18/2023
FILE: ...\ST\SW3P\Long Ave\894epic.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. The Storm Water Management Plan covers all the incorporated urbanized areas of the City

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

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

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

1. NWP 14 - Little Fossil Creek
2.
3.
4.

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ 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

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

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

☐ No Action Required ☒ Required Action

Action No.

1. The following species could occur in the project area: Louisiana pigtoe, sandbank pocketbook, Texas heelsplitter, Strecker's chorus frog, Woodhouse's toad, Western Burrowing Owl, swamp rabbit, Western chicken turtle, Texas garter snake, timber (canebrake) rattlesnake, American bumblebee, Glen Rose yucca, Osage Plains false foxglove, Reverchon's scurfpea, Topeka purple-coneflower, Monarch butterfly, and Alligator Snapping turtle. Follow the BMPs and Special Notes listed below to protect these species.
2. Survey is required for Louisiana pigtoe, sandbank pocketbook, and Texas heelsplitter at Little Fossil Creek (STA 17+75). TxDOT to complete the survey at this location prior to disturbance.
3. Contractor to implement the following BMPs from "Beneficial Management Practices: Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources" available at https://ftp.txdot.gov/pub/txdot-info/env/toolkit/300-01-bmp.pdf.
   a. Section 2.6.2 Terrestrial Amphibian and Reptile BMP Section
   b. Section 2.6.1 Aquatic Amphibian and Reptile BMP
   c. Section 2.4.3 Freshwater Mussel BMP
   d. Section 2.2.1 Bird BMP
   e. Section 1.4 Water Quality BMP
   f. Section 1.5 Stream Crossing BMP
   g. Section 1.6 Dewatering BMP
   h. Section 1.2 Vegetation BMP
   i. Section 2.4.4 Insect Pollinator BMP
   j. Section 2.5.1 Small Mammal BMP

Special note: The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell trade or transport any migratory bird, nest, young, feather or egg in part or in while, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on site during construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. The Texas Department of Transportation proposes to have a temporary occupancy impact on the existing trail system, and utilizes a Determination of No Adverse Effects and Certification of 4(f) Exception for this trail.

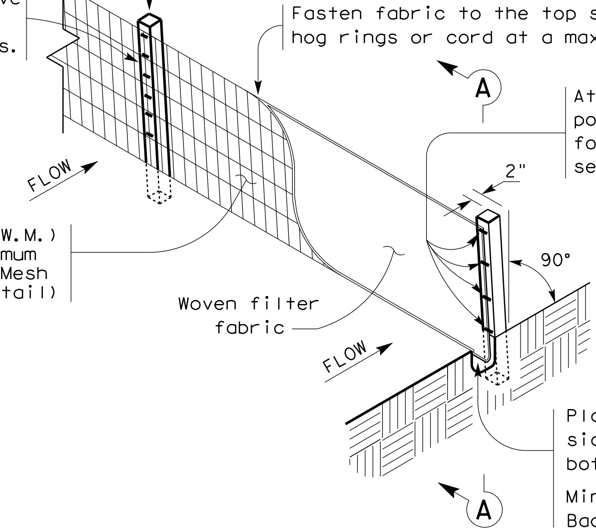
EAST LONG AVENUE

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

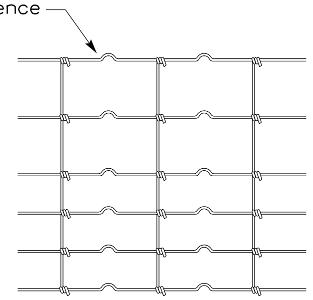
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		213



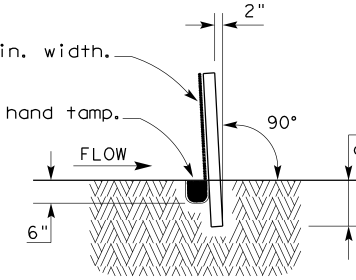
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

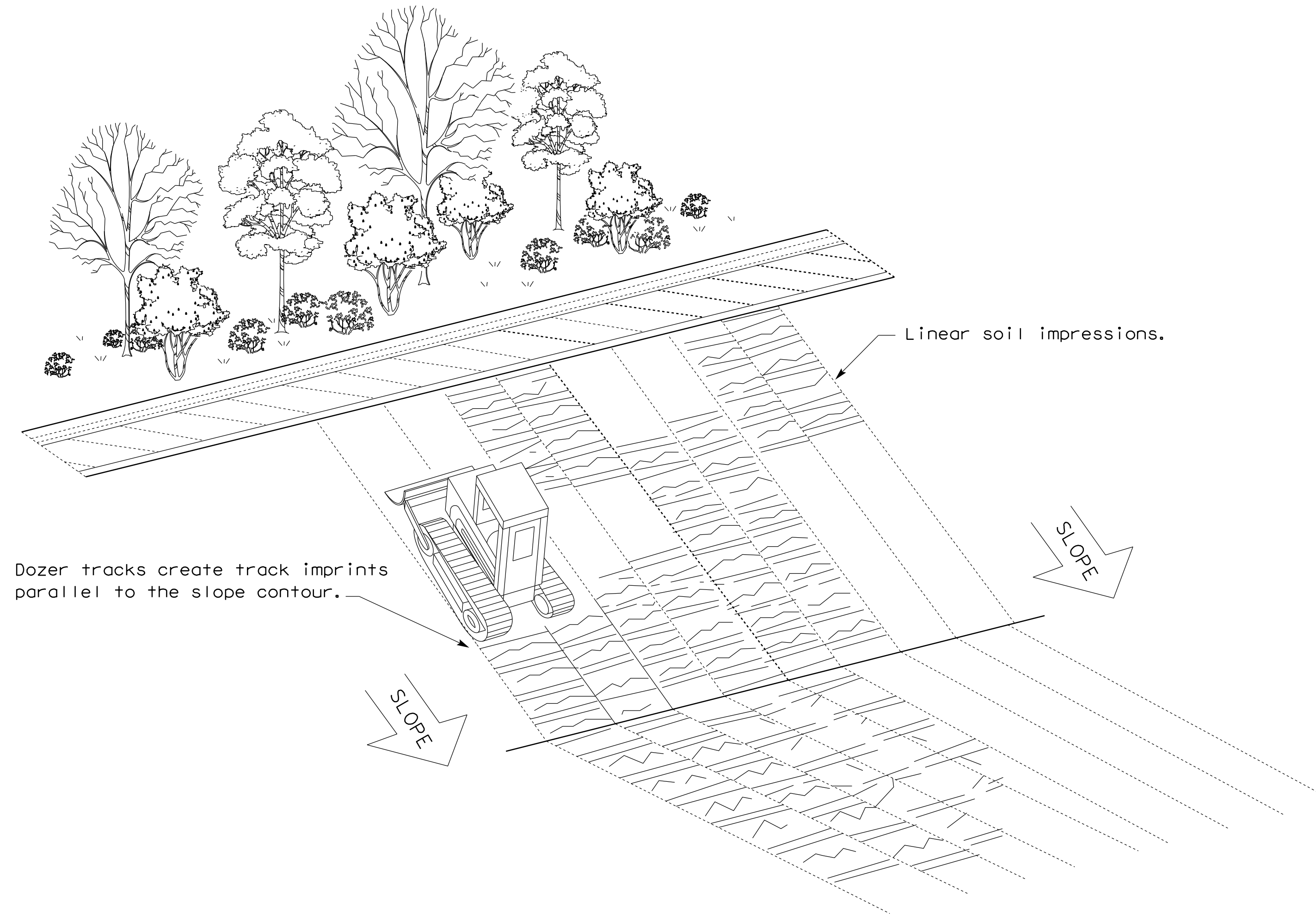
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

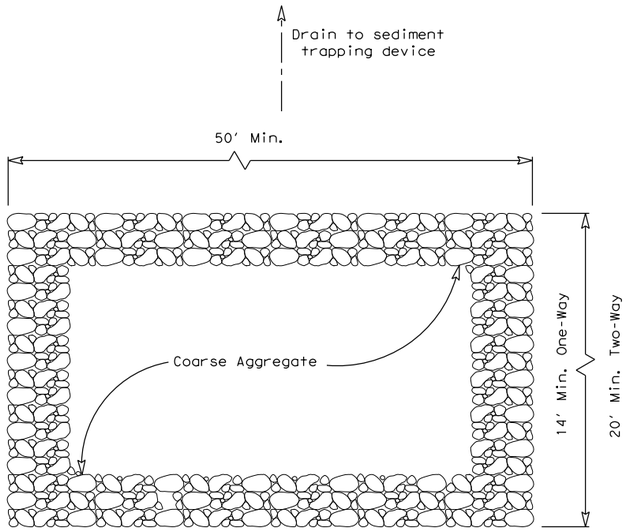
FENCE & VERTICAL TRACKING

EC(1)-16

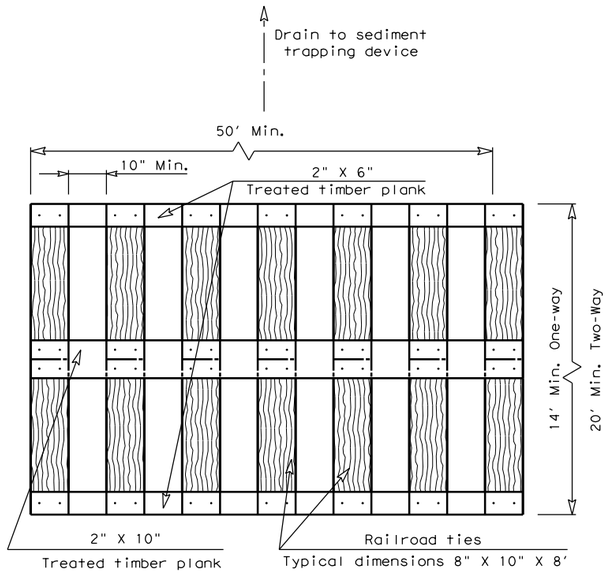
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT 0902	SECT 48	JOB 894	HIGHWAY CS
REVISIONS	DIST FTW	COUNTY TARRANT		SHEET NO. 214

10/18/2023
...\SW3P\Long Ave\894ec116.dgn

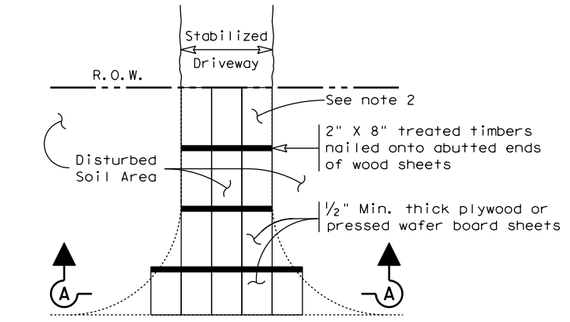
DATE: 1/18/2023
FILE: ...\ST\SW3P\Long Ave\894ec316.dgn



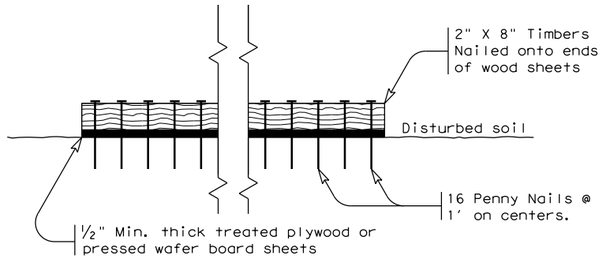
PLAN VIEW



PLAN VIEW



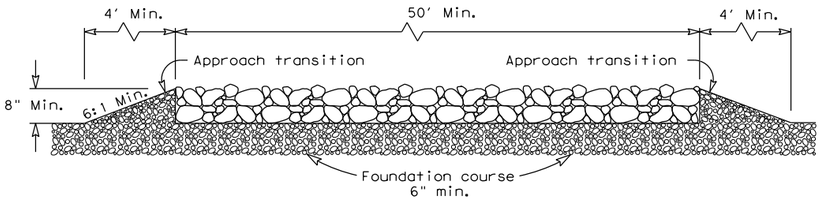
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

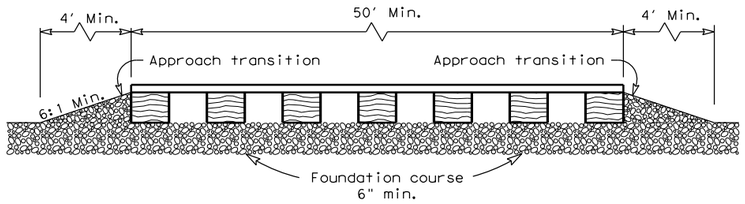
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

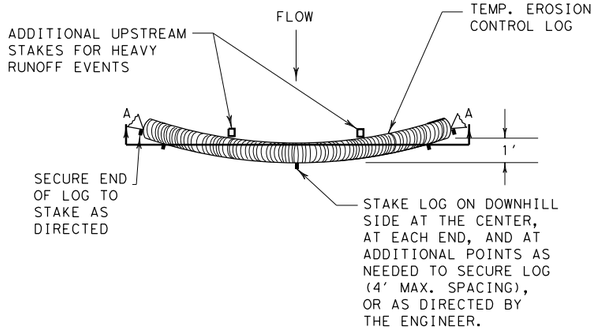
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

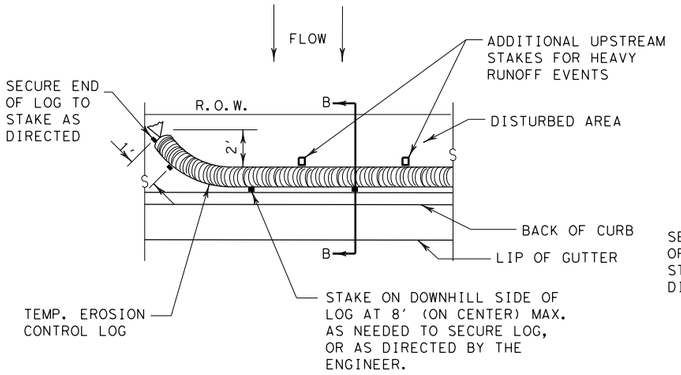
CONSTRUCTION EXITS

EC(3)-16

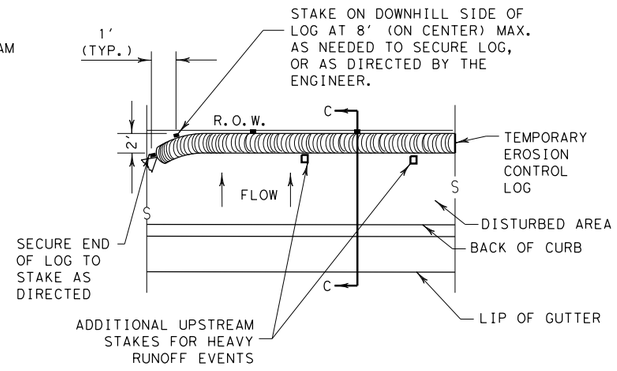
FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0902	48	894	CS
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		215



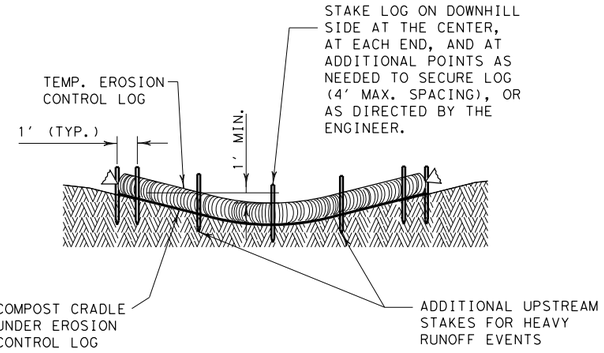
PLAN VIEW



PLAN VIEW



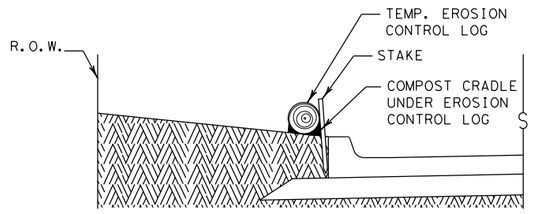
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

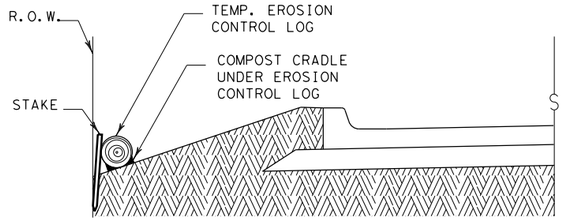
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

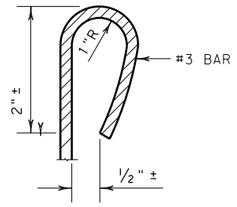
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

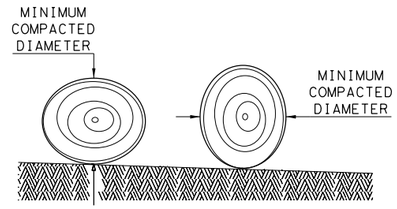
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

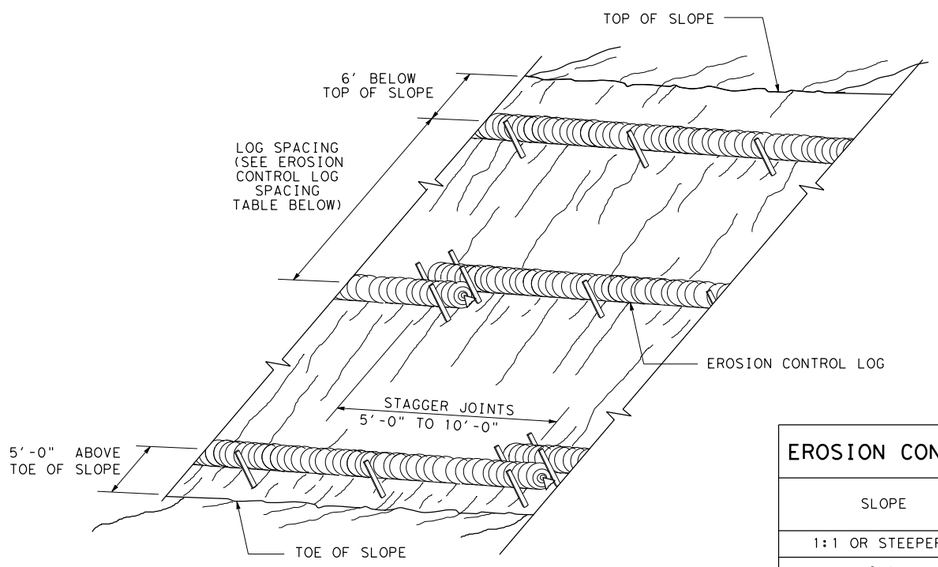
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

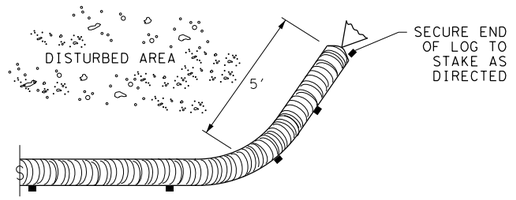
FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0902	48	894		CS		
	DIST	COUNTY			SHEET NO.		
	FTW	TARRANT			216		

DATE: 1/18/2023
FILE: ...\STSW3P\Long Ave\894ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

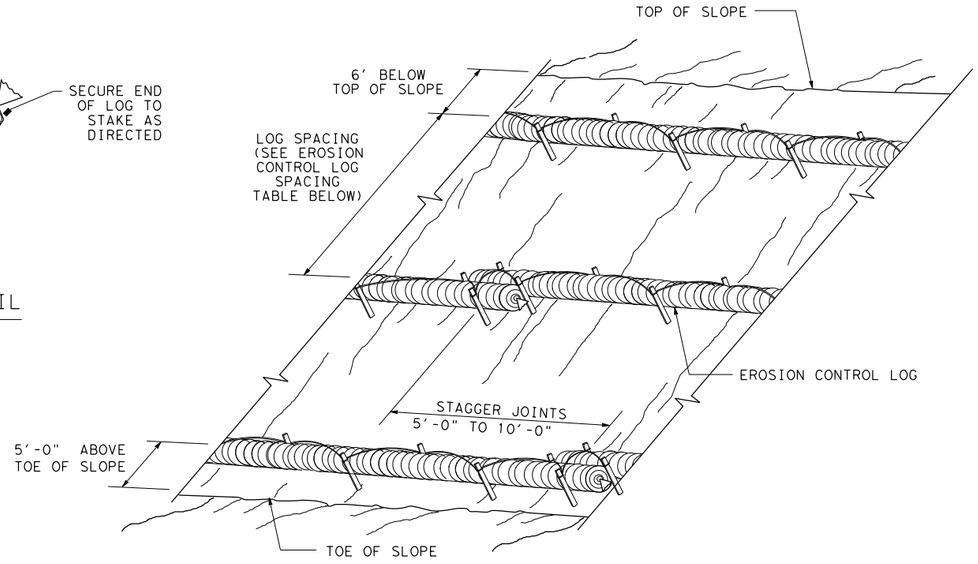
CL-SST



END SECTION RAP DETAIL

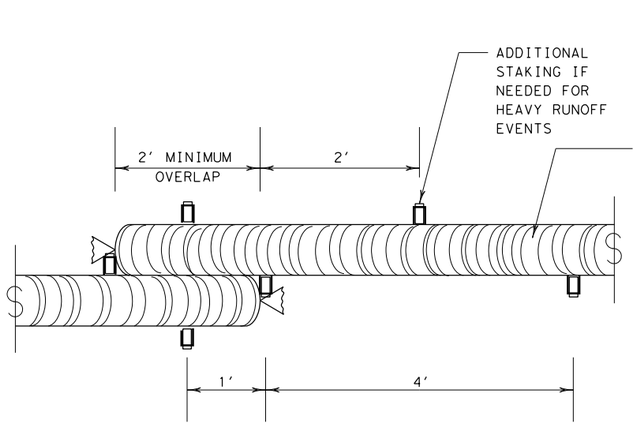
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

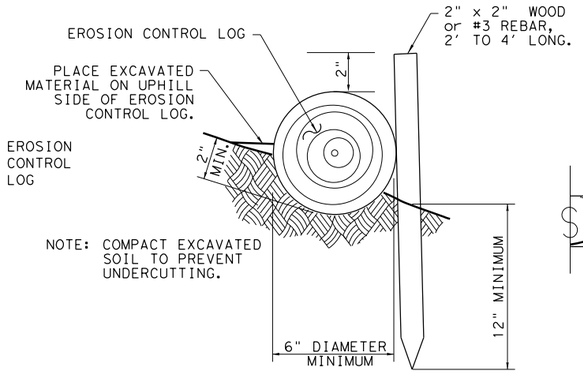
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

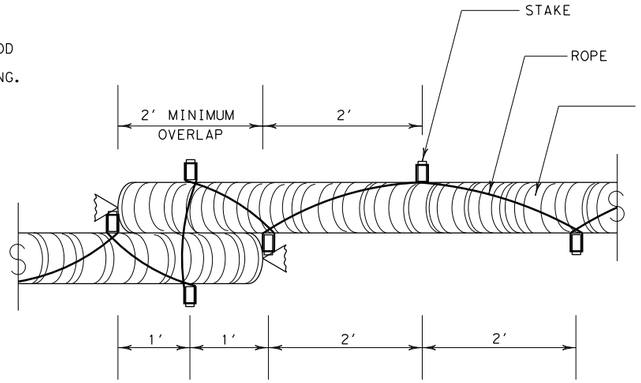


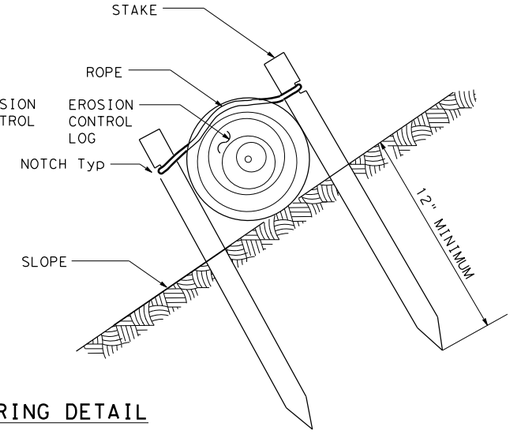


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

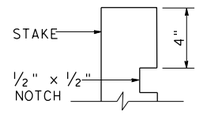
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



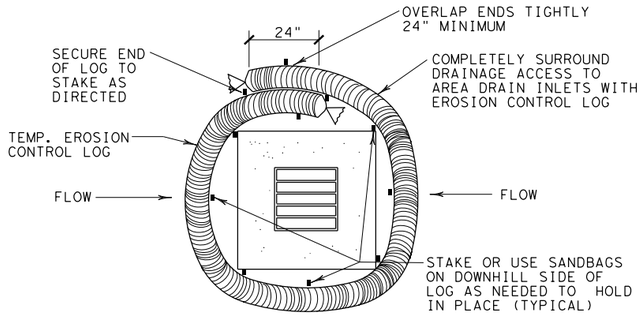
STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

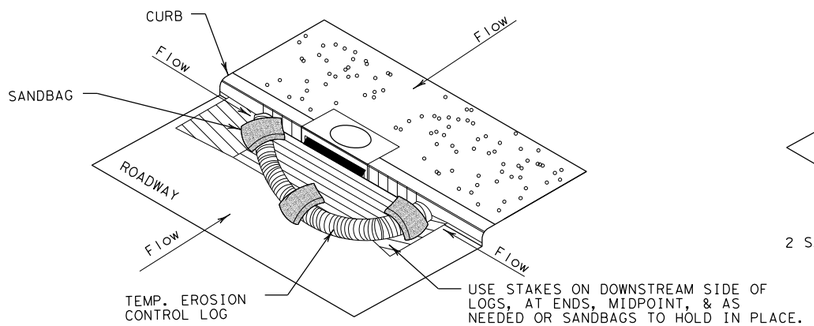
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0902	48	894		CS	
	DIST	COUNTY			SHEET NO.	
	FTW	TARRANT			217	

DATE: 1/18/2023
FILE: ...\ST\SW3P\Long Ave\894ec916.dgn



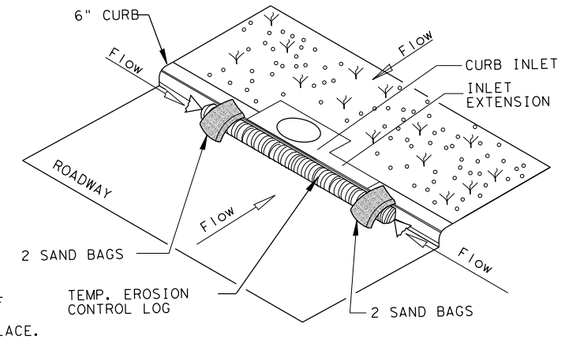
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

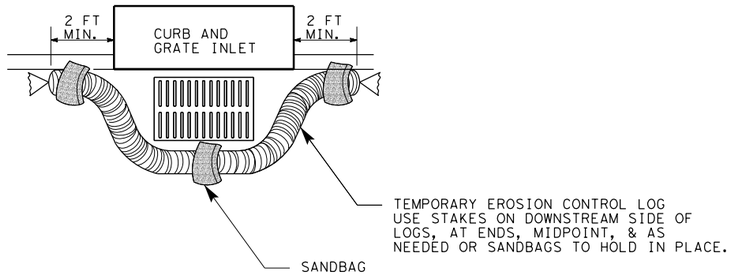
CL-CI



EROSION CONTROL LOG AT CURB INLET

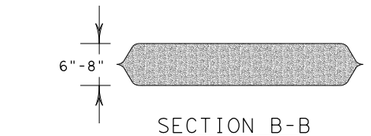
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

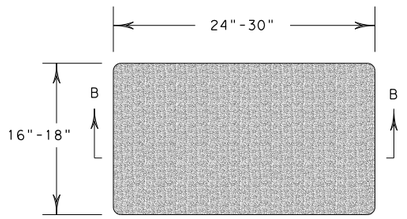


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0902	48	894		CS		
	DIST	COUNTY			SHEET NO.		
	FTW	TARRANT			218		

DATE: 1/18/2023
FILE: ...\ST\SW3P\Long Ave\894ec916.dgn