100% SUBMITTAL

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
REFER TO SHEET 2	

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. BR 2024 (920)

Volume II
(CONTRACT CSJ: 0922-33-198)

LAS TIENDAS RD, ETC.
WEBB COUNTY
CSJ: 0922-33-185, ETC.

NET LENGTH OF ROADWAY = 990.86 FT.= 0.188 MI.
NET LENGTH OF BRIDGE = 190.75 FT.= 0.036 MI.
NET LENGTH OF PROJECT = 1181.61 FT.= 0.224 MI.

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

FEDERAL AID PROJECT NO.			
BR 2024 (920)			
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		1

DESIGN CRITERIA:	4R / NEW CONSTRUCTION
FUNCTIONAL CLASS:	RURAL MINOR COLLECTOR
DESIGN SPEED:	MEET OR IMPROVE EXISTING
TDLR REQUIRED:	___ YES _X_ NO

	CR 352 CSJ 0922-33-185	CR 352 CSJ 0922-33-196	CR 1025 CSJ 0922-33-187	CR 1005 CSJ 0922-33-197
A.D.T. (2018)	122	122	53	28
A.D.T. (2042)	183	183	900	900
% Truck A.D.T.	54.9	54.9	3.4	3.4

LOCATION #1- CULVERT 1
BEGIN STA. 12+08.44 END STA. 14+61.54

CSJ: 0922-33-185
LIMITS
FROM: LAS TIENDAS RD
TO: .
NET LENGTH OF ROADWAY = 207.16 FT.= 0.039 MI.
NET LENGTH OF BRIDGE = 45.94 FT.= 0.009 MI.
NET LENGTH OF PROJECT = 253.10 FT.= 0.048 MI.

LOCATION #2- BRIDGE 1
BEGIN STA. 11+78.14 END STA. 14+69.07

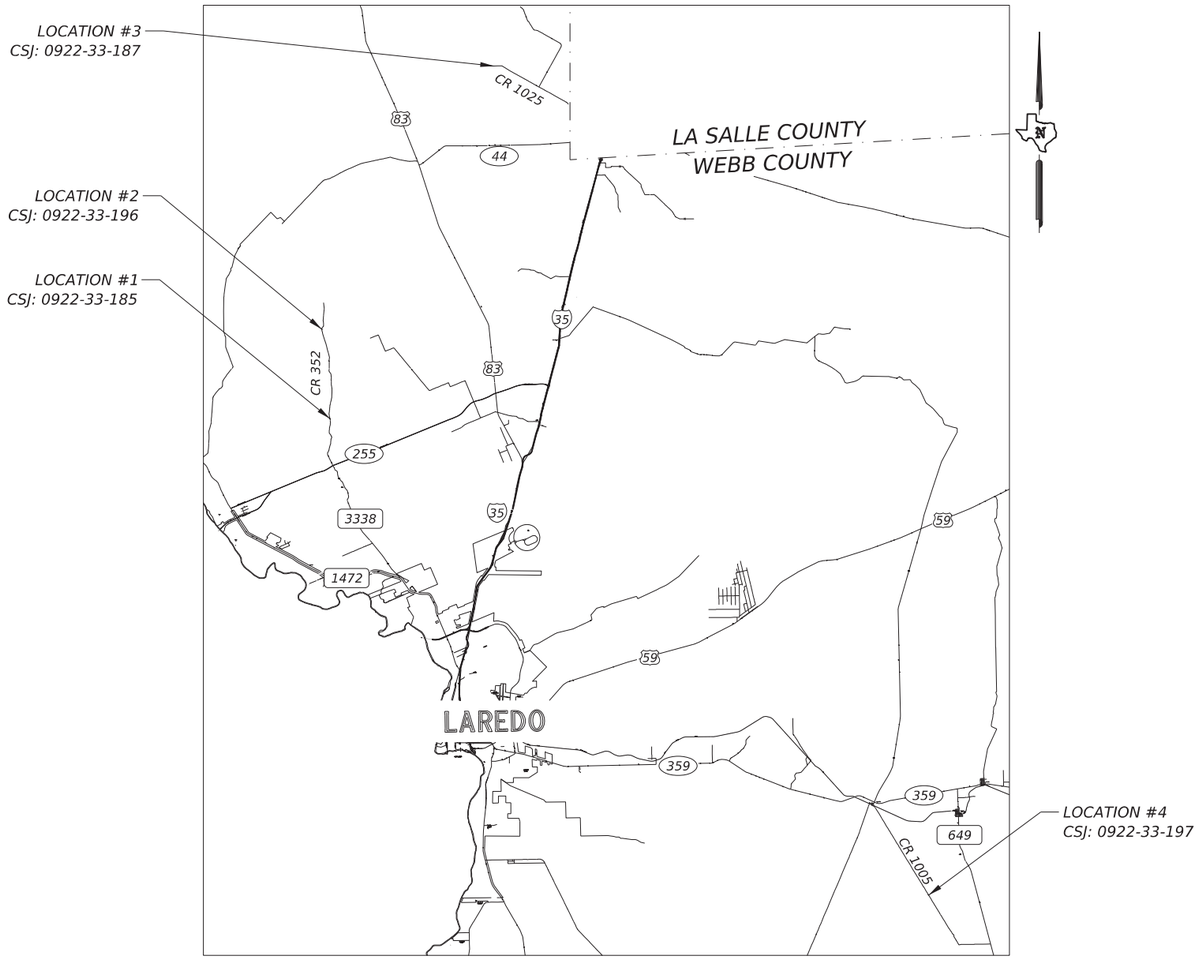
CSJ: 0922-33-196
LIMITS
FROM: LAS TIENDAS RD
TO: .
NET LENGTH OF ROADWAY = 240.93 FT.= 0.046 MI.
NET LENGTH OF BRIDGE = 50.00 FT.= 0.010 MI.
NET LENGTH OF PROJECT = 290.93 FT.= 0.055 MI.

LOCATION #3- CULVERT 2
BEGIN STA. 13+21.04 END STA. 16+46.62

CSJ: 0922-33-187
LIMITS
FROM: KREUGER RD
TO: .
NET LENGTH OF ROADWAY = 298.77 FT.= 0.057 MI.
NET LENGTH OF BRIDGE = 26.81 FT.= 0.005 MI.
NET LENGTH OF PROJECT = 325.58 FT.= 0.062 MI.

LOCATION #4- CULVERT 3
BEGIN STA. 11+25.83 END STA. 14+37.99

CSJ: 0922-33-197
LIMITS
FROM: VAQUILLAS RD
TO: .
NET LENGTH OF ROADWAY = 243.79 FT.= 0.046 MI.
NET LENGTH OF BRIDGE = 68.37 FT.= 0.013 MI.
NET LENGTH OF PROJECT = 312.16 FT.= 0.059 MI.



N.T.S.

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR : _____

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

PREPARED BY: 3/28/2024
ATKINSRÉALIS PROJECT MANAGER

Texas Department of Transportation

SUBMITTED FOR LETTING: 4/1/2024
DocuSigned by: Angelica Chapa 307945B8A8784F3...
...N ENGINEER

RECOMMENDED FOR LETTING: 4/2/2024
DocuSigned by: A54CD9F731724EC...
...GINEER

RECOMMENDED FOR LETTING: 4/2/2024
DocuSigned by: Roberto Rodriguez III B6BEDC41D58848E...
...ATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 4/1/2024
DocuSigned by: Enrique Hoyos, P.E. A5A9883ECD1E4F7...

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023)

DATE: 4/1/2024 9:31:14 AM
FILE: ...\Visualization\VicMap_Webb.dgn

100% SUBMITTAL

DN: CF CC: RW DW: MG CK: RW

INDEX OF SHEETS

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

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/02/2024

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

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

3/28/2024

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

STATE OF TEXAS
URIEL GARCIA
144964
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

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

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

INDEX OF SHEETS

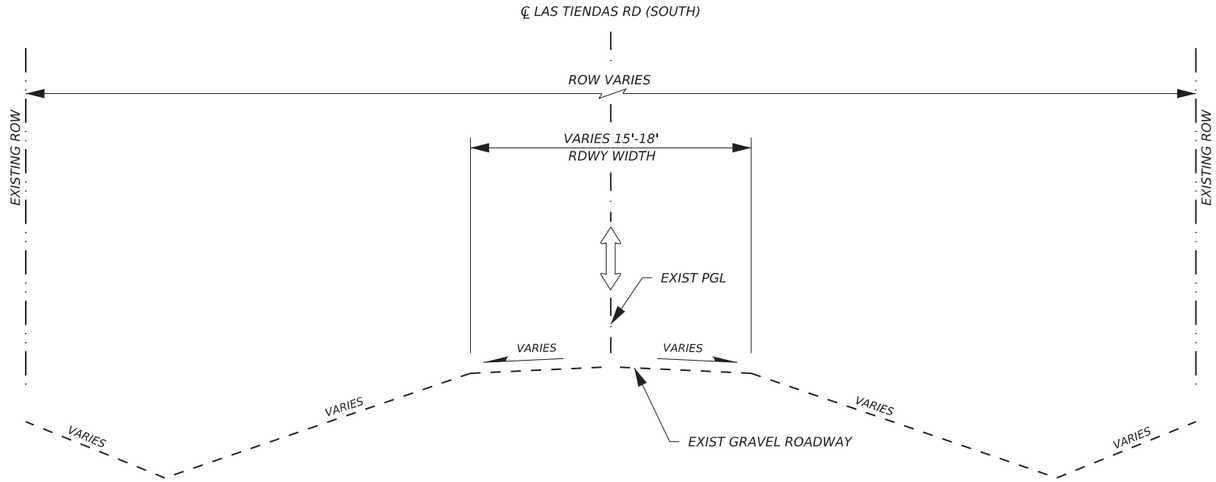
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		2

DATE: 3/28/2024 3:14:35 PM
FILE: ...\Plan Set\1. General\LRD_Index

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW



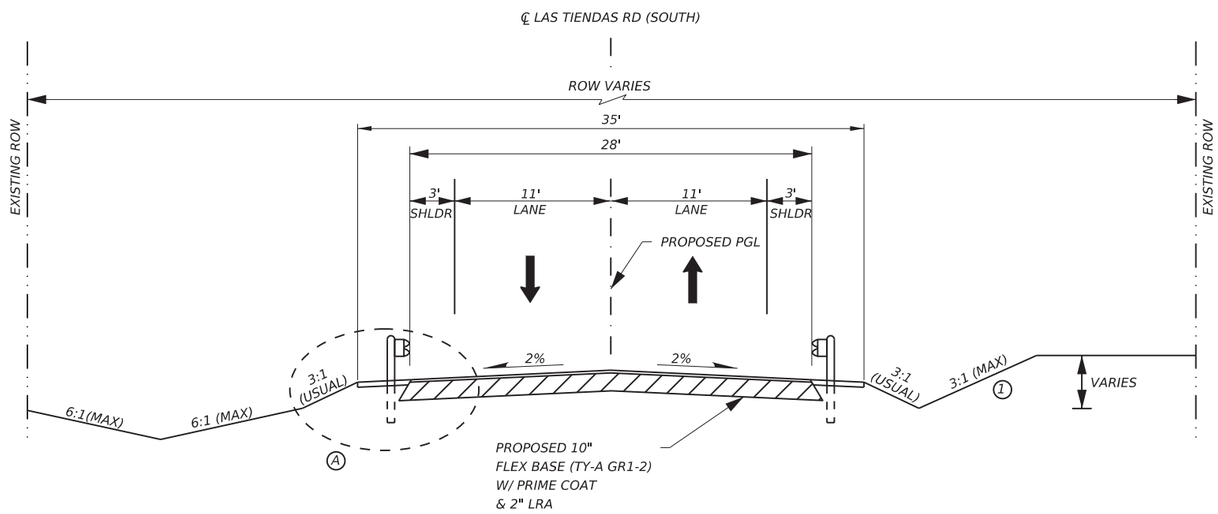
LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)
EXIST TYPICAL SECTION
STA 12+08.44 TO STA 14+61.54

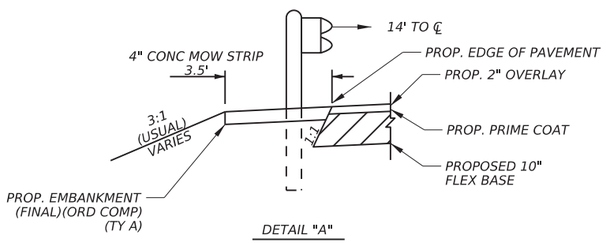
NOTES

SEE "SUMMARY OF QUANTITIES" SHEETS FOR MORE QUANTITY INFORMATION.

SEE "GEOMETRIC DATA SHEET", "SURVEY CONTROL INDEX SHEET" FOR DESIGN ALIGNMENT & GPS MARK DATA.

(1) WHERE END CONDITIONS REQUIRE CUT SLOPES, GRADE DITCHES TO DRAIN





DETAIL "A"

LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)
PROPOSED TYPICAL SECTION
STA 12+08.44 TO STA 14+61.54

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT
SANTA ISABEL CK BRANCH (SOUTH)

TYPICAL SECTIONS

SCALE: N.T.S.

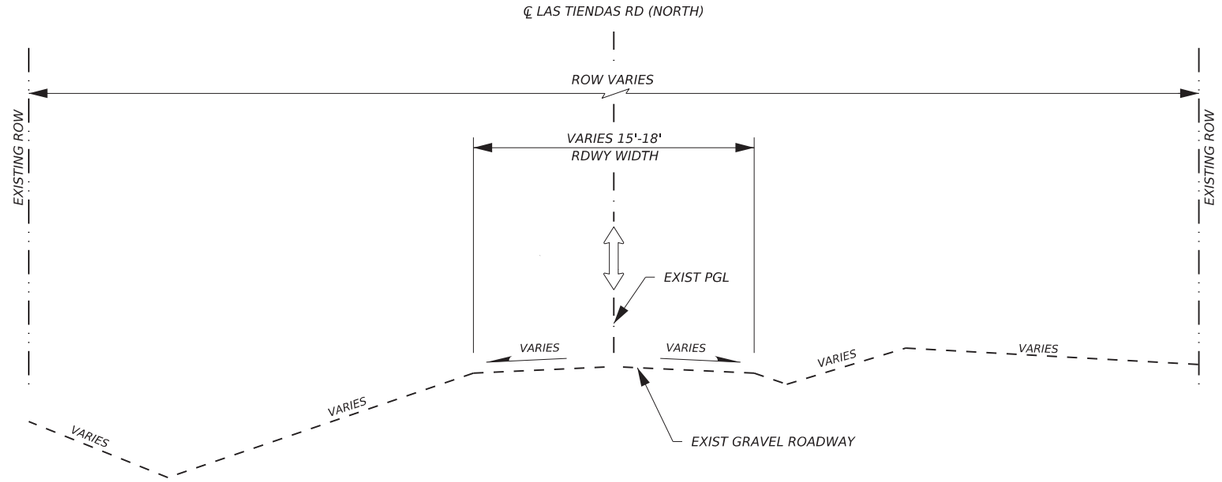
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		3

DATE: 5/2/2024 4:42:18 PM
FILE: ...\Unnamed Plan-2 - TYP LasTiendasSouth.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



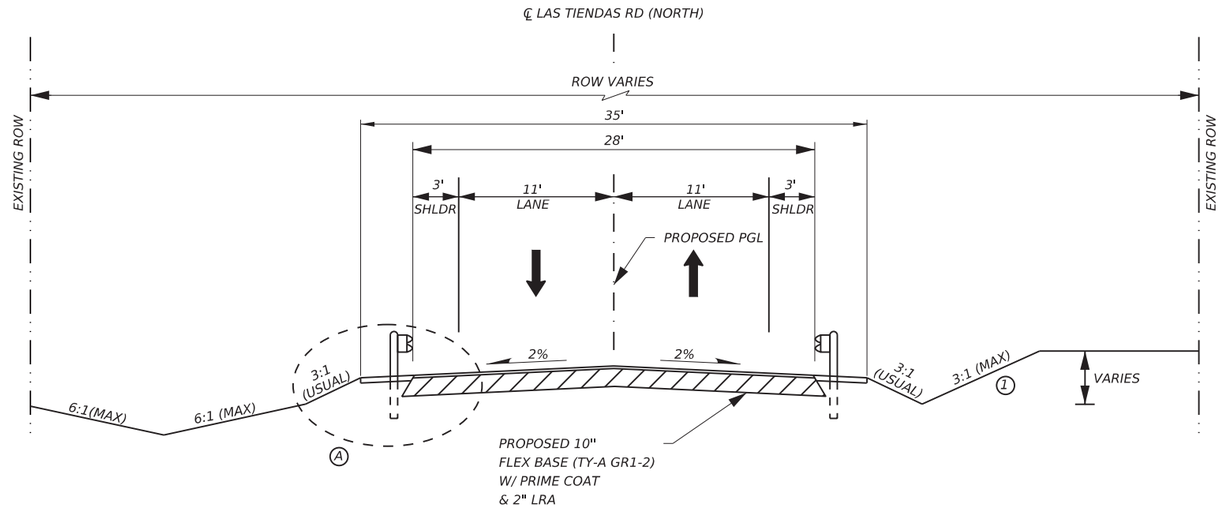
LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)
EXIST TYPICAL SECTION
STA 11+78.14 TO STA 12+63.00
STA 13+13.00 TO STA 14+69.07

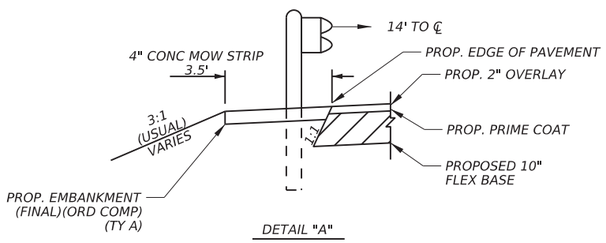
NOTES

SEE "SUMMARY OF QUANTITIES" SHEETS FOR MORE QUANTITY INFORMATION.

SEE "GEOMETRIC DATA SHEET", "SURVEY CONTROL INDEX SHEET" FOR DESIGN ALIGNMENT & GPS MARK DATA.

(1) WHERE END CONDITIONS REQUIRE CUT SLOPES, GRADE DITCHES TO DRAIN





DETAIL "A"

LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)
PROPOSED TYPICAL SECTION
STA 11+78.14 TO STA 12+63.00
STA 13+13.00 TO STA 14+69.07

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT
SANTA ISABEL CREEK BRANCH (NORTH)

TYPICAL SECTIONS

SCALE: N.T.S.

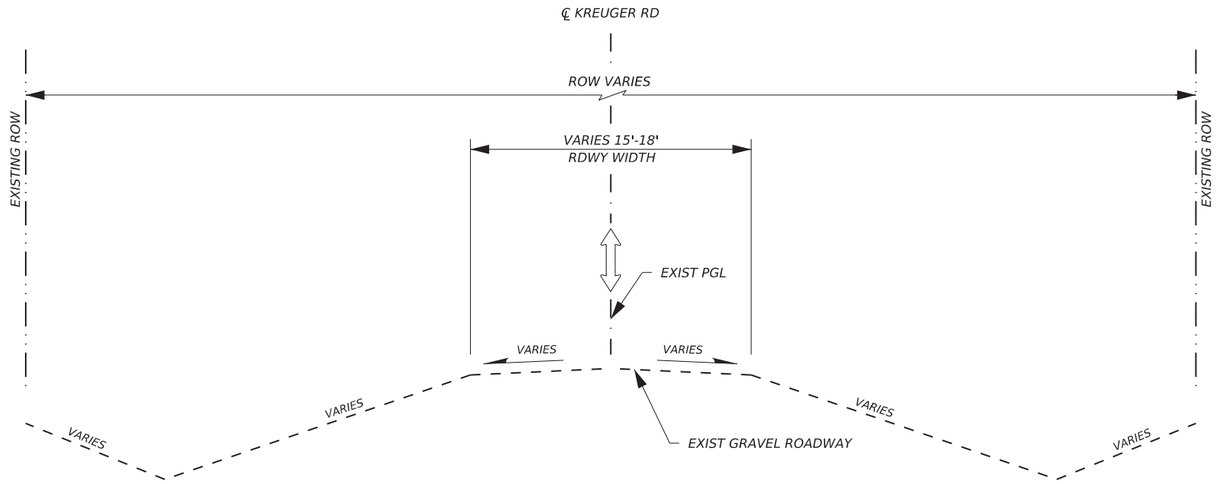
SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		4

DATE: 5/2/2024 4:42:23 PM
FILE: ...\Unnamed Plan-3 - TYP LasTiendasNorth.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



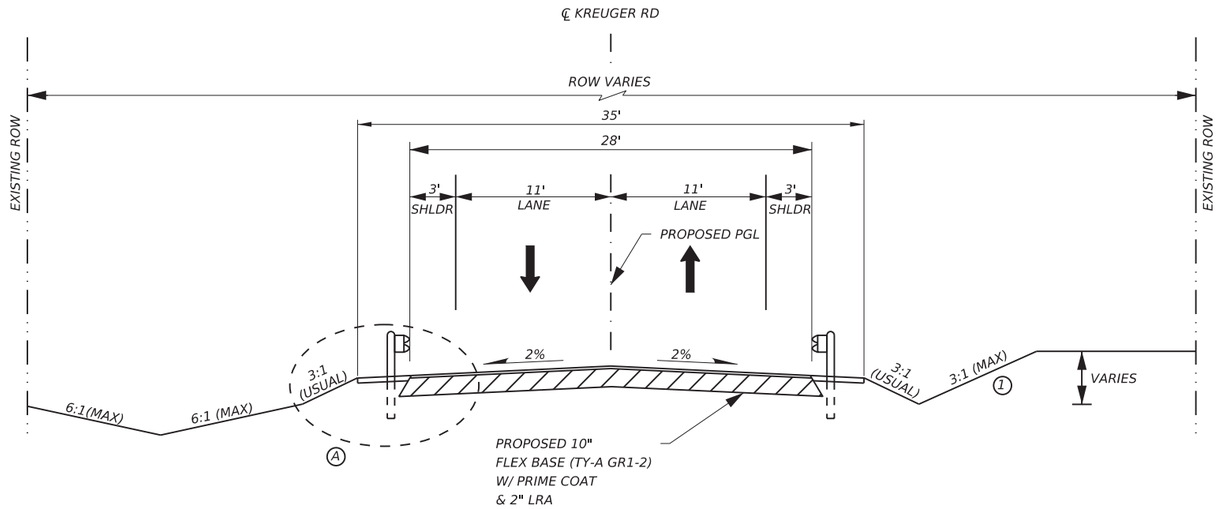
KREUGER RD AT JABONCILLO CK BRANCH
EXIST TYPICAL SECTION
STA 13+21.04 TO STA 16+46.62

NOTES

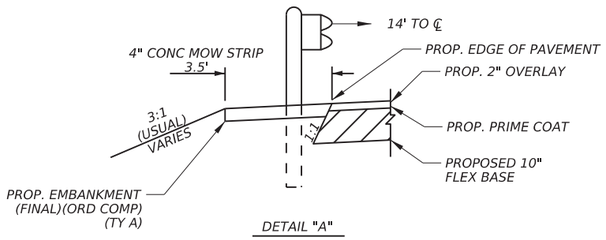
SEE "SUMMARY OF QUANTITIES" SHEETS FOR MORE QUANTITY INFORMATION.

SEE "GEOMETRIC DATA SHEET", "SURVEY CONTROL INDEX SHEET" FOR DESIGN ALIGNMENT & GPS MARK DATA.

(1) WHERE END CONDITIONS REQUIRE CUT SLOPES, GRADE DITCHES TO DRAIN



KREUGER RD AT JABONCILLO CK BRANCH
PROPOSED TYPICAL SECTION
STA 13+21.04 TO STA 16+46.62



DETAIL "A"

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD AT JABONCILLO CREEK BRANCH

TYPICAL SECTIONS

SCALE: N.T.S.

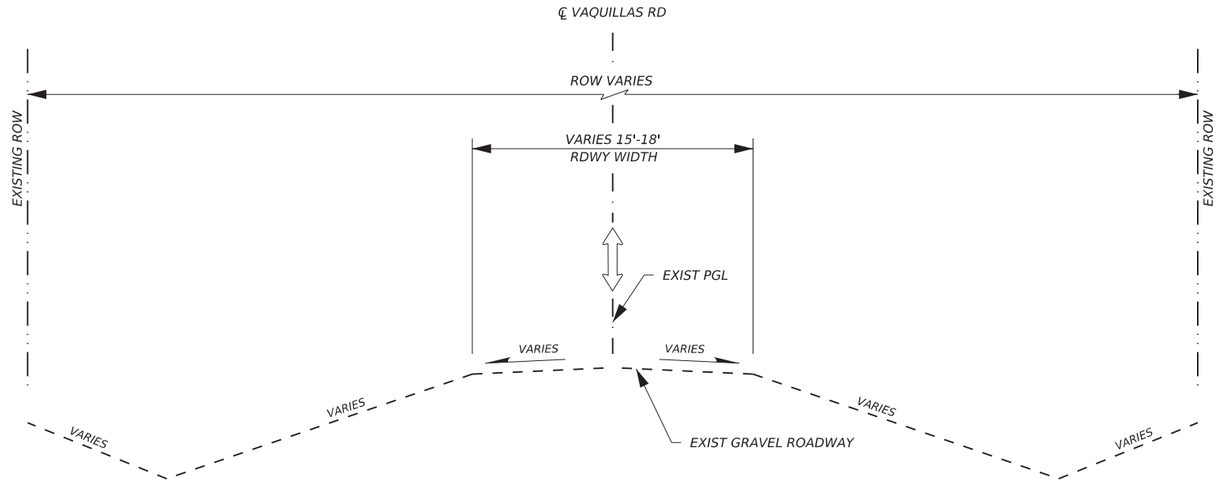
SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		5

DATE: 5/2/2024 4:42:28 PM
FILE: ...\KreugerRD TYP - KreugerRD TYP.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



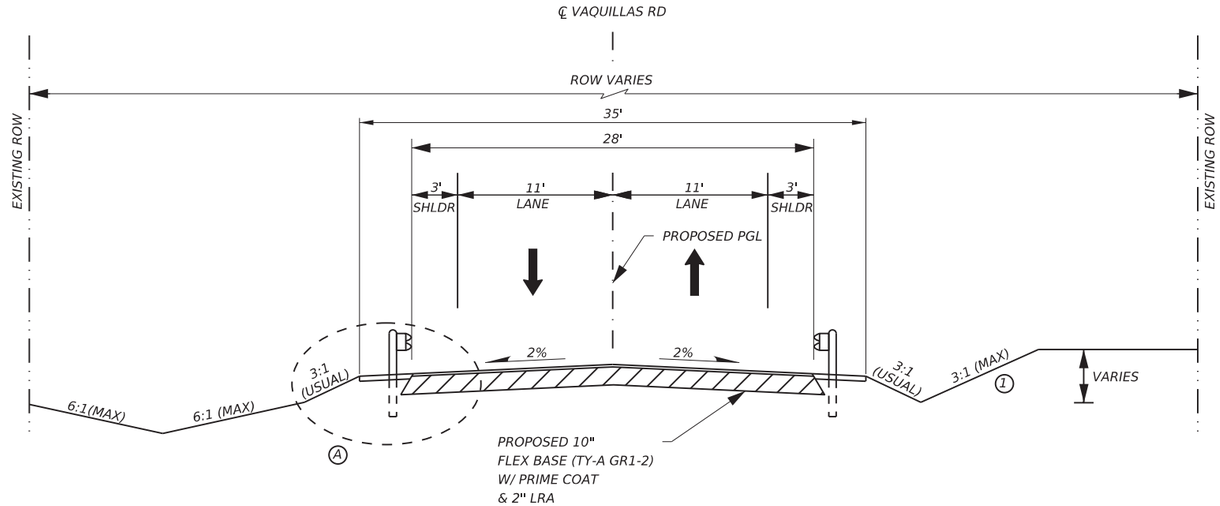
VAQUILLAS RD AT AGUA AZUL CK
EXIST TYPICAL SECTION
STA 11+25.83 TO STA 14+37.99

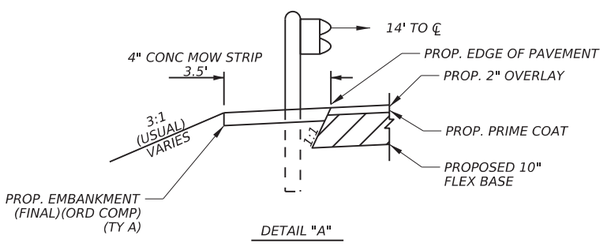
NOTES

SEE "SUMMARY OF QUANTITIES" SHEETS FOR MORE QUANTITY INFORMATION.

SEE "GEOMETRIC DATA SHEET", "SURVEY CONTROL INDEX SHEET" FOR DESIGN ALIGNMENT & GPS MARK DATA.

① WHERE END CONDITIONS REQUIRE CUT SLOPES, GRADE DITCHES TO DRAIN





DETAIL "A"

VAQUILLAS RD AT AGUA AZUL CK
PROPOSED TYPICAL SECTION
STA 11+25.83 TO STA 14+37.99

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO.	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

TYPICAL SECTIONS

SCALE: N.T.S.

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		6

DATE: 5/2/2024 4:42:33 PM
FILE: ...\Unnamed Plan-1 - TYP VaquillasRd.dgn

OMIT

OMIT

OMIT

OMIT

OMIT

OMIT

OMIT

OMIT

100% SUBMITTAL

DN: CF CK: RW RW: CK MG: DW

SUMMARY OF ROADWAY QUANTITIES

ITEM NO. DESC. CODE	100-6002	110-6001	132-6002	216-6001 ■	247-6041	330-6002 ▲	432-6045	450-6018	540-6001	540-6016	544-6001	310-6009 ▲
LOCATION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	PROOF ROLLING	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	LRA PAV TY-I GR-A	RIPRAP (MOW STRIP)(4 IN)	RAIL (TY T631)	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	PRIME COAT (MC-30)
CSJ: 0922-33-185	STA	CY	CY	HR	CY	TON	CY	LF	LF	EA	EA	GAL
STATION 12+08.44 TO 14+61.54	3	122	103	2	218	86	9	130	150	2	2	157
TOTAL	3	122	103	2	218	86	9	130	150	2	2	157

BASIS OF ESTIMATE FOR CONTRACTORS INFORMATION

ITEM	DESCRIPTION	RATE	AMOUNT	UNIT	QUANTITY	PAY UNIT
330-6002	OVERLAY: 2" LRA PAV TY-A GR-A	110 LB/SY/IN	783	SY	86	TON
310-6009	PRIME COAT: MC-30	0.2 GAL/SY	783	SY	157	GAL

SIGNING & DEL SUMMARY

ITEM NO. DESC. CODE	644-6076	658-6060	658-6016
LOCATION	REMOVE SM RD SN SUP&AM	REMOVE DELIN & OBJECT MARKER ASSMS	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)
	EA	EA	EA
CSJ: 0922-33-185	4	10	12
TOTAL	4	10	12

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

ITEM NO. DESC. CODE	508-6001	512-6009	512-6010	512-6033	512-6034	512-6057	512-6058	110-6001 ✳	132-6002 ✳	6001-6002
LOCATION	CONSTRUCTING DETOURS	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)	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	PORTABLE CHANGEABLE MESSAGE SIGN
	SY	LF	LF	LF	LF	LF	LF	CY	CY	EA
CSJ: 0922-33-185	610	640	80	220	40	640	80	36	156	2
TOTAL	610	640	80	220	40	640	80	36	156	2

NOTES:

✳ ITEM SHOWN ON THIS TABLE ARE PART OF THE DETOUR AND WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 508 "CONSTRUCTING DETOURS"

▲ THE ASPHALT AND AGGREGATE RATES ARE FOR ESTIMATION PURPOSES ONLY. THESE RATES WILL BE ADJUSTED AS NEEDED IN THE FIELD.

■ THE PROOF ROLLING IS FOR ESTIMATION PURPOSE ONLY. THIS WILL BE ADJUSTED IN THE FIELD.

✳ SUMMARY OF DETOUR ITEMS FOR CONTRACTORS INFORMATION

ITEM NO. DESC. CODE	247-6061 ✳	401-6001 ✳	464-6018 ✳	496-6007 ✳
LOCATION	FL BS (CMP IN PLC)(TYA GR1-2) (6")	FLOWABLE BACKFILL	RC PIPE (CL IV)(24 IN)	REMOV STR (PIPE)
CSJ: 0922-33-185	SY	CY	LF	LF
	611	22	90	90
TOTAL	611	22	90	90

SUMMARY OF BRIDGE QUANTITIES

ITEM NO. DESC. CODE	496-6009	432-6031	462-6014	466-6179	466-6180
LOCATION	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	RIPRAP (STONE PROTECTION)(12 IN)	CONC BOX CULV (7 FT X 3 FT)	WINGWALL (PW - 1) (HW=4 FT)	WINGWALL (PW - 1) (HW=5 FT)
CSJ: 0922-33-185					
NBI: 22-240-0-AA03-52-103	EA	CY	LF	EA	EA
STATION 13+21.25 TO 13+67.19	1	118	158	1	1
TOTAL	1	118	158	1	1

EROSION CONTROL SUMMARY

ITEM NO. DESC. CODE	506-6011	506-6001	506-6020	506-6024	506-6030	506-6038	506-6039	164-6036	164-6042	164-6044
LOCATION	ROCK FILTER DAMS (REMOVE)	ROCK FILTER DAMS (INSTALL) (TY 1)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	DRILL SEEDING (PERM) (RURAL) (CLAY)	DRILL SEEDING (TEMP) (WARM)	DRILL SEEDING (TEMP) (COOL)
CSJ: 0922-33-185	LF	LF	SY	SY	HR	LF	LF	AC	AC	AC
CULVERT 1	172	172	111	111				0.60	0.60	0.60
DETOUR PHASE I					2	76	76			
TOTAL	172	172	111	111	2	76	76	0.60	0.60	0.60

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT
SANTA ISABEL CK BRANCH (SOUTH)

SUMMARY OF QUANTITIES

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		9

DATE: 5/3/2024 3:10:53 PM
FILE: ...\Unnamed Plan - Quantities_LasTiendasSouth.dgn

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

SUMMARY OF ROADWAY QUANTITIES

ITEM NO. DESC. CODE	100-6002	110-6001	110-6002	132-6002	216-6001 ■	247-6041	330-6002 ▲	432-6045	540-6001	540-6007	540-6016	544-6001	310-6009 ▲
LOCATION	PREPARING ROW	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	PROOF ROLLING	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	LRA PAV TY-I GR-A	RIPRAP (MOW STRIP)(4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (TL2)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	PRIME COAT (MC-30)
CSJ: 0922-33-196	STA	CY	CY	CY	HR	CY	TON	CY	LF	EA	EA	EA	GAL
STATION 11+78.14 TO 14+69.07	3	172	992	45	2	259	103	13	150	4	2	2	186
TOTAL	3	172	992	45	2	259	103	13	150	4	2	2	186

BASIS OF ESTIMATE FOR CONTRACTORS INFORMATION

ITEM	DESCRIPTION	RATE	AMOUNT	UNIT	QUANTITY	PAY UNIT
330-6002	OVERLAY: 2" LRA PAV TY-A GR-A	110 LB/SY/IN	932	SY	103	TON
310-6009	PRIME COAT: MC-30	0.2 GAL/SY	932	SY	186	GAL

✳ SUMMARY OF DETOUR ITEMS FOR CONTRACTORS INFORMATION

ITEM NO. DESC. CODE	247-6061 ✳	401-6001 ✳	464-6018 ✳	496-6007 ✳
LOCATION	FL BS (CMP IN PLC)(TYA GR1-2)(6")	FLOWABLE BACKFILL	RC PIPE (CL IV)(24 IN)	REMOV STR (PIPE)
CSJ: 0922-33-196	SY	CY	LF	LF
	617	24	90	90
TOTAL	617	24	90	90

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

ITEM NO. DESC. CODE	508-6001	512-6009	512-6010	512-6033	512-6034	512-6057	512-6058	110-6001 ✳	132-6002 ✳	6001-6002
LOCATION	CONSTRUCTING DETOURS	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)	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	PORTABLE CHANGEABLE MESSAGE SIGN
	SY	LF	LF	LF	LF	LF	LF	CY	CY	EA
CSJ: 0922-33-196	623	600	80	260	40	600	80	66	149	2
TOTAL	623	600	80	260	40	600	80	66	149	2

SIGNING & DEL SUMMARY

ITEM NO. DESC. CODE	644-6076	658-6060	658-6014	658-6016
LOCATION	REMOVE SM RD SN SUP&AM	REMOVE DELIN & OBJECT MARKER ASSMS	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)
	EA	EA	EA	EA
CSJ: 0922-33-196	3	10	4	8
TOTAL	3	10	4	8

SUMMARY OF BRIDGE QUANTITIES

ITEM NO. DESC. CODE	400-6005	416-6002	420-6013	422-6007	422-6015	425-6012	432-6031	450-6006	454-6004	496-6009
LOCATION	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION)(12 IN)	RAIL (TY T223)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
CSJ: 0922-33-196										
NBI 222400AA0352105	CY	LF	CY	SF	CY	LF	CY	LF	LF	EA
Las Tiendas Rd at Santa Isabel Branch North STATION 12+63.00 TO 13+13.00	27	120	20.6	1504	45	297	120	124	57	1
TOTAL	27	120	20.6	1504	45	297	120	124	57	1

NOTES:

✳ ITEM SHOWN ON THIS TABLE ARE PART OF THE DETOUR AND WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 508 "CONSTRUCTING DETOURS"

▲ THE ASPHALT AND AGGREGATE RATES ARE FOR ESTIMATION PURPOSES ONLY. THESE RATES WILL BE ADJUSTED AS NEEDED IN THE FIELD.

■ THE PROOF ROLLING IS FOR ESTIMATION PURPOSE ONLY. THIS WILL BE ADJUSTED IN THE FIELD.

EROSION CONTROL SUMMARY

ITEM NO. DESC. CODE	506-6001	506-6011	506-6020	506-6024	506-6030	506-6038	506-6039	164-6036	164-6042	164-6044
LOCATION	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	DRILL SEEDING (PERM) (RURAL) (CLAY)	DRILL SEEDING (TEMP) (WARM)	DRILL SEEDING (TEMP) (COOL)
CSJ: 0922-33-196	LF	LF	SY	SY	HR	LF	LF	AC	AC	AC
BRIDGE #1	184	184	111	111				0.55	0.55	0.55
DETOUR PHASE II					2	96	96			
TOTAL	184	184	111	111	2	96	96	0.55	0.55	0.55

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT
SANTA ISABEL CK BRANCH (NORTH)

SUMMARY OF QUANTITIES

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		10

DATE: 5/3/2024 3:11:29 PM
FILE: ...\Unnamed Plan-1 - Quantities_LasTiendasNorth.dgn

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

SUMMARY OF ROADWAY QUANTITIES

ITEM NO. DESC. CODE	100-6002	110-6001	132-6002	216-6001 ■	247-6041	330-6002 ▲	432-6045	450-6018	540-6001	540-6016	544-6001	310-6009 ▲
LOCATION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	PROOF ROLLING	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	LRA PAV TY-I GR-A	RIPRAP (MOW STRIP)(4 IN)	RAIL (TY T631)	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	PRIME COAT (MC-30)
CSJ: 0922-33-187	STA	CY	CY	HR	CY	TON	CY	LF	LF	EA	EA	GAL
STATION 13+21.04 TO 16+46.62	3	189	231	2	275	109	11	98	150	2	2	198
TOTAL	3	189	231	2	275	109	11	98	150	2	2	198

BASIS OF ESTIMATE FOR CONTRACTORS INFORMATION

ITEM	DESCRIPTION	RATE	AMOUNT	UNIT	QUANTITY	PAY UNIT
330-6002	OVERLAY: 2" LRA PAV TY-A GR-A	110 LB/SY/IN	988	SY	109	TON
310-6009	PRIME COAT: MC-30	0.2 GAL/SY	988	SY	198	GAL

NOTES:

▲ THE ASPHALT AND AGGREGATE RATES ARE FOR ESTIMATION PURPOSES ONLY. THESE RATES WILL BE ADJUSTED AS NEEDED IN THE FIELD.

■ THE PROOF ROLLING IS FOR ESTIMATION PURPOSE ONLY. THIS WILL BE ADJUSTED IN THE FIELD.

SUMMARY OF BRIDGE QUANTITIES

ITEM NO. DESC. CODE	496-6009	432-6031	462-6014	466-6180
Location	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	RIPRAP (STONE PROTECTION) (12 IN)	CONC BOX CULV (7 FT X 3 FT)	WINGWALL (PW - 1) (HW=5 FT)
CSJ: 0922-33-187				
NBI: 22-240-0-AA10-25-101	EA	CY	LF	EA
STATION 14+72.25 TO 14+99.06	1	66	93	2
TOTAL	1	66	93	2

SIGNING & DEL SUMMARY

ITEM NO. DESC. CODE	644-6076	658-6060	658-6016
LOCATION	REMOVE SM RD SN SUP&AM	REMOVE DELIN & OBJECT MARKER ASSMS	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)
	EA	EA	EA
CSJ: 0922-33-187	2	6	12
TOTAL	2	6	12

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

ITEM NO. DESC. CODE	432-6022	512-6009	512-6010	512-6057	512-6058	6001-6002
LOCATION	RIPRAP (STONE COMMON)(DRY) (6 IN)	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	PORT CTB (REMOVE)(LOW PROF)(TY 1)	PORT CTB (REMOVE)(LOW PROF)(TY 2)	PORTABLE CHANGEABLE MESSAGE SIGN
	CY	LF	LF	LF	LF	EA
CSJ: 0922-33-187	17	300	40	300	40	2
TOTAL	17	300	40	300	40	2

EROSION CONTROL SUMMARY

ITEM NO. DESC. CODE	506-6001	506-6011	506-6020	506-6024	506-6030	506-6038	506-6039	164-6036	164-6042	164-6044
LOCATION	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	DRILL SEEDING (PERM) (RURAL) (CLAY)	DRILL SEEDING (TEMP) (WARM)	DRILL SEEDING (TEMP) (COOL)
CSJ: 0922-33-187	LF	LF	SY	SY	HR	LF	LF	AC	AC	AC
CULVERT 2	134	134	111	111	2	100	100	0.28	0.28	0.28
TOTAL	134	134	111	111	2	100	100	0.28	0.28	0.28

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD AT JABONCILLO CK BRANCH

SUMMARY OF QUANTITIES

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		11

DATE: 5/3/2024 3:11:56 PM
FILE: ...\Unnamed Plan-2 - Quantities KreugerRd.dgn

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

SUMMARY OF ROADWAY QUANTITIES

ITEM NO. DESC. CODE	100-6002	110-6001	132-6002	216-6001	247-6041	330-6002	432-6045	450-6018	540-6001	540-6016	544-6001	310-6009
LOCATION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	■ PROOF ROLLING	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	▲ LRA PAV TY-I GR-A	RIPRAP (MOW STRIP)(4 IN)	RAIL (TY T631)	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	▲ PRIME COAT (MC-30)
CSJ: 0922-33-197	STA	CY	CY	HR	CY	TON	CY	LF	LF	EA	EA	GAL
STATION 11+25.83 TO 14+37.99	3	193	83	2	257	102	8	168	150	2	2	185
TOTAL	3	193	83	2	257	102	8	168	150	2	2	185

BASIS OF ESTIMATE FOR CONTRACTORS INFORMATION

ITEM	DESCRIPTION	RATE	AMOUNT	UNIT	QUANTITY	PAY UNIT
330-6002	OVERLAY: 2" LRA PAV TY-A GR-A	110 LB/SY/IN	923	SY	102	TON
310-6009	PRIME COAT: MC-30	0.2 GAL/SY	923	SY	185	GAL

SUMMARY OF BRIDGE QUANTITIES

ITEM NO. DESC. CODE	496-6009	432-6031	462-6006	466-6179
Location	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	RIPRAP (STONE PROTECTION) (12 IN)	CONC BOX CULV (5 FT X 2 FT)	WINGWALL (PW - 1) (HW=4 FT)
CSJ: 0922-33-197				
NBI: 22-240-0-AA10-05-101	EA	CY	LF	EA
STATION 12+27.50 TO 12+95.87	1	112	310	2
TOTAL	1	112	310	2

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

ITEM NO. DESC. CODE	508-6001	512-6009	512-6010	512-6033	512-6034	512-6057	512-6058	110-6001	132-6002	6001-6002
LOCATION	CONSTRUCTING DETOURS	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)	✳ EXCAVATION (ROADWAY)	✳ EMBANKMENT (FINAL)(DENS CONT)(TY A)	PORTABLE CHANGEABLE MESSAGE SIGN
	SY	LF	LF	LF	LF	LF	LF	CY	CY	EA
CSJ: 0922-33-197	436	640	80	280	40	640	80	72	211	2
TOTAL	436	640	80	280	40	640	80	72	211	2

NOTES:

✳ ITEM SHOWN ON THIS TABLE ARE PART OF THE DETOUR AND WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 508 "CONSTRUCTING DETOURS"

▲ THE ASPHALT AND AGGREGATE RATES ARE FOR ESTIMATION PURPOSES ONLY. THESE RATES WILL BE ADJUSTED AS NEEDED IN THE FIELD.

■ THE PROOF ROLLING IS FOR ESTIMATION PURPOSE ONLY. THIS WILL BE ADJUSTED IN THE FIELD.

SIGNING & DEL SUMMARY

ITEM NO. DESC. CODE	644-6076	658-6060	658-6016
LOCATION	REMOVE SM RD SN SUP&AM	REMOVE DELIN & OBJECT MARKER ASSMS	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)
	EA	EA	EA
CSJ: 0922-33-197	4	8	12
TOTAL	4	8	12

✳ SUMMARY OF DETOUR ITEMS FOR CONTRACTORS INFORMATION

ITEM NO. DESC. CODE	247-6061	401-6001	464-6018	496-6007
LOCATION	✳ FL BS (CMP IN PLC)(TYA GR1-2)(6")	✳ FLOWABLE BACKFILL	✳ RC PIPE (CL IV)(24 IN)	✳ REMOV STR (PIPE)
CSJ: 0922-33-197	SY	CY	LF	LF
	640	30	90	90
TOTAL	640	30	90	90

EROSION CONTROL SUMMARY

ITEM NO. DESC. CODE	506-6011	506-6001	506-6020	506-6024	506-6030	506-6038	506-6039	164-6036	164-6042	164-6044
LOCATION	ROCK FILTER DAMS (REMOVE)	ROCK FILTER DAMS (INSTALL) (TY 1)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	DRILL SEEDING (PERM) (RURAL) (CLAY)	DRILL SEEDING (TEMP) (WARM)	DRILL SEEDING (TEMP) (COOL)
CSJ: 0922-33-197	LF	LF	SY	SY	HR	LF	LF	AC	AC	AC
CULVERT 3	218	218	111	111				0.28	0.28	0.28
DETOUR PHASE II					2	66	66			
TOTAL	218	218	111	111	2	66	66	0.28	0.28	0.28

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

SUMMARY OF QUANTITIES

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		12

DATE: 5/3/2024 3:12:23 PM
FILE: ...\Unnamed Plan-3 - Quantities VaquillasRd.dgn

100% SUBMITTAL

DN: CF CK: AW DW: MG CK: RW

TRAFFIC CONTROL PLAN GENERAL NOTES

1. This is a suggested Traffic Control Plan (TCP). The Contractor may submit an alternate Traffic Control Plan, signed and sealed by a license Professional Engineer in Texas, for approval by the Engineer. When mutually beneficial changes are proposed to the existing Traffic Control Plan and are agreed upon by the Contractor and the Department, the plan sheets may be developed and signed and sealed by the Engineer.
2. Refer to Item 8 "Prosecution and Progress" and project general notes for additional information regarding the Traffic Control Plan.
3. Furnish and install all Traffic Control Plan devices, including but not limited to barricades, signs, and work zone markings, in compliance with the latest version of the Texas Manual on Uniform Traffic Control Devices (TxMUTCD), the State Standard Traffic Control Plans (TCP) sheets, and the Barricades and Construction (BC) sheets.
4. Verify the location and spacing of signs, barricades, and channelizing devices prior to their placement along vertical curves, horizontal curves, and other geometric constraints to assure visibility to all motorists.
5. Place the traffic control devices only while work is actually in progress or a definite need exists. Always have enough barricades, channelizing devices, and signs at all times to replace those damaged.
6. Cover all existing signs that conflict with the Traffic Control Plan and uncover during non-working hours or as directed by the Engineer. Partial coverage of the sign or coverage by material that will not cover the entire sign is not permitted.
7. Vary the spacing of signs to meet traffic conditions or as directed by the engineer and assure that all traffic control devices and work zone pavement markings are kept in a highly visible condition (clean, upright and at proper location).
8. Maintain the roadway surface within the project while the traffic control plan is in effect.
9. Conduct construction operations so as to provide the least possible interference to traffic and to permit and the continuous movement of traffic in all allowable directions at all times or as permitted by the sequence of construction. Provide for safe and convenient access to abutting property, highways, public roads, and street crossings except as otherwise shown on the sequence of construction. The contractor will at all times maintain a two-way traffic or a minimum of one lane using a pilot vehicle and flaggers.
10. Place all stockpiled material, waste material, signs, barricades, channelizing devices, and work vehicles not in use, a minimum of 30 feet from the outer edge of the nearest travel lane.
11. In all phases of construction, maintain positive drainage. Keep excavated and stockpiled material in a location that does not block drainage.
12. Regulate all construction traffic to minimal inconvenience to the traveling public. At the times when it is necessary for trucks to stop, unload or cross roadways under traffic, provide warning signs and flaggers as needed to adequately protect the traveling public.
13. During non-working hours, all drop-offs are to be filled to a 3:1 maximum slope unless otherwise noted.
14. Notify the Engineer in writing two weeks prior to shifting of traffic within each phase of the Traffic Control Plan.
15. During the holiday time frame of December 21st through January 1st, every effort should be taken to ensure that all travel lanes remain open where possible.
16. Remove all loose materials and debris at the end of each workday.

Implement all required erosion control measures as shown in the plans during the various stages of construction.

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

TRAFFIC CONTROL PLAN
GENERAL NOTES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		13

DATE: 3/28/2024 3:21:43 PM
FILE: ...\2. TCP\TCP SOC & GENERALNOTES

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

SEQUENCE OF CONSTRUCTION

LAS TIENDAS RD (SOUTH), KREUGER RD, VAQUILLAS RD

GENERAL INSTRUCTIONS

THE FOLLOWING WORK WILL BE PERFOMED ON THE ROADWAY. PLEASE REFER TO THE TCP PHASES, TCP GENERAL NOTES, AND CORRESPONDING PLAN SHEETS FOR MORE DETAILED INFORMATION.

INSTALL ALL APPLICABLE BARRICADES, SIGNS, WORK ZONE MARKINGS IN ACCORDANCE WITH TCP, BC, AND WZ TxDOT STANDARD SHEETS FOR TRAFFIC CONTROL SETUP.

ONCE WORK HAS BEGUN, THE ENTIRE SEQUENCE MUST BE WORKED ON CONTINUOUSLY TO COMPLETION.

GENERAL SEQUENCE OF WORK

A) CONSTRUCT DETOURS AND SHIFT TRAFFIC TO DETOUR
B) REMOVE EXISTING BRIDGE
C) INSTALL HALF BOX CULVERTS AND APPROACHES.
D) SHIFT TRAFFIC TO CONSTRUCTED HALF
E) REMOVE DETOUR
F) INSTALL SECOND HALF OF CULVERT AND APPROACH
G) INSTALL BRIDGE RAIL AND MBGF

PHASE I

STAGE 1

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN IN PLANS TO CONSTRUCT DETOUR. REFER TO TXDOT STANDARD TCP SHEET TCP (2-8A) FOR SETUP OF ONE LANE TWO WAY TRAFFIC CONTROL.
2. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN IN PLANS TO DETOUR TRAFFIC DURING BRIDGE REPLACEMENT. REFER TO TXDOT STANDARD TCP SHEET TCP (2-8A) FOR SETUP OF ONE LANE TWO WAY TRAFFIC CONTROL.

STAGE 2

1. CONSTRUCT DETOUR

STAGE 3

1. REMOVE EXISTING BRIDGE STRUCTURE

STAGE 4

1. CONSTRUCT APPROACHES

STAGE 5

1. INSTALL ½ OF BOX CULVERTS' LENGTH

STAGE 6

1. INSTALL BRIDGE RAIL AND MBGF ON FINISHED HALF OF CULVERT

STAGE 7

1. PLACE CTBS

PHASE II

STAGE 1

REMOVE DETOUR

STAGE 2

CONSTRUCT REMAINING APPROACHES

STAGE 3

INSTALL REMAINING LENGTH OF BOX CULVERTS

STAGE 4

INSTALL SIGNS, BRIDGE RAIL, AND MBGF

STAGE 5

PERFORM CLEAN UP AND OPEN BRIDGE FOR TRAFFIC BEFORE PROCEEDING TO NEXT STRUCTURE

PHASE III

PERFORM FINAL CLEAN UP AND REMOVE ALL BARRICADES AS DIRECTED BY THE ENGINEER

LAS TIENDAS RD NORTH

GENERAL INSTRUCTIONS

THE FOLLOWING WORK WILL BE PERFOMED ON THE ROADWAY. PLEASE REFER TO THE TCP PHASES, TCP GENERAL NOTES, AND CORRESPONDING PLAN SHEETS FOR MORE DETAILED INFORMATION.

INSTALL ALL APPLICABLE BARRICADES, SIGNS, WORK ZONE MARKINGS IN ACCORDANCE WITH TCP, BC, AND WZ TxDOT STANDARD SHEETS FOR TRAFFIC CONTROL SETUP.

ONCE WORK HAS BEGUN, THE ENTIRE SEQUENCE MUST BE WORKED ON CONTINUOUSLY TO COMPLETION.

GENERAL SEQUENCE OF WORK

A. CONSTRUCT DETOUR
B. SHIFT TRAFFIC TO DETOUR
C. CONSTRUCT BRIDGE AND APPROACH
D. INSTALL BRIDGE RAIL AND MBGF
E. SHIFT TRAFFIC TO BRIDGE
F. REMOVE DETOUR

PHASE I

STAGE 1

1. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN IN PLANS TO CONSTRUCT DETOUR. REFER TO TXDOT STANDARD TCP SHEET TCP (2-8A) FOR SETUP OF ONE LANE TWO WAY TRAFFIC CONTROL.
2. INSTALL TRAFFIC CONTROL DEVICES AS SHOWN IN PLANS TO DETOUR TRAFFIC DURING BRIDGE REPLACEMENT. REFER TO TXDOT STANDARD TCP SHEET TCP (2-8A) FOR SETUP OF ONE LANE TWO WAY TRAFFIC CONTROL.

STAGE 2

CONSTRUCT DETOUR

STAGE 3

REMOVE EXISTING BRIDGE STRUCTURES

PHASE II

STAGE 1

CONSTRUCT REMAINING APPROACHES

STAGE 2

CONSTRUCT BRIDGE

STAGE 3

INSTALL SIGNS, BRIDGE RAIL, AND MBGF

STAGE 4

PERFORM CLEAN UP AND OPEN BRIDGE FOR TRAFFIC BEFORE PROCEEDING TO NEXT STRUCTURE

PHASE III

PERFORM FINAL CLEAN UP AND REMOVE ALL BARRICADES AS DIRECTED BY THE ENGINEER

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

Christopher Fournier

3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

SEQUENCE OF CONSTRUCTION NARRATIVE

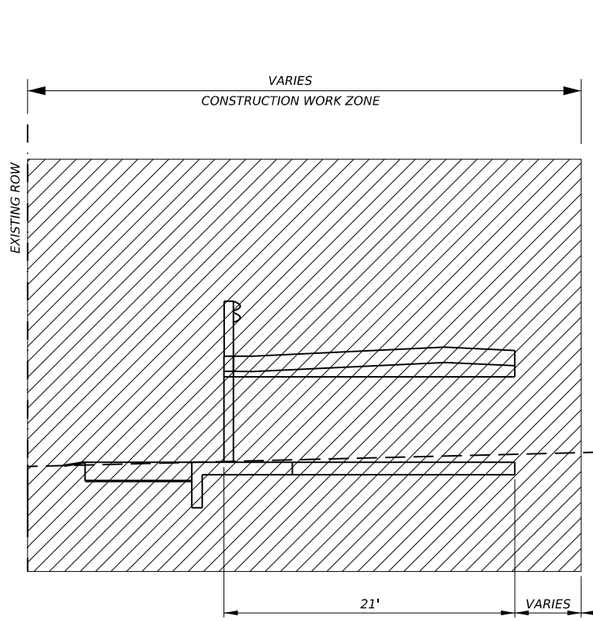
SHEET 1 OF 1

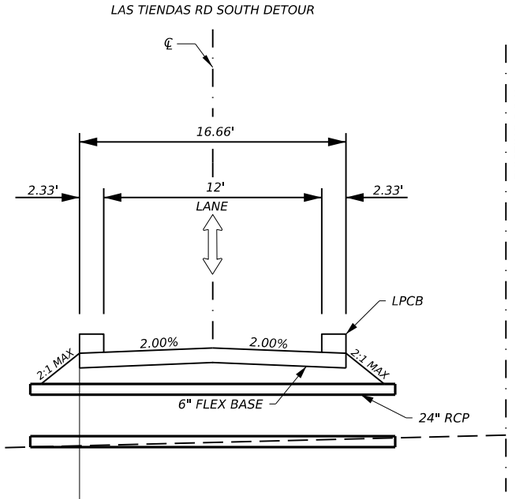
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		14

DATE: 3/28/2024 3:21:44 PM
FILE: ...12. TCP\TCP SOC & GENERALNOTES

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW





LAS TIENDAS RD SOUTH
TCP PHASE 1 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD (SOUTH)

TCP PHASE I
TYPICAL SECTIONS

SCALE: N.T.S.

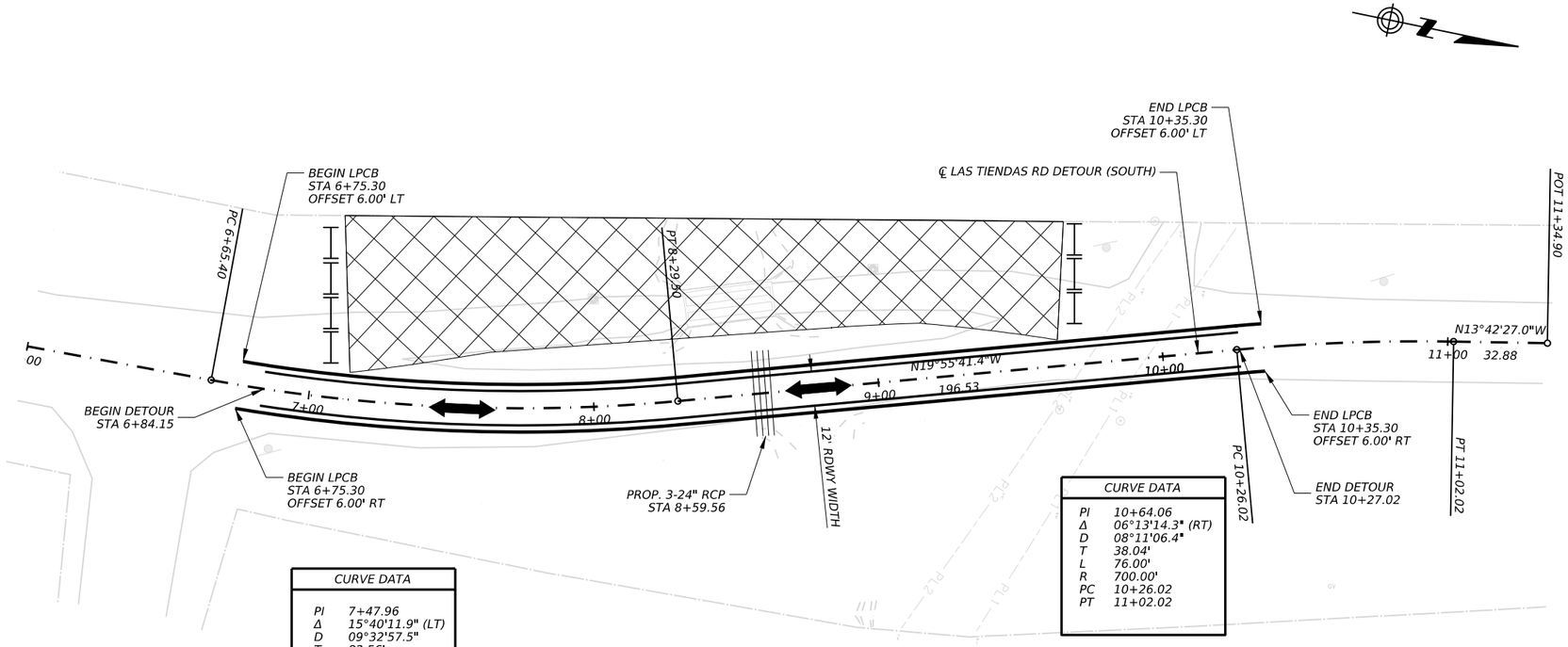
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		15

DATE: 3/28/2024 3:21:49 PM
FILE: ...\2_TCP\TCP P1_LTSouth_TYP.dgn

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW



CURVE DATA	
PI	7+47.96
Δ	15°40'11.9" (LT)
D	09°32'57.5"
T	82.56'
L	164.10'
R	600.00'
PC	6+65.40
PT	8+29.50

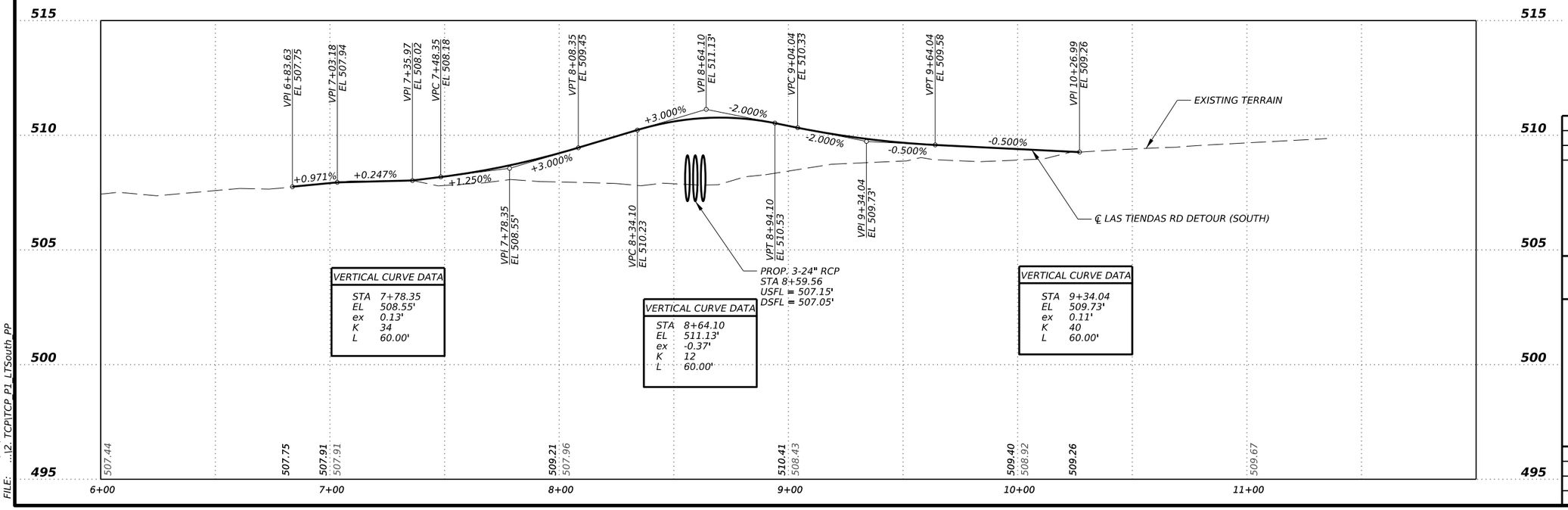
CURVE DATA	
PI	10+64.06
Δ	06°13'14.3" (RT)
D	08°11'06.4"
T	38.04'
L	76.00'
R	700.00'
PC	10+26.02
PT	11+02.02

LEGEND

- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE

NOTES:

1. REFER TO TCP PHASE I TYPICAL SECTIONS FOR MORE INFORMATION ON CROSS SECTIONS.



VERTICAL CURVE DATA	
STA	7+78.35
EL	508.55'
ex	0.13'
K	34
L	60.00'

VERTICAL CURVE DATA	
STA	8+64.10
EL	511.13'
ex	-0.37'
K	12
L	60.00'

VERTICAL CURVE DATA	
STA	9+34.04
EL	509.73'
ex	0.11'
K	40
L	60.00'

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD (SOUTH)

TCP PHASE I
PLAN AND PROFILE

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

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		16

DATE: 3/28/2024 3:21:55 PM
FILE: ...\2_TCP\TCP_P1_LTSouth_PP

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW

CURVE DATA	
PI	11+59.98
Δ	13°33'45.7" (LT)
D	08°11'06.4"
T	83.24'
L	165.70'
R	700.00'
PC	10+76.74
PT	12+42.44

CURVE DATA	
PI	14+49.94
Δ	11°31'35.7" (RT)
D	08°11'06.4"
T	70.65'
L	140.82'
R	700.00'
PC	13+79.29
PT	15+20.12

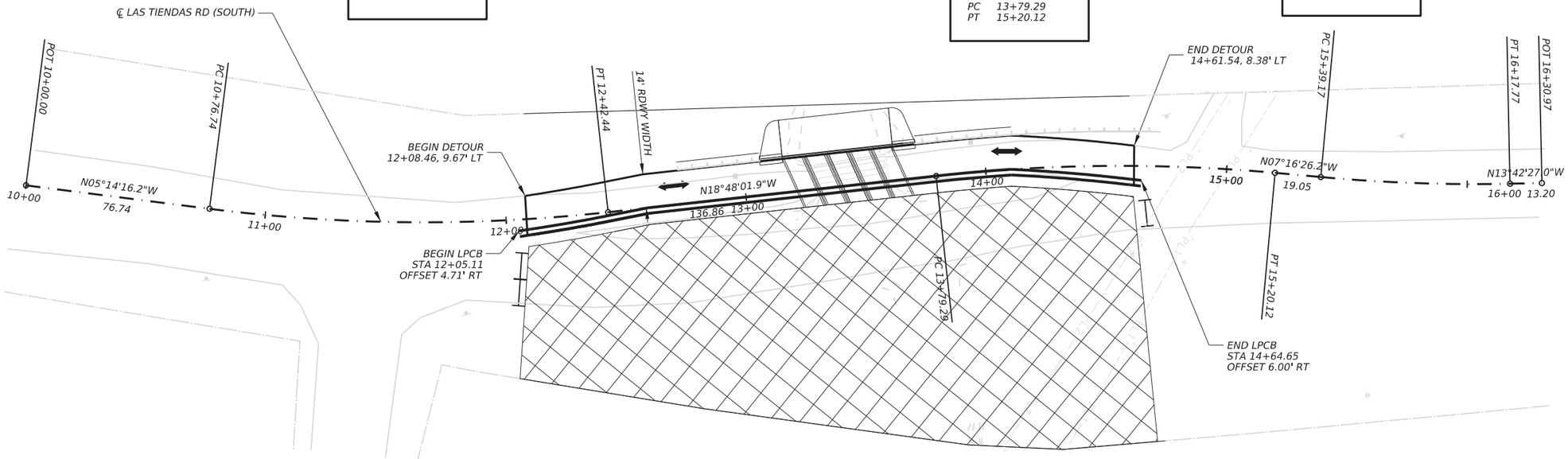
CURVE DATA	
PI	15+78.51
Δ	06°26'00.8" (LT)
D	08°11'06.4"
T	39.34'
L	78.60'
R	700.00'
PC	15+39.17
PT	16+17.77

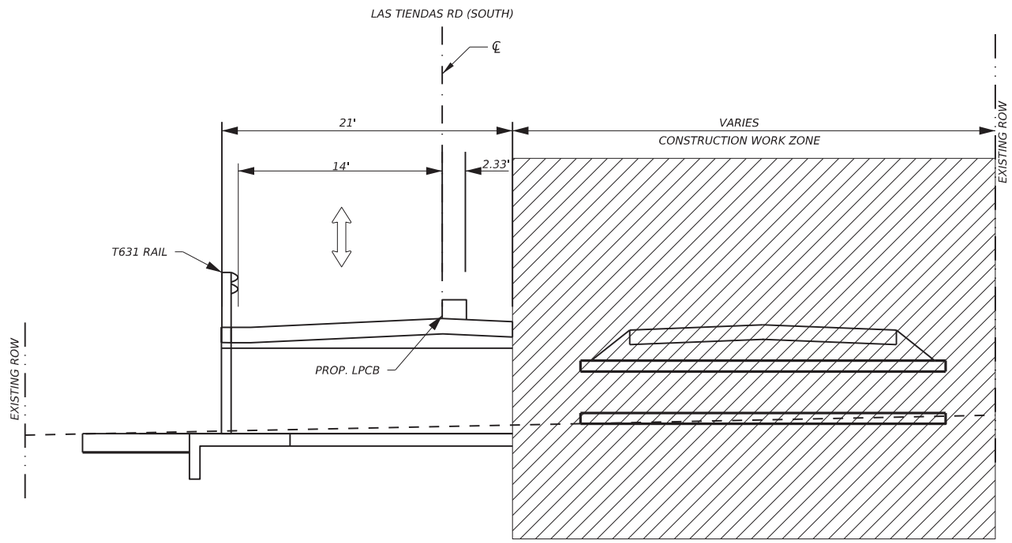
LEGEND

DIRECTION OF TRAVEL

WORK ZONE

TYPE III BARRICADE





LAS TIENDAS RD SOUTH
TCP PHASE 2 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/3/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD (SOUTH)

TCP PHASE II

SCALE: 1" = 50' H

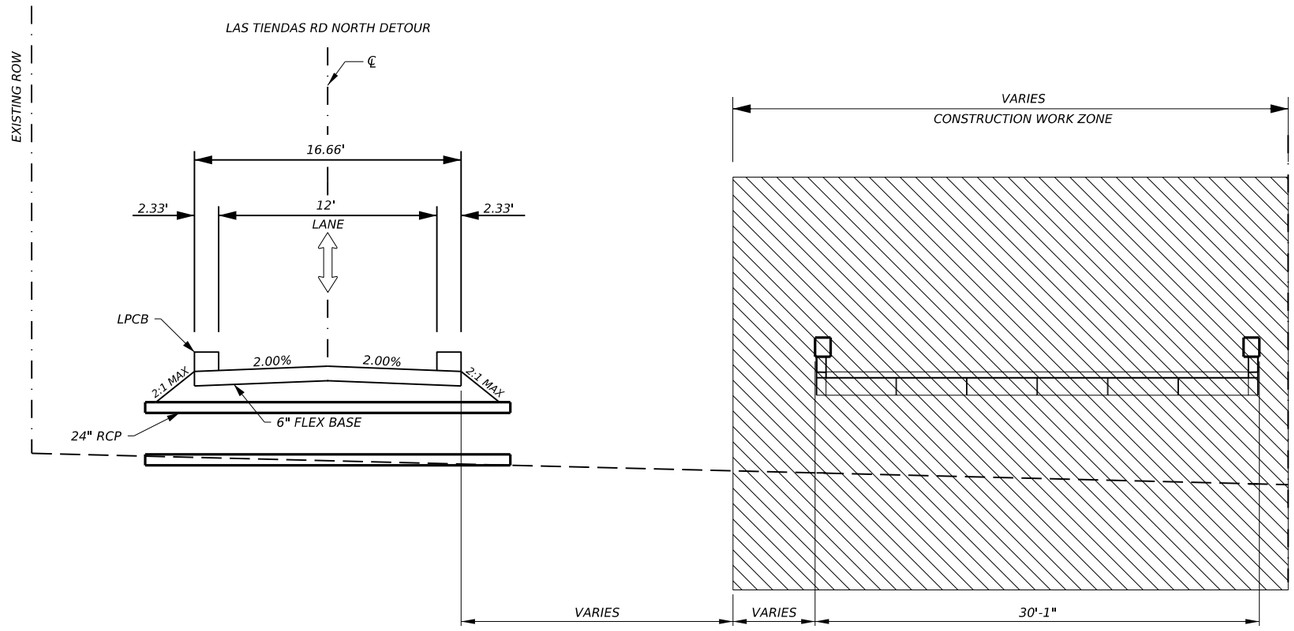
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		17

DATE: 5/3/2024 11:55:24 AM
FILE: ...12_TCP\TCP P2_LTSouth.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



LAS TIENDAS RD NORTH
TCP PHASE 1 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD (NORTH)

TCP PHASE I
TYPICAL SECTIONS

SCALE: N.T.S.

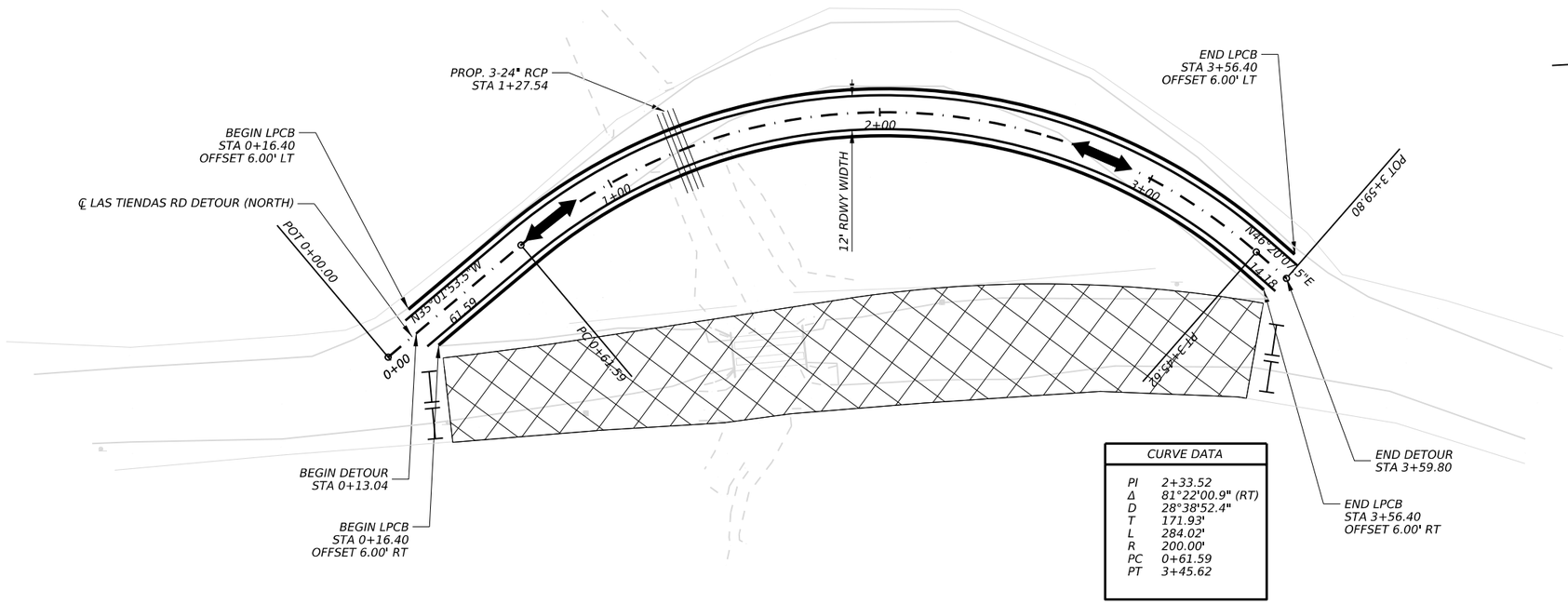
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		18

DATE: 3/28/2024 3:22:06 PM
FILE: ...\2. TCP\TCP P1 LTNorth TYP

100% SUBMITTAL

DN: CF: CK: RW: DW: MG: CK: RW:



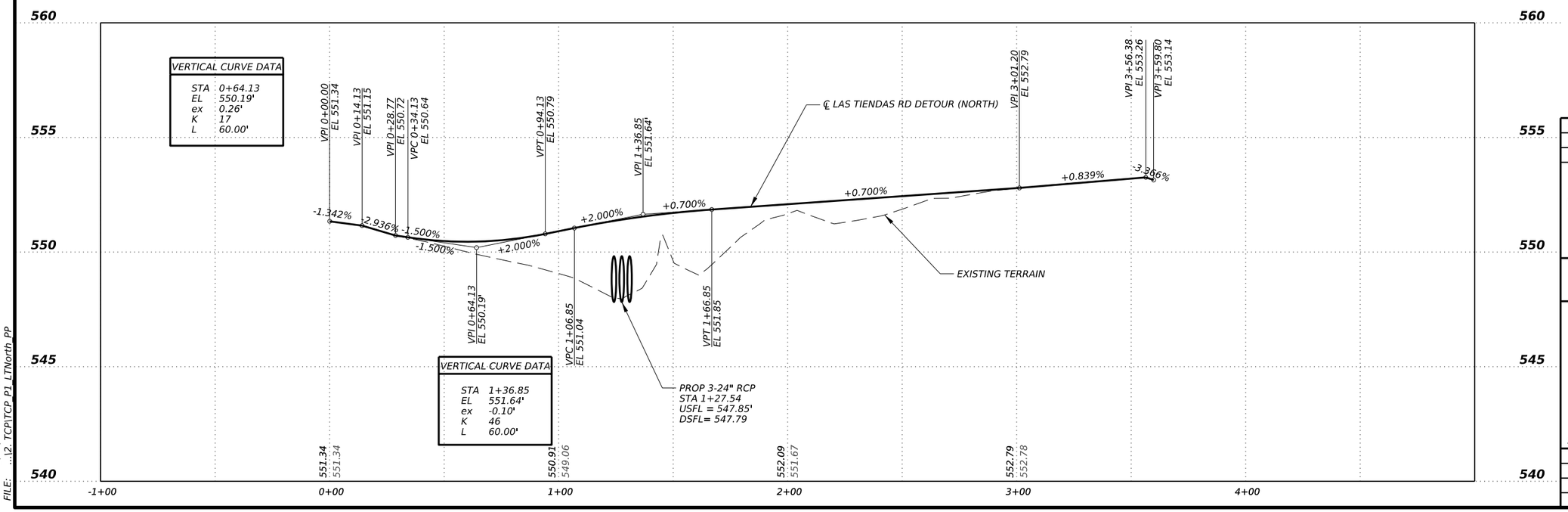
CURVE DATA	
PI	2+33.52
Δ	81°22'00.9" (RT)
D	28°38'52.4"
T	171.93'
L	284.02'
R	200.00'
PC	0+61.59
PT	3+45.62

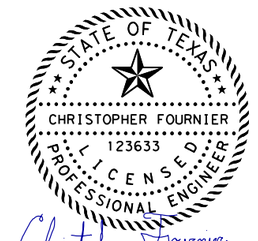
LEGEND

- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE

NOTES:

1. REFER TO TCP PHASE I TYPICAL SECTIONS FOR MORE INFORMATION ON CROSS SECTIONS.





REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD (NORTH)

TCP PHASE I
PLAN AND PROFILE

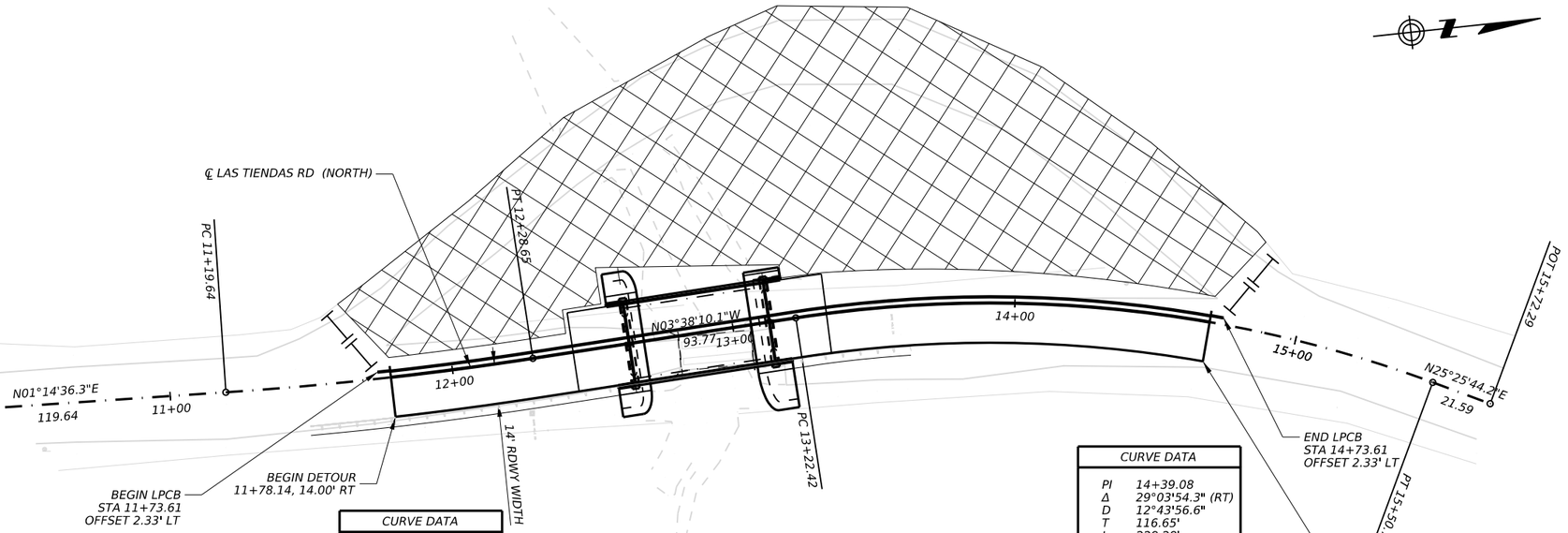
SCALE: 1" = 50' H, 1" = 5' V SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		19

DATE: 3/28/2024 3:22:12 PM
FILE: ...\2_TCP\TCP_P1_LTNorth_PP

100% SUBMITTAL

DW | CP | CK | RW | DW | MG | CK | RW

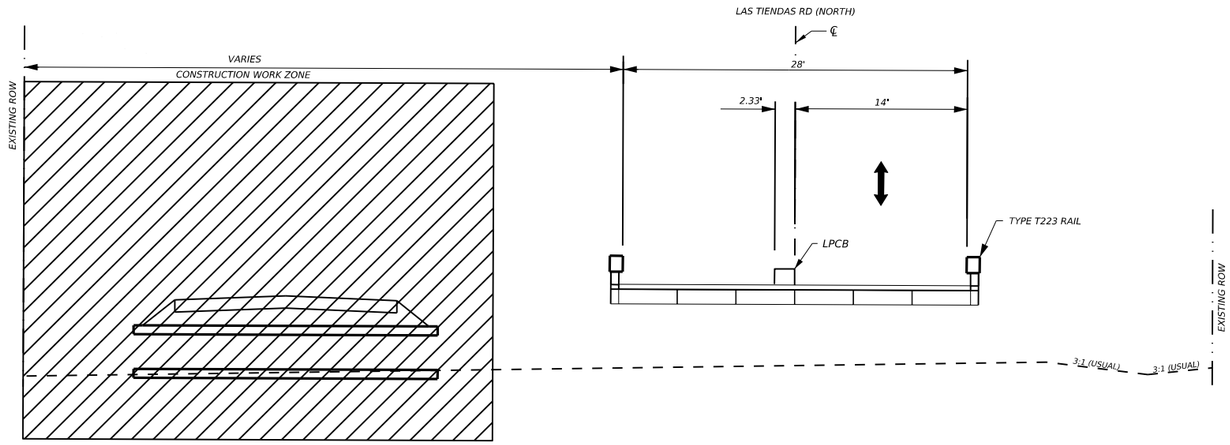


CURVE DATA	
PI	11+74.18
Δ	04°52'46.4" (LT)
D	04°28'34.4"
T	54.54'
L	109.01'
R	1280.00'
PC	11+19.64
PT	12+28.65

CURVE DATA	
PI	14+39.08
Δ	29°03'54.3" (RT)
D	12°43'56.6"
T	116.65'
L	228.28'
R	450.00'
PC	13+22.42
PT	15+50.70

LEGEND

- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE



LAS TIENDAS RD NORTH
TCP PHASE 2 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD (NORTH)

TCP PHASE II

SCALE: 1" = 50' H

SHEET 1 OF 1

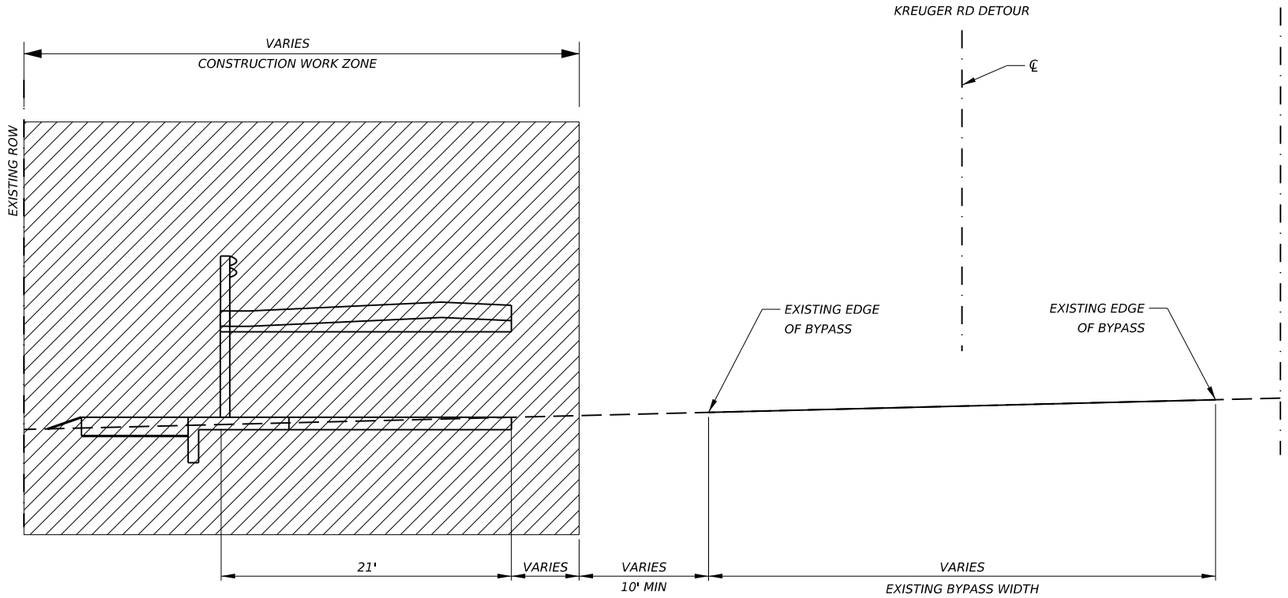
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		20

DATE: 3/28/2024 3:22:18 PM
FILE: ...\2. TCP\TCP P2_LTNorth.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW

NOTE:
CONTRACTOR TO MAINTAIN EXISTING LOW WATER BYPASS
FOR DETOUR PURPOSES



KREUGER RD
TCP PHASE 1 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD

TCP PHASE I
TYPICAL SECTIONS

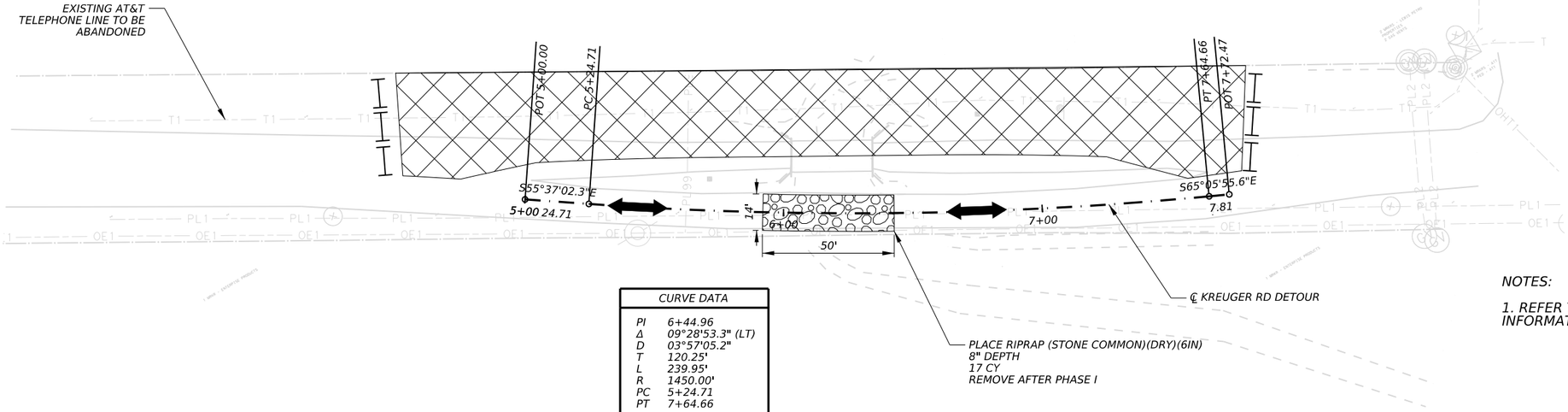
SCALE: N.T.S. SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		21

DATE: 3/28/2024 3:22:23 PM
FILE: ...\2. TCP\TCP_P1_Kreuger_TYP.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



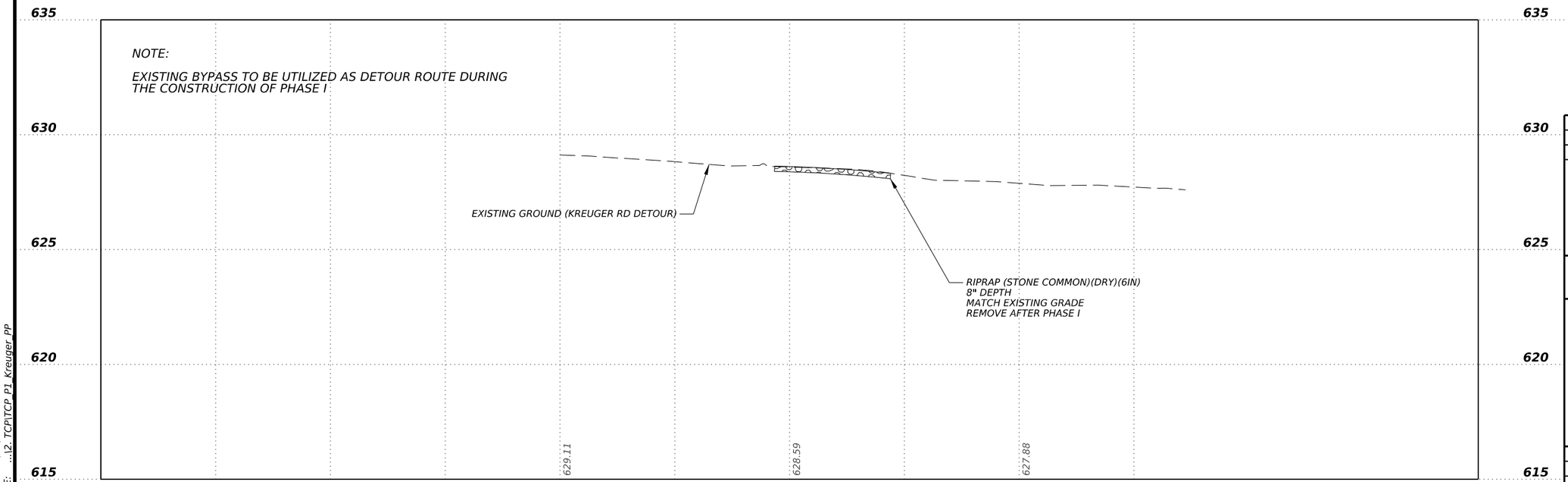
CURVE DATA	
PI	6+44.96
Δ	09°28'53.3" (LT)
D	03°57'05.2"
T	120.25'
L	239.95'
R	1450.00'
PC	5+24.71
PT	7+64.66

LEGEND

- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE

NOTES:

1. REFER TO TCP PHASE I TYPICAL SECTIONS FOR MORE INFORMATION ON CROSS SECTIONS.



STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD

TCP PHASE I
PLAN AND PROFILE

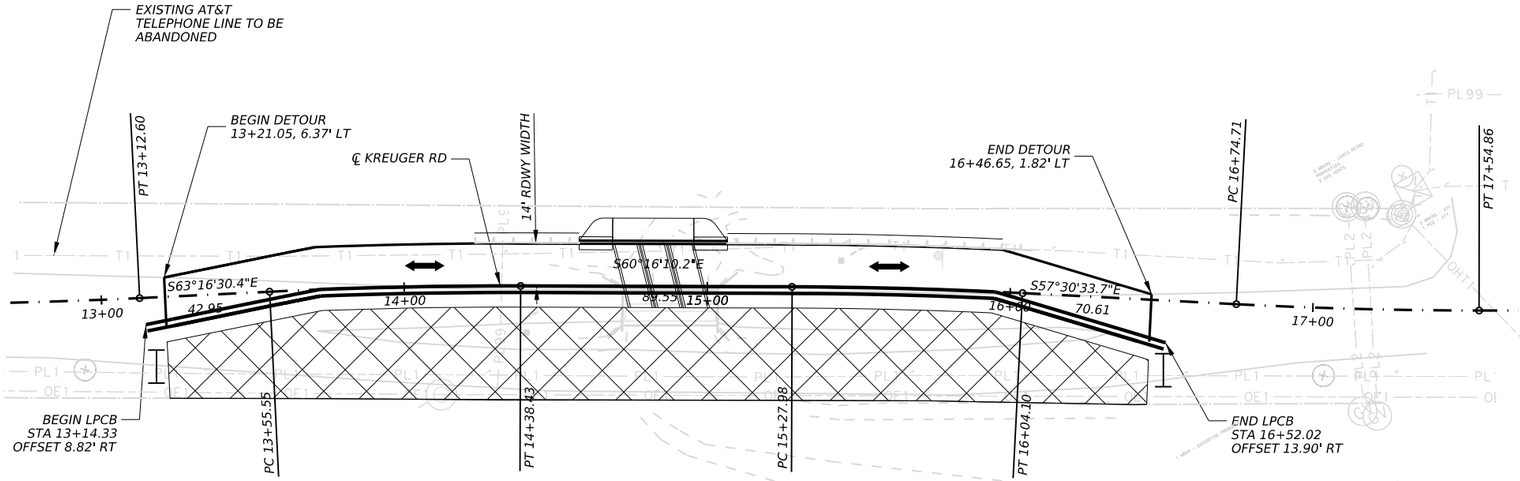
SCALE: 1" = 50' H, 1" = 5' V SHEET 1 OF 1

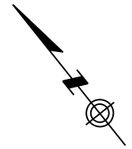
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		22

DATE: 3/28/2024 3:22:29 PM
FILE: ...\2_TCP\TCP_P1_Kreuger_PP

100% SUBMITTAL

DN:	CF	CK:	RW	CK:	RW	DW:	MG





LEGEND

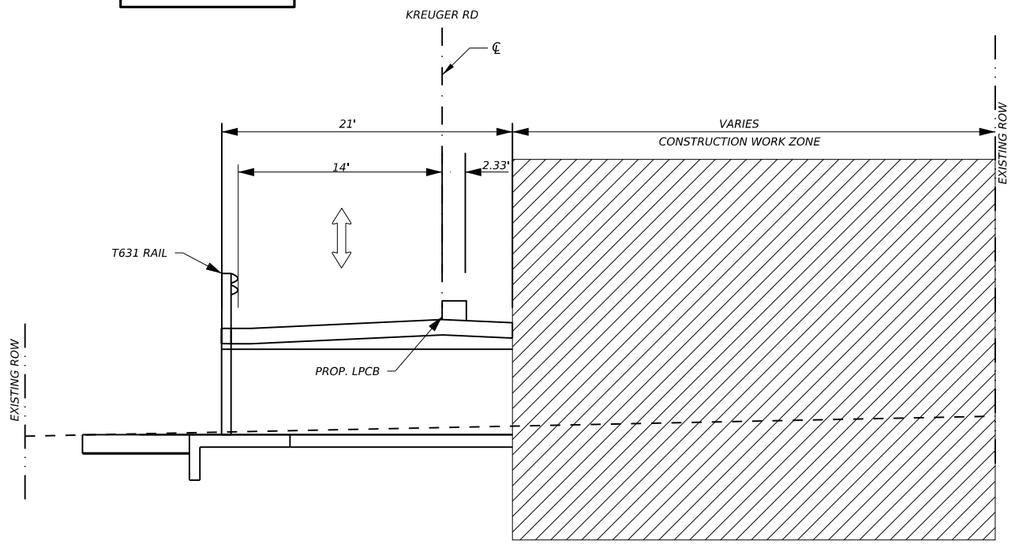
- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE

CURVE DATA	
PI	12+65.93
Δ	03°23'09.4" (LT)
D	03°37'34.7"
T	46.70'
L	93.37'
R	1580.00'
PC	12+19.23
PT	13+12.60

CURVE DATA	
PI	13+97.00
Δ	03°00'20.1" (RT)
D	03°37'34.7"
T	41.45'
L	82.88'
R	1580.00'
PC	13+55.55
PT	14+38.43

CURVE DATA	
PI	15+66.05
Δ	02°45'36.5" (RT)
D	03°37'34.7"
T	38.06'
L	76.11'
R	1580.00'
PC	15+27.98
PT	16+04.10

CURVE DATA	
PI	17+14.80
Δ	02°54'23.7" (LT)
D	03°37'34.7"
T	40.08'
L	80.15'
R	1580.00'
PC	16+74.71
PT	17+54.86



KREUGER RD
TCP PHASE 2 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD

TCP PHASE II

SCALE: 1" = 50' H

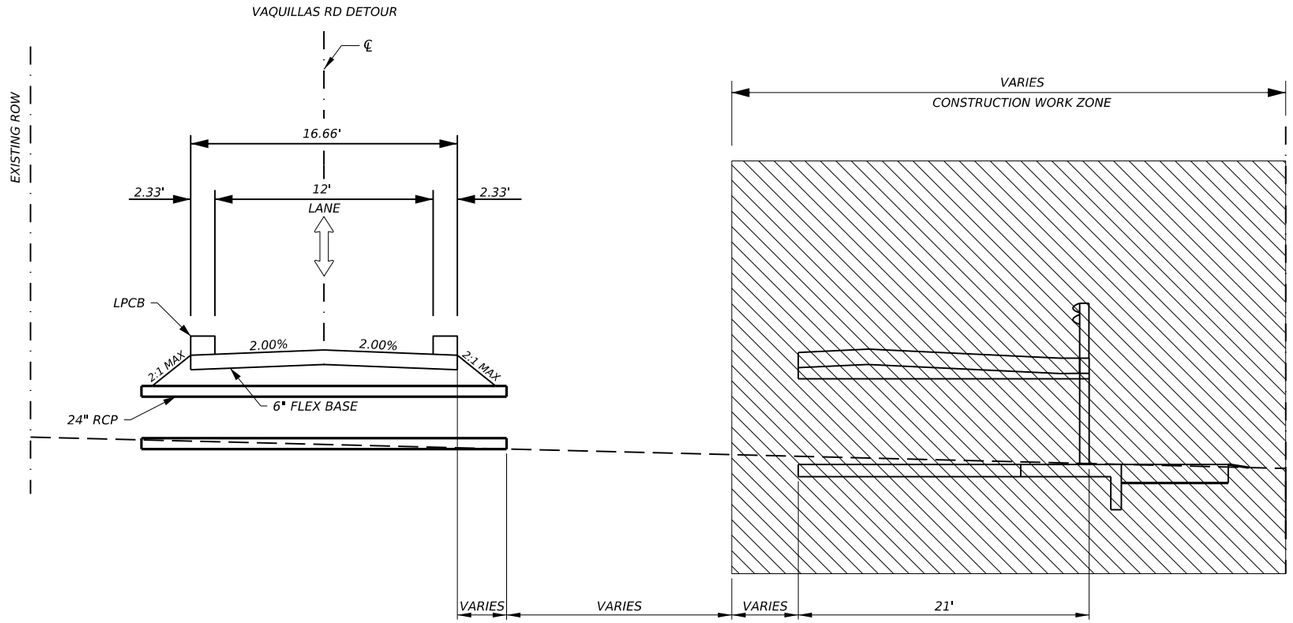
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		23

DATE: 3/28/2024 3:22:35 PM
FILE: ...\2_TCP\TCP P2 Kreuger.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



VAQUILLAS RD
TCP PHASE 1 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS RD

TCP PHASE I
TYPICAL SECTIONS

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

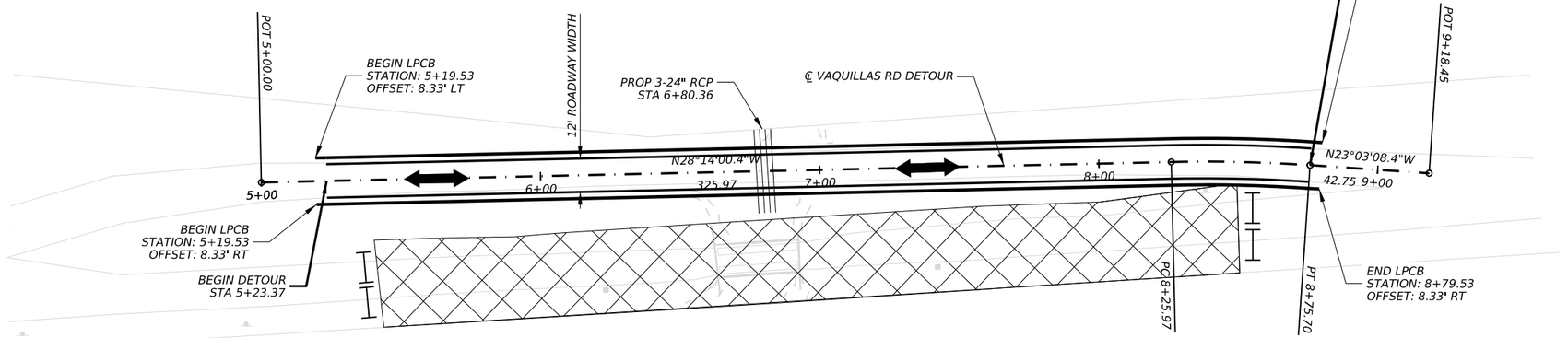
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		24

DATE: 3/28/2024 3:22:40 PM
FILE: ...\TCP_P1_Vaquillas_TYP.dgn

100% SUBMITTAL

DW	CP	CK	RW	DW	MG	CK	RW

CURVE DATA	
PI	8+50.85
Δ	05°10'52.0" (RT)
D	10°25'02.7"
T	24.88'
L	49.73'
R	550.00'
PC	8+25.97
PT	8+75.70



LEGEND

- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE

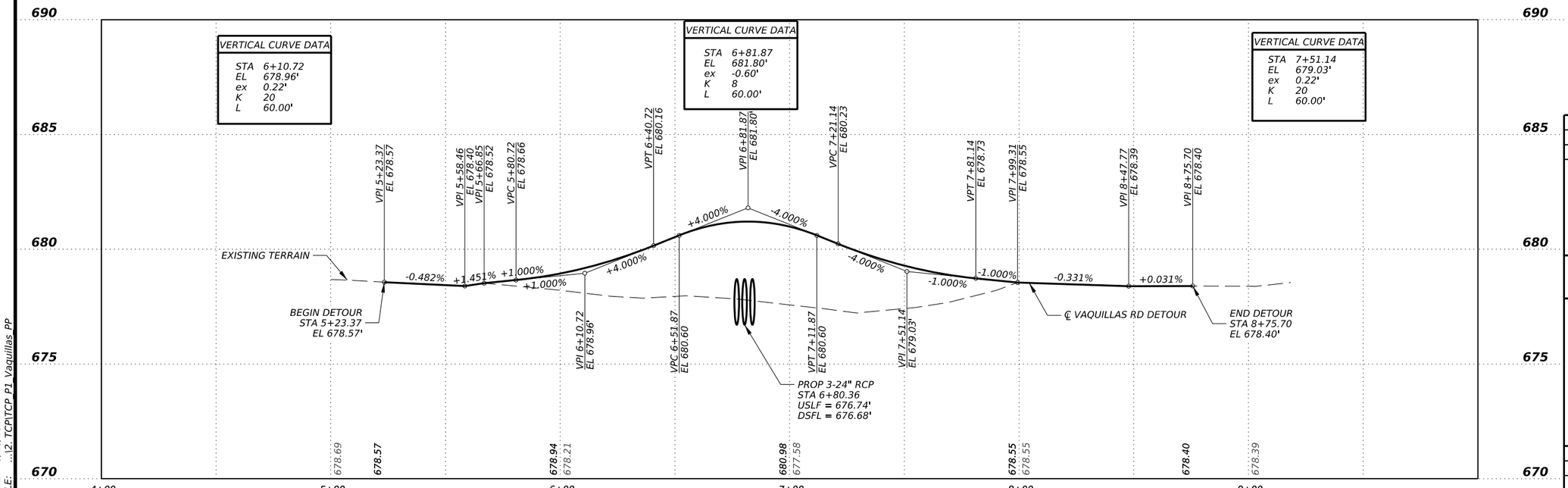
NOTES:

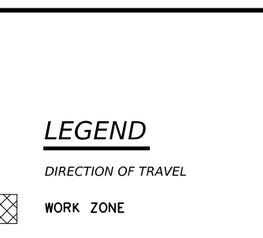
1. REFER TO TCP PHASE I TYPICAL SECTIONS FOR MORE INFORMATION ON CROSS SECTIONS.

VERTICAL CURVE DATA	
STA	6+10.72
EL	678.96'
ex	0.22'
K	20
L	60.00'

VERTICAL CURVE DATA	
STA	6+81.87
EL	681.80'
ex	-0.60'
K	8
L	60.00'

VERTICAL CURVE DATA	
STA	7+51.14
EL	679.03'
ex	0.22'
K	20
L	60.00'





REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS RD

TCP PHASE I
PLAN AND PROFILE

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

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		25

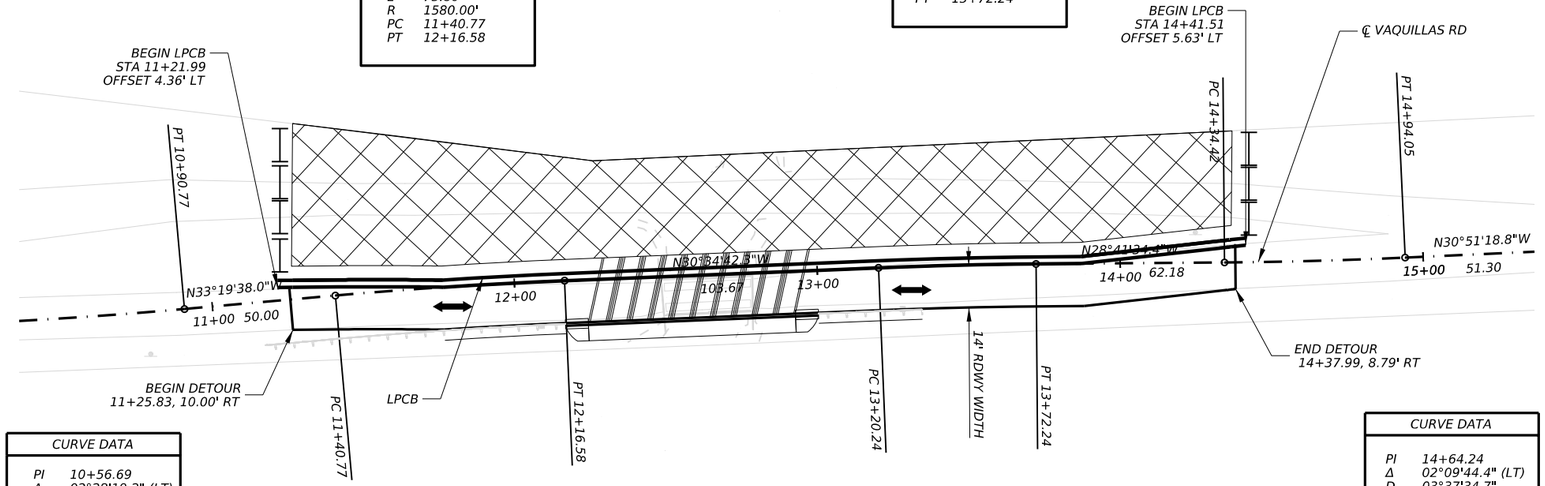
DATE: 3/28/2024 3:22:46 PM
FILE: ...\2. TCP\TCP P1 Vaquillas PP

100% SUBMITTAL

DN:	CP	CK:	RW	DW:	RG	CK:	RW

CURVE DATA	
PI	11+78.68
Δ	02°44'55.7" (RT)
D	03°37'34.7"
T	37.91'
L	75.80'
R	1580.00'
PC	11+40.77
PT	12+16.58

CURVE DATA	
PI	13+46.24
Δ	01°53'07.9" (RT)
D	03°37'34.7"
T	26.00'
L	52.00'
R	1580.00'
PC	13+20.24
PT	13+72.24

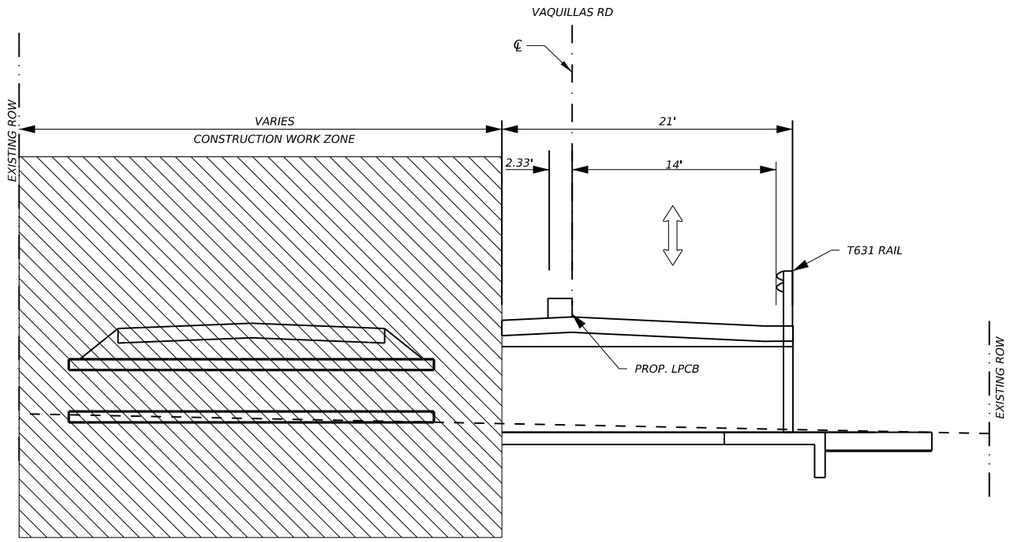


CURVE DATA	
PI	10+56.69
Δ	02°28'19.2" (LT)
D	03°37'34.7"
T	34.09'
L	68.17'
R	1580.00'
PC	10+22.61
PT	10+90.77

CURVE DATA	
PI	14+64.24
Δ	02°09'44.4" (LT)
D	03°37'34.7"
T	29.82'
L	59.63'
R	1580.00'
PC	14+34.42
PT	14+94.05

LEGEND

- DIRECTION OF TRAVEL
- WORK ZONE
- TYPE III BARRICADE



VAQUILLAS RD
TCP PHASE 2 TYPICAL SECTION

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS RD
TCP PHASE II

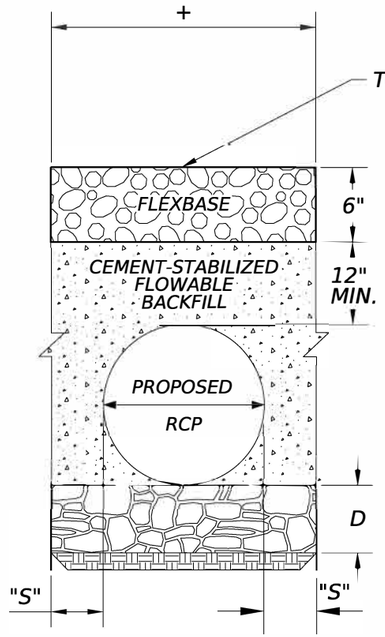
SCALE: 1" = 50' H

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		26

DATE: 3/28/2024 3:22:53 PM
FILE: ...\2. TCP\TCP P2 Vaquillas.dgn

100% SUBMITTAL



TCP DETOUR CEMENT STABILIZED FLOWABLE BACKFILL SECTION

+ CEMENT STABILIZED FLOWABLE BACKFILL TO BE PLACED WITHIN OVERALL PROPOSED DETOUR WIDTH. REFER TO DETOUR TYPICAL SECTION PHASE I.

NOTES:

D = DEPTH OF CLASS "C" BEDDING IN ACCORDANCE TO ITEM 400; BUT WILL NOT BE LESS THAN 3 INCHES. BEDDING MATERIAL WILL BE AS APPROVED BY THE ENGINEER.

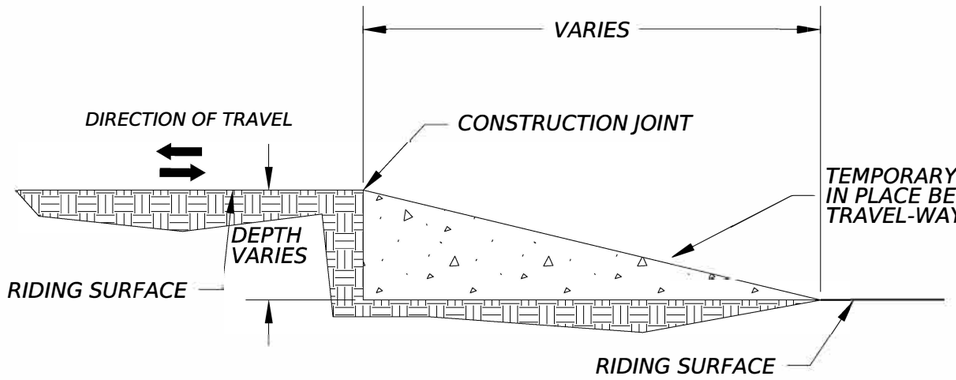
REFER TO TCP PLAN AND PROFILE SHEETS FOR STATION LIMITS OF PROPOSED TEMPORARY STRUCTURES.

CONTRACTOR WILL HAVE THE OPTION TO PREPARE AND MIX CEMENT STABILIZED FLOWABLE BACKFILL ONSITE PER SPECIFICATIONS AND WITH ENGINEER'S APPROVAL.

ALL PREPARATION AND WORK ITEMS RELATED TO INSTALLATION OF DETOUR WITH TEMPORARY DRAINAGE STRUCTURE SHALL BE SUBSIDIARY TO ITEM 508, "CONSTRUCT DETOURS". REMOVAL OF DETOUR WILL BE PAID FOR UNDER ITEM 508.

S = SPACING BETWEEN PIPES AS SPECIFIED IN THE STANDARD SPECIFICATION.

THE CONTRACTOR MAY SUBMIT ALTERNATE PIPE MATERIAL, EMBEDMENT AND BACKFILL FOR THE TEMPORARY DRAINAGE PIPES FOR APPROVAL BY THE ENGINEER, PRIOR TO THE BEGINNING OF DETOUR ROUTE CONSTRUCTION.



CONSTRUCTION JOINT TAPER (PROFILE)

END OF WORK DAY

NOTES:

DURING ANY PHASE OF CONSTRUCTION, A CONSTRUCTION JOINT TAPER IS TO BE IN PLACE AT THE END OF THE WORK DAY PRIOR TO OPENING ALL LANES TO TRAFFIC, IN ALL DIRECTIONS.

USE FOR ALL LONGITUDINAL DROP-OFFS WHICH MAY RESULT FORM PLANNING, OVERLAYS, OR ANY OTHER CONSTRUCTION OPERATIONS.

PLACEMENT AND REMOVAL OF THIS CONSTRUCTION TAPER DURING CONSTRUCTION WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 502. UTILIZE TAPER MATERIAL AS GUIDED BY THE FIELD ENGINEER.

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER
Christopher Fournier
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

TCP MISCELLANEOUS DETAILS

SCALE: N.T.S.

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		27

DATE: 3/28/2024 3:22:58 PM
FILE: ...\2. TCP\TCP MISC DETAILS

DATE:
FILE:

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

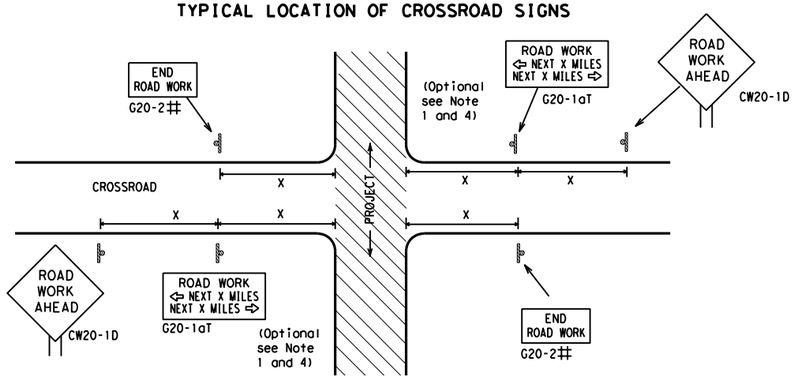
Traffic Safety Division Standard

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	0922	33	185, ETC.	CR 352, ETC.
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LRD	WEBB		28
5-10 5-21				

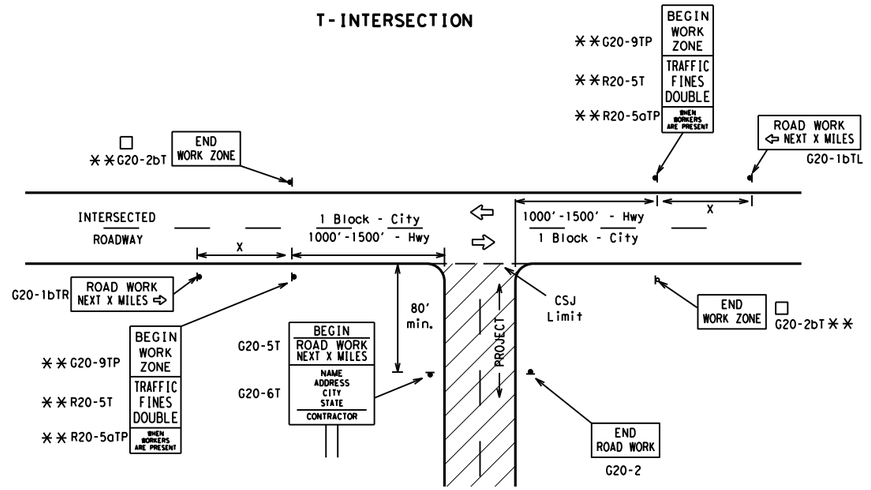
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

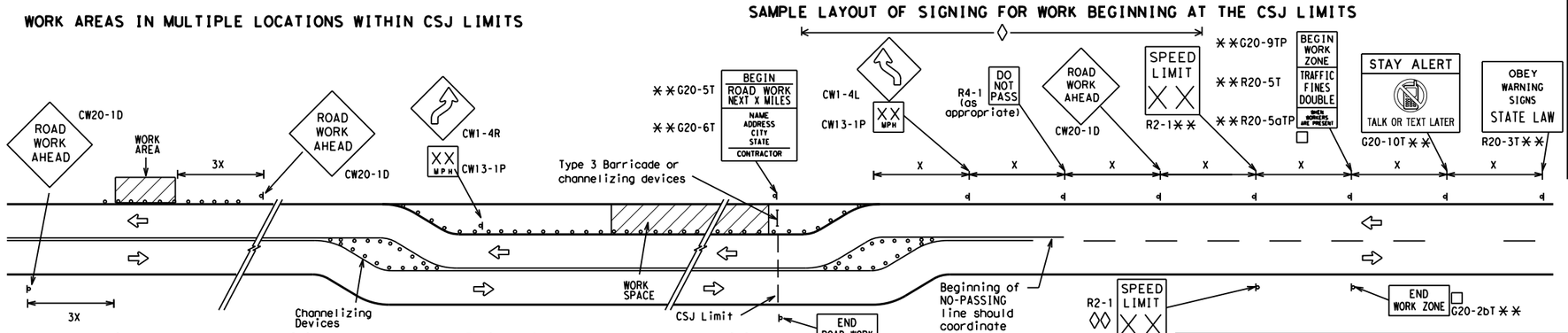
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

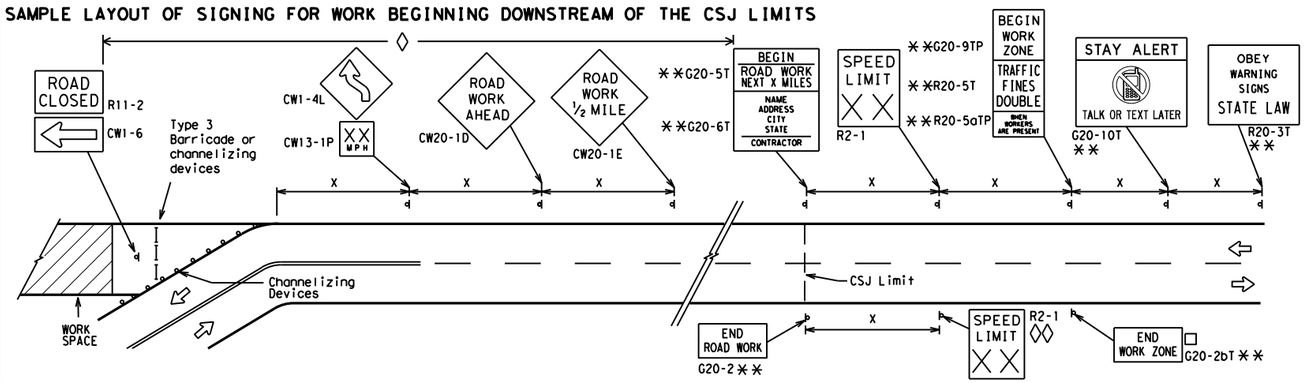
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		29

DATE:
FILE:

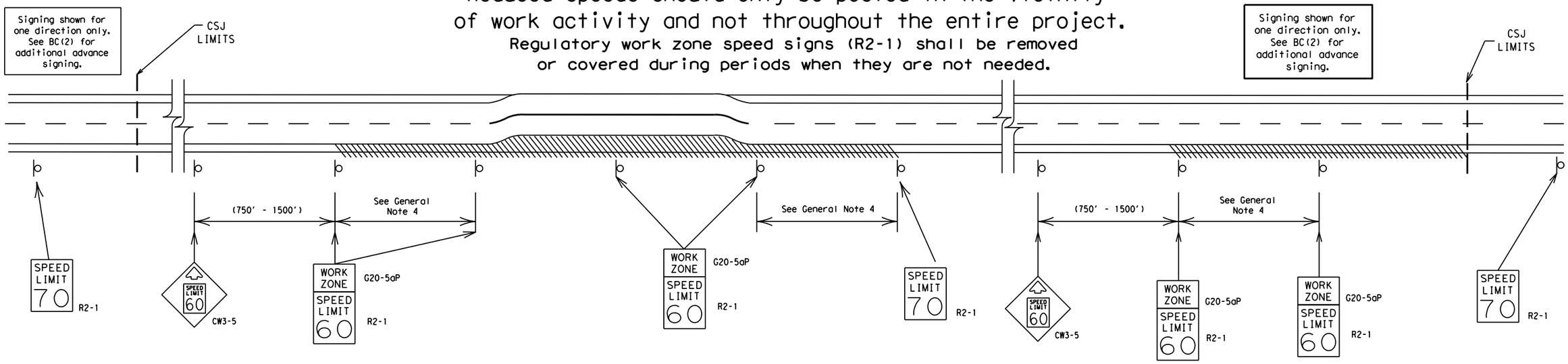
DATE:
FILE:

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

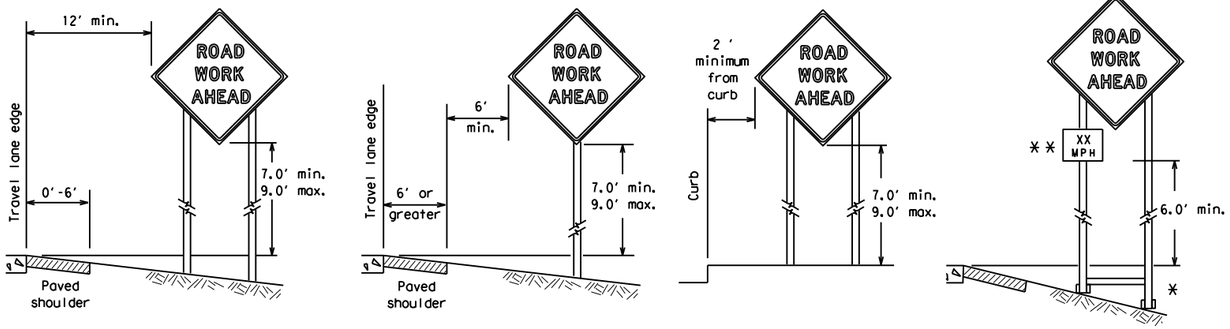
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		30

DATE:
FILE:

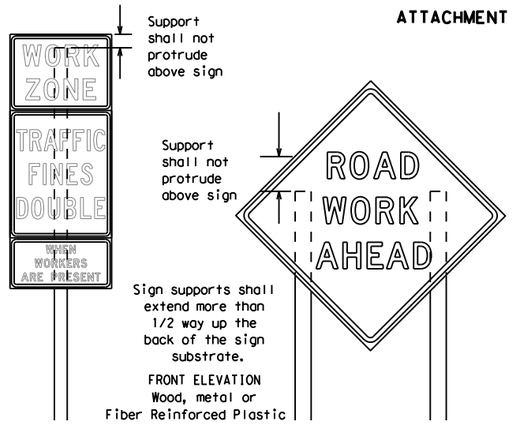
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

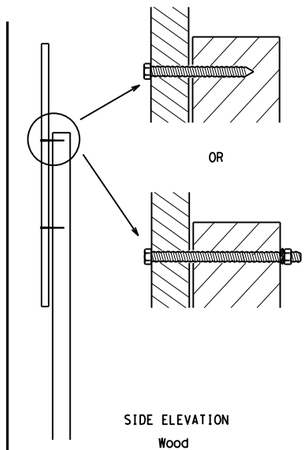


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





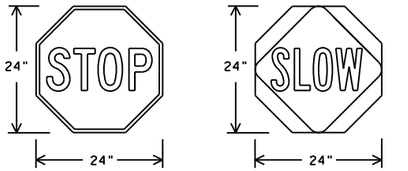
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

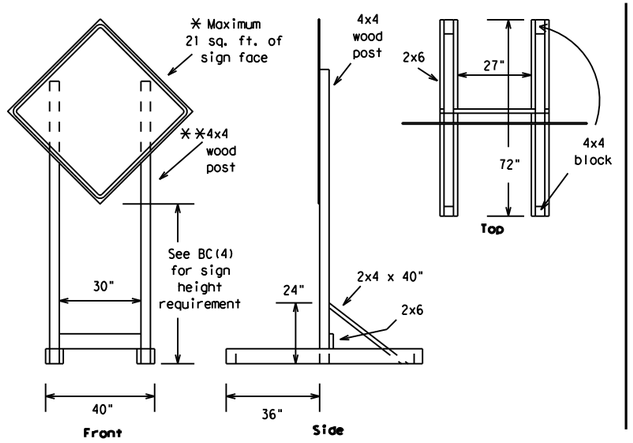
Texas Department of Transportation | Traffic Safety Division Standard

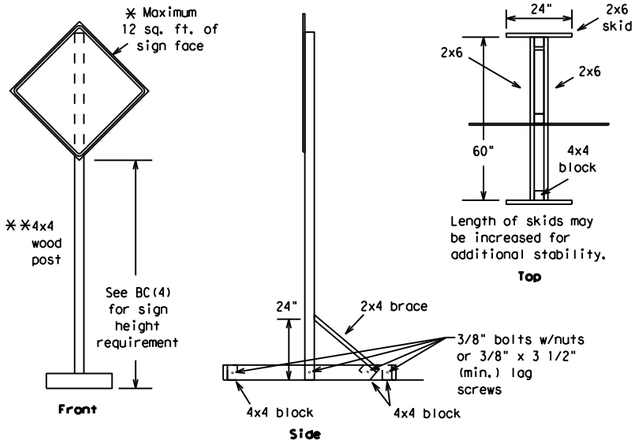
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		31

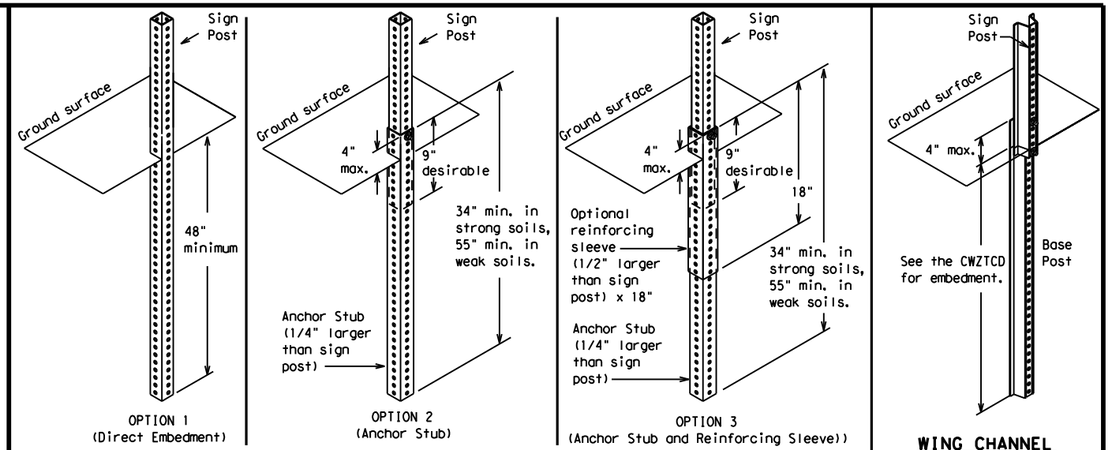
DATE:
FILE:





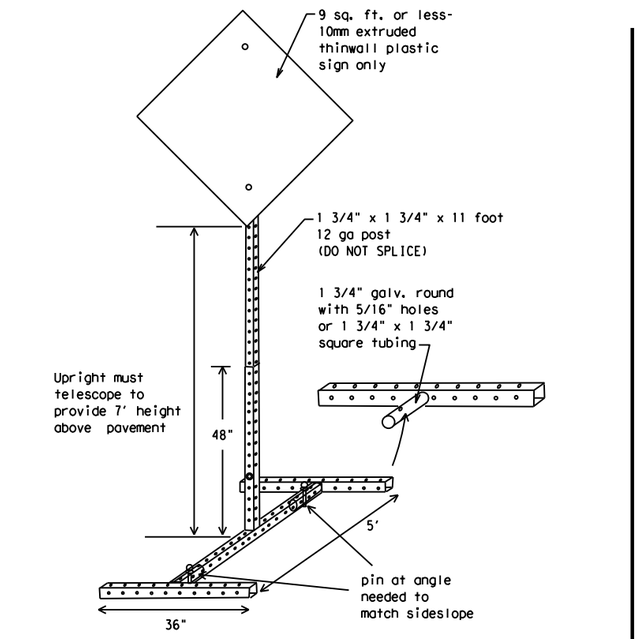
SKID MOUNTED WOOD SIGN SUPPORTS

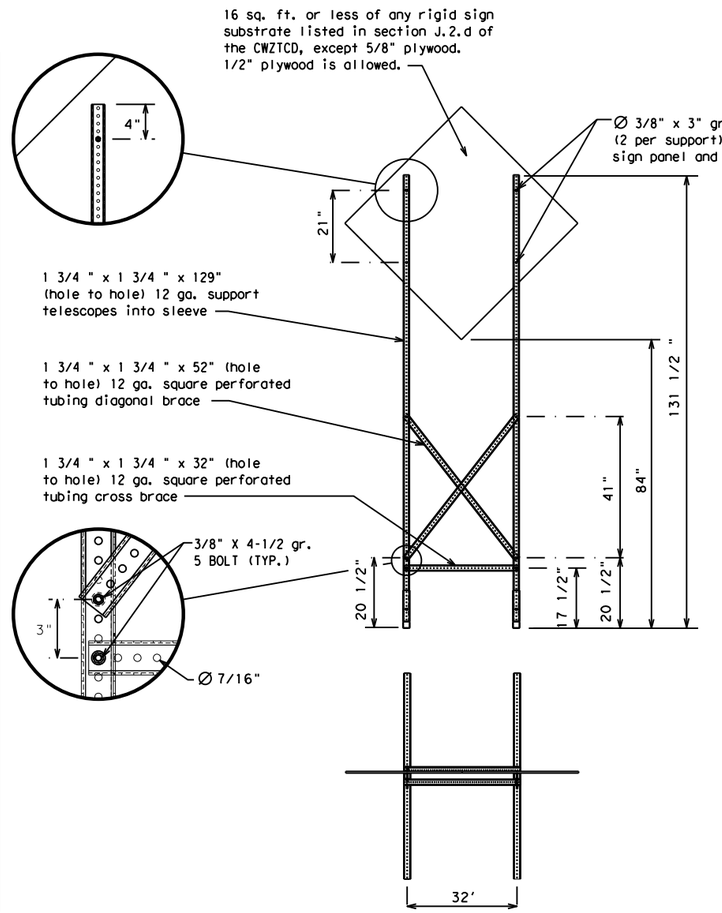
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

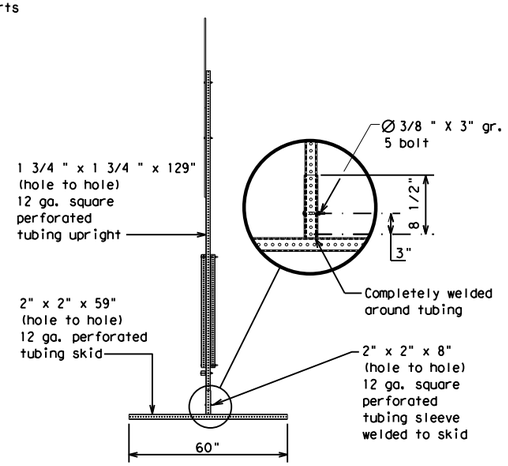


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

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	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		32

DATE:
FILE:

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

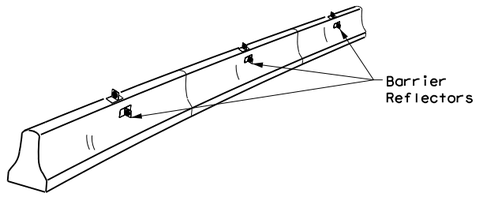
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		33

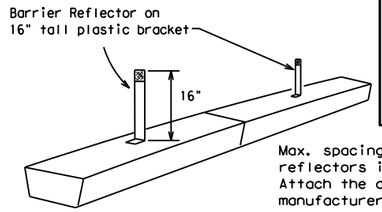
DATE:
FILE:

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



CONCRETE TRAFFIC BARRIER (CTB)

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

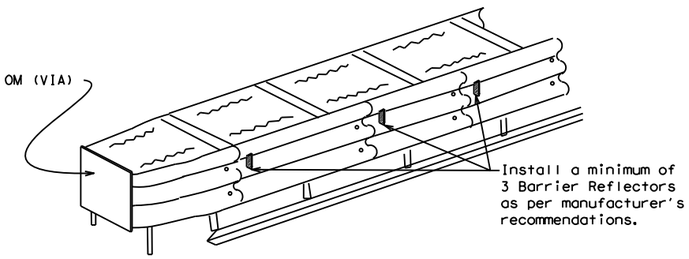


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

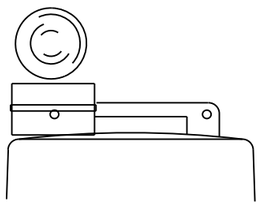


DELINEATION OF END TREATMENTS

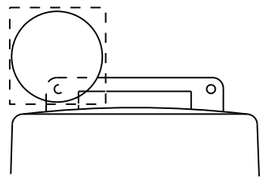
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

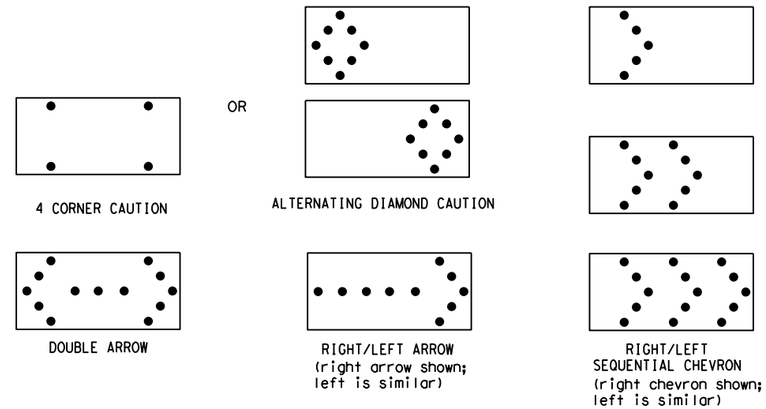
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		34

DATE:
FILE:

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:

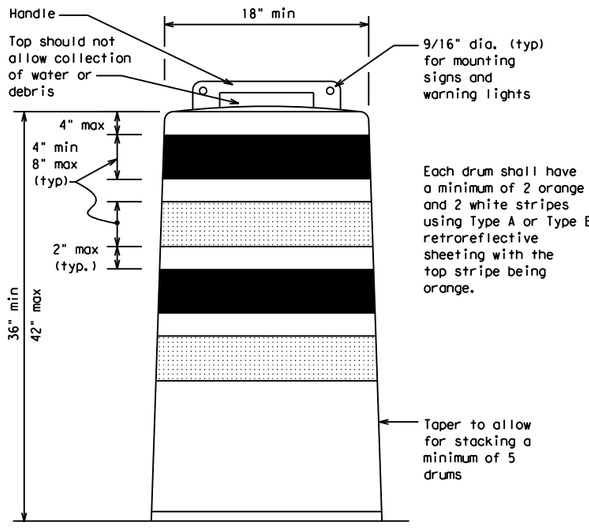
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

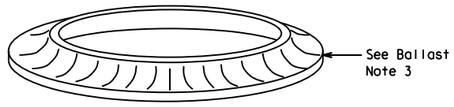
RETROREFLECTIVE SHEETING

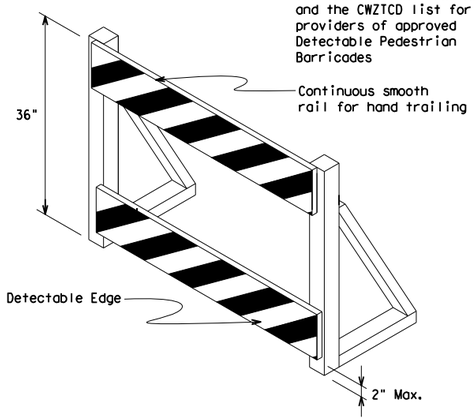
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

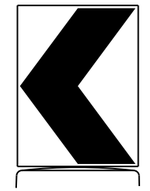




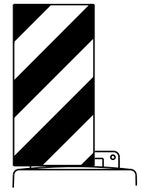


DETECTABLE PEDESTRIAN BARRICADES

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

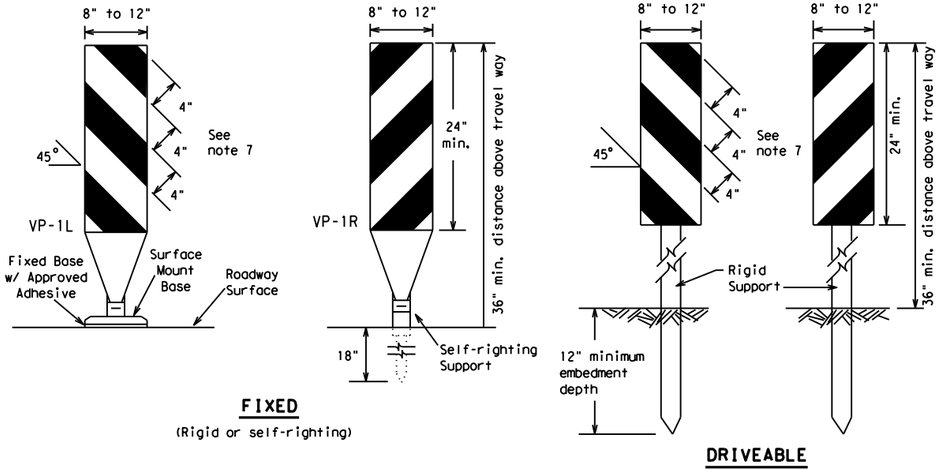
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

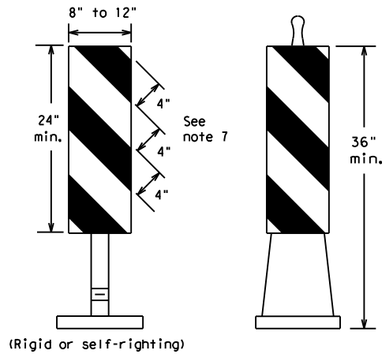
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	LRD	WEBB		35
7-13				

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.



FIXED
(Rigid or self-righting)

DRIVEABLE

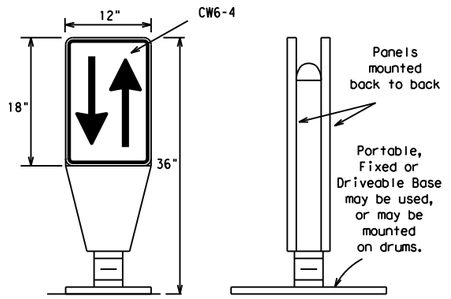


(Rigid or self-righting)

PORTABLE

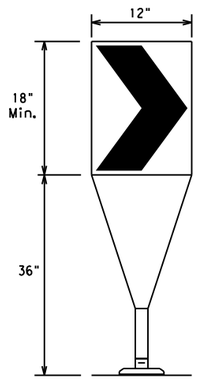
VERTICAL PANELS (VPs)

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)



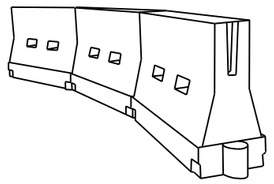
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		36

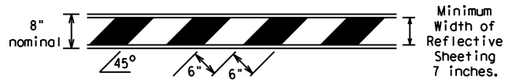
DATE:
FILE:

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.

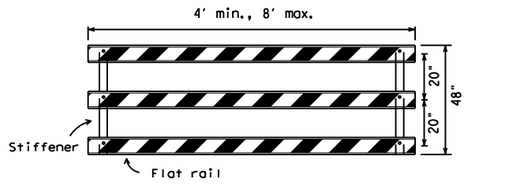
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



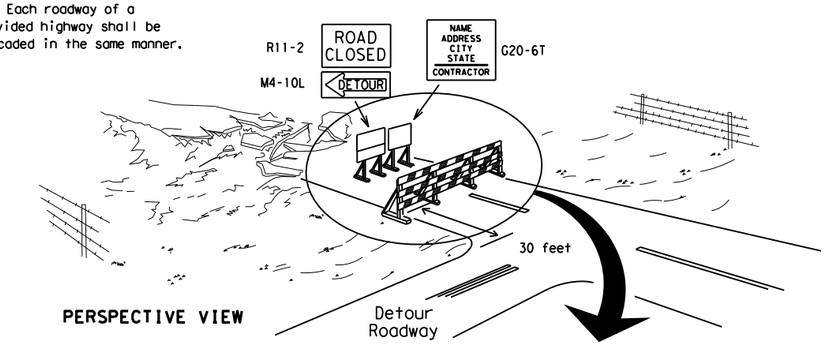
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

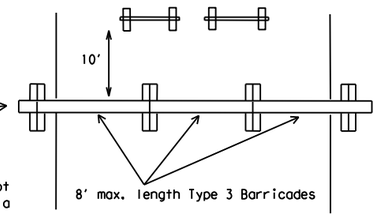
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

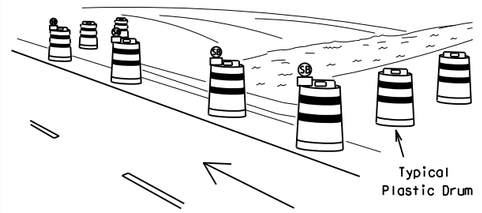
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

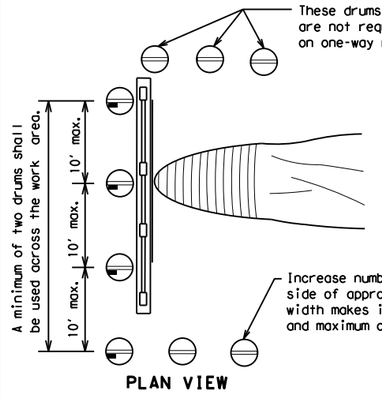
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

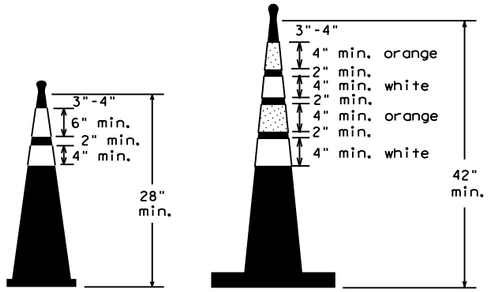
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



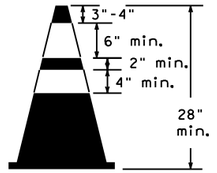
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

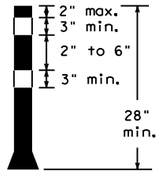
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

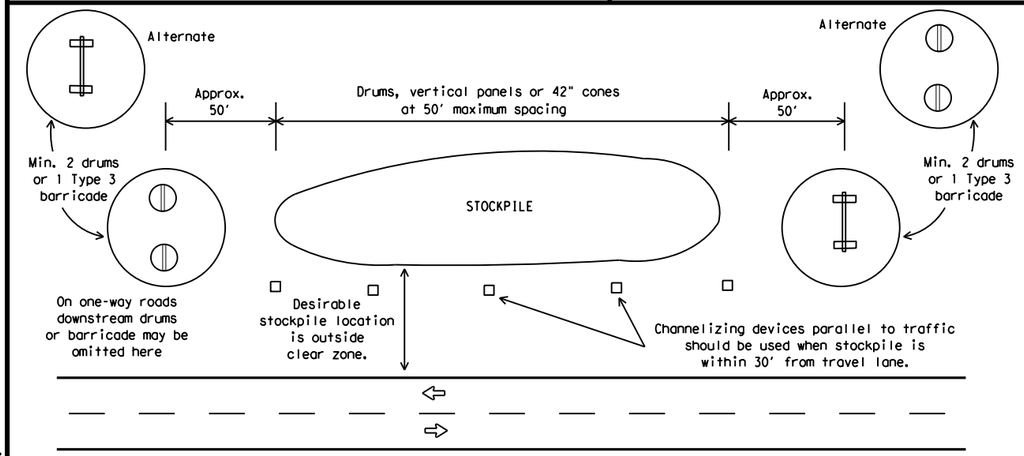


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

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	0922	33	185, ETC.	CR 352, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LRD	WEBB		37

DATE:
FILE:

104

DATE:
FILE:

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.

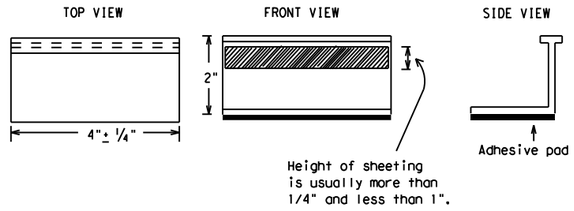
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

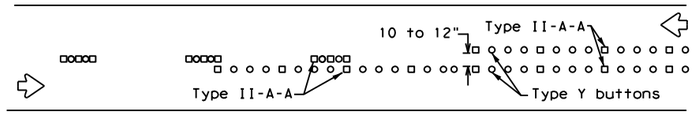
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	LRD	WEBB		38
11-02 8-14				

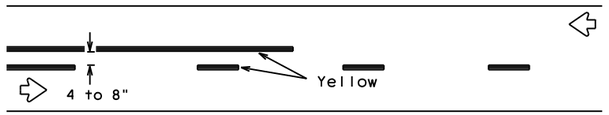
DATE:
FILE:

PAVEMENT MARKING PATTERNS

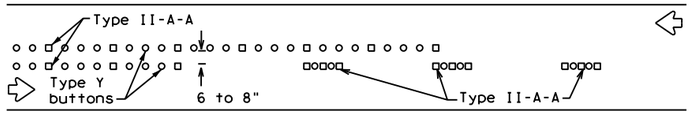
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



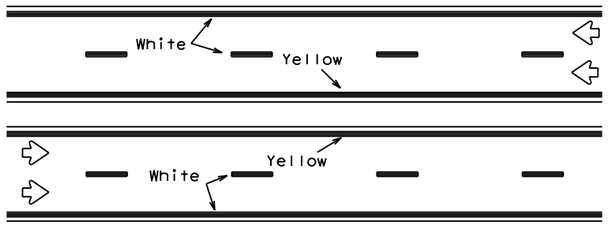
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



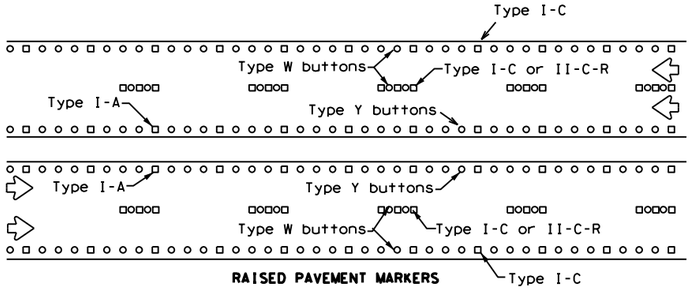
RAISED PAVEMENT MARKERS - PATTERN B

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



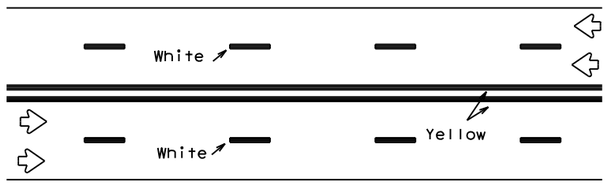
REFLECTORIZED PAVEMENT MARKINGS



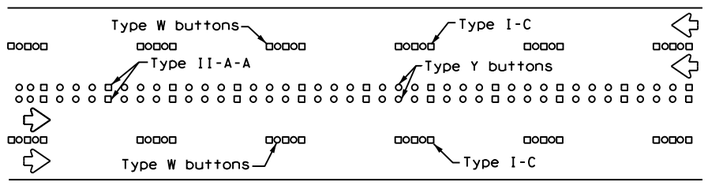
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



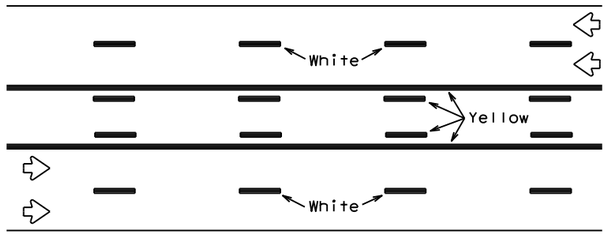
REFLECTORIZED PAVEMENT MARKINGS



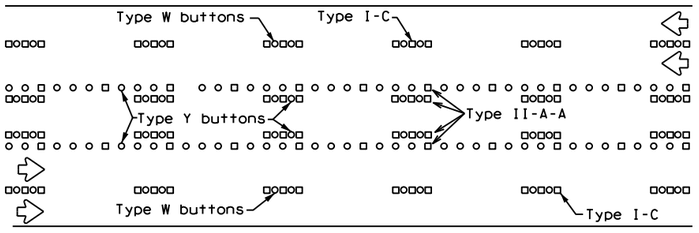
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

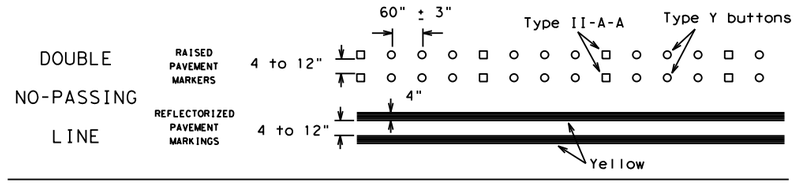
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

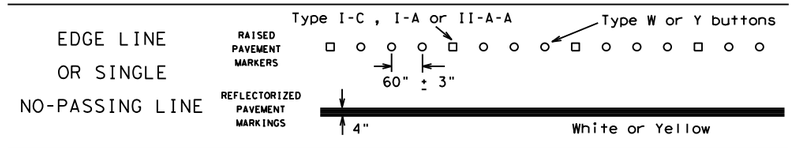
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

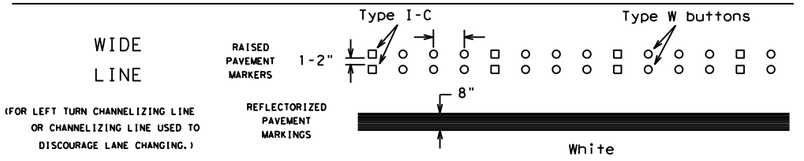


EDGE LINE OR SINGLE NO-PASSING LINE



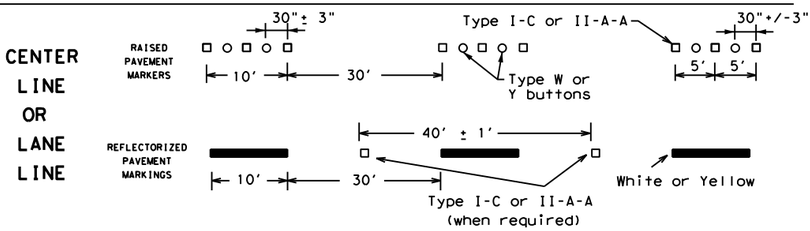
WIDE LINE

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

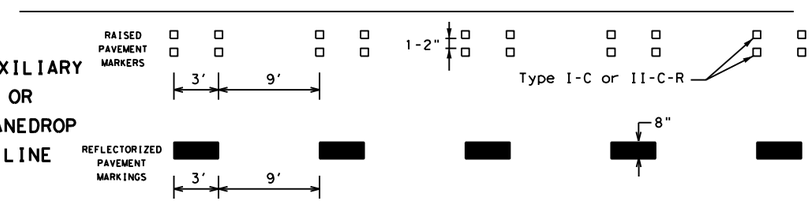


BROKEN LINES

CENTER LINE OR LANE LINE

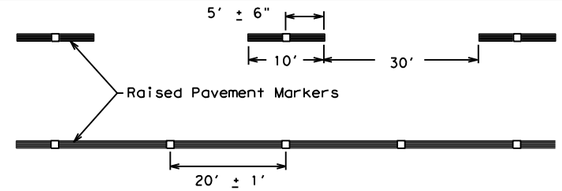


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

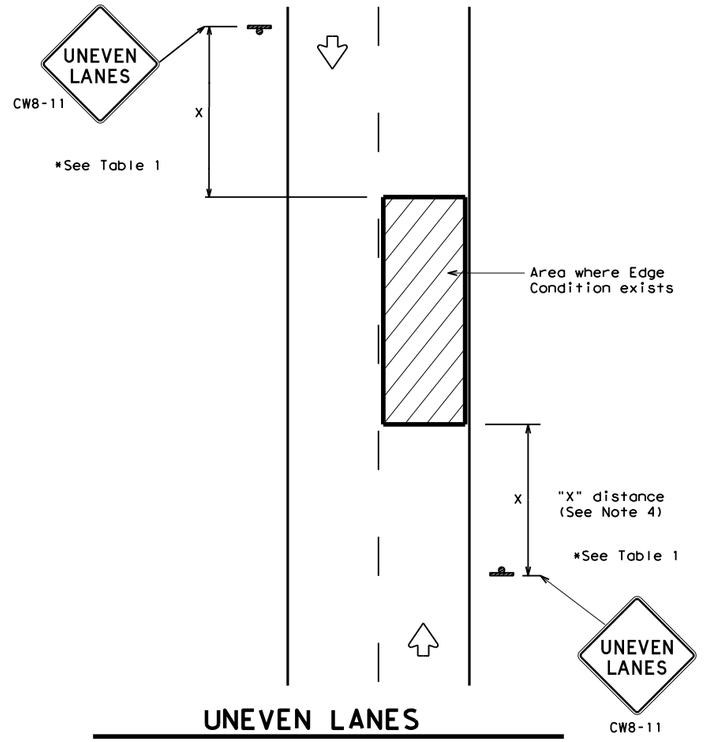
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

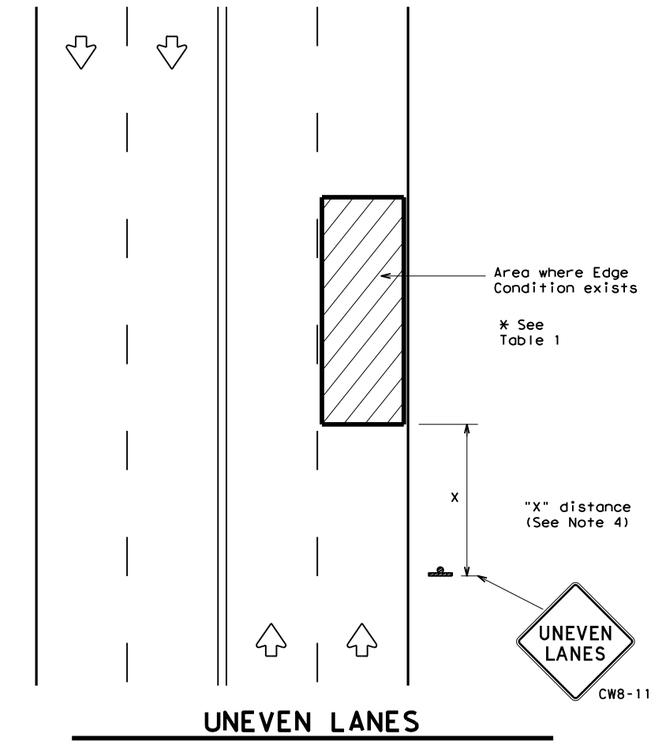
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	LRD	WEBB		39
11-02 8-14				

106

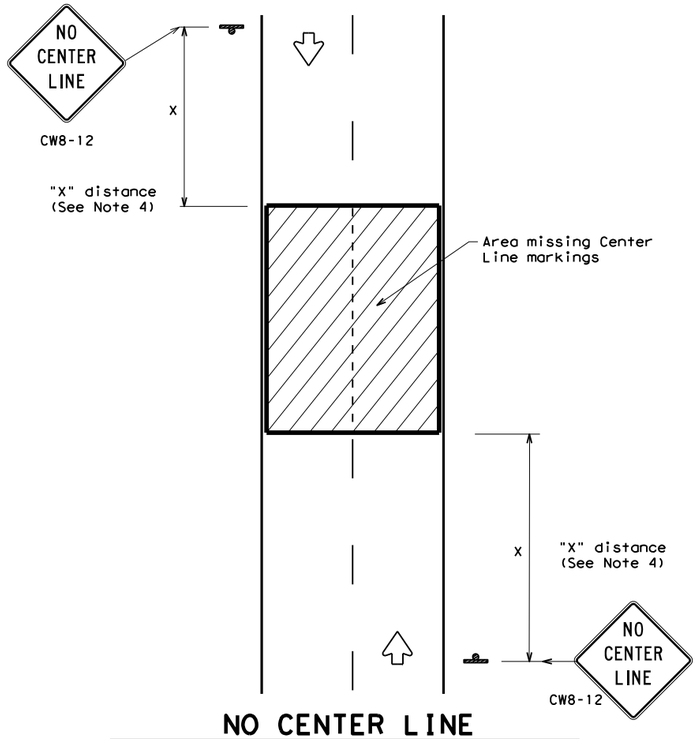
DATE:
FILE:



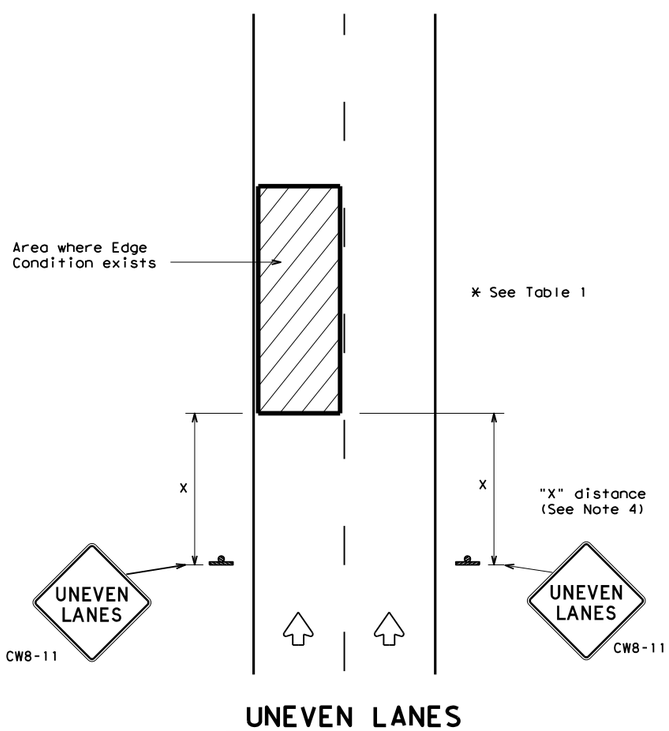
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

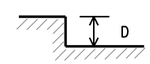
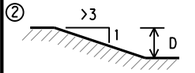
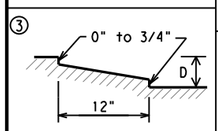
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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"

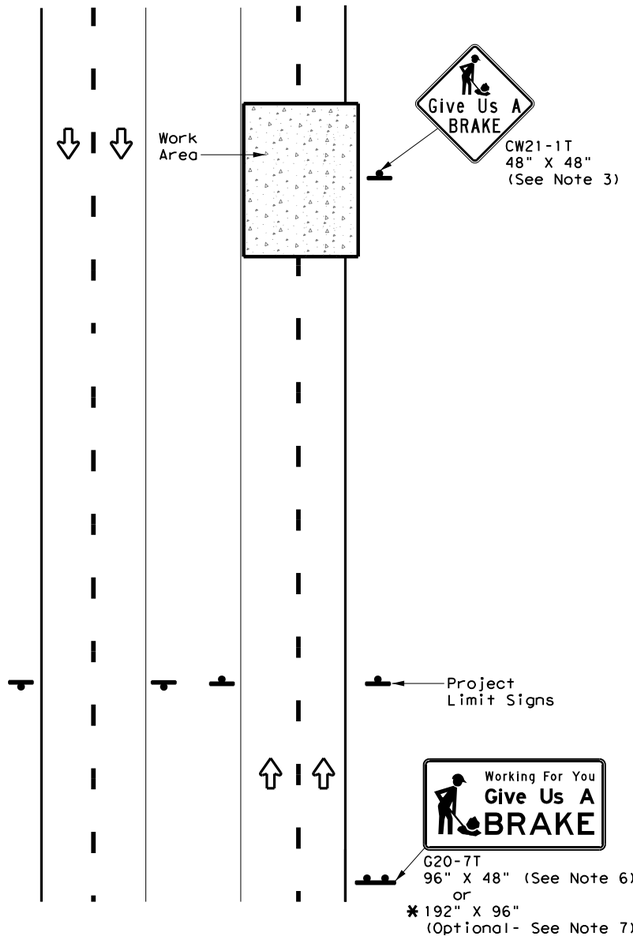
Texas Department of Transportation

Traffic Operations Division Standard

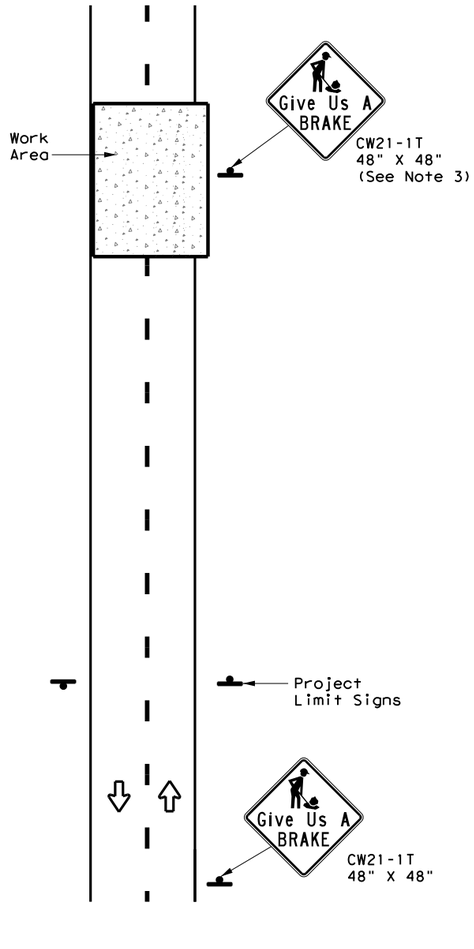
SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	LRD	WEBB		40



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.

DATE:
FILE:

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

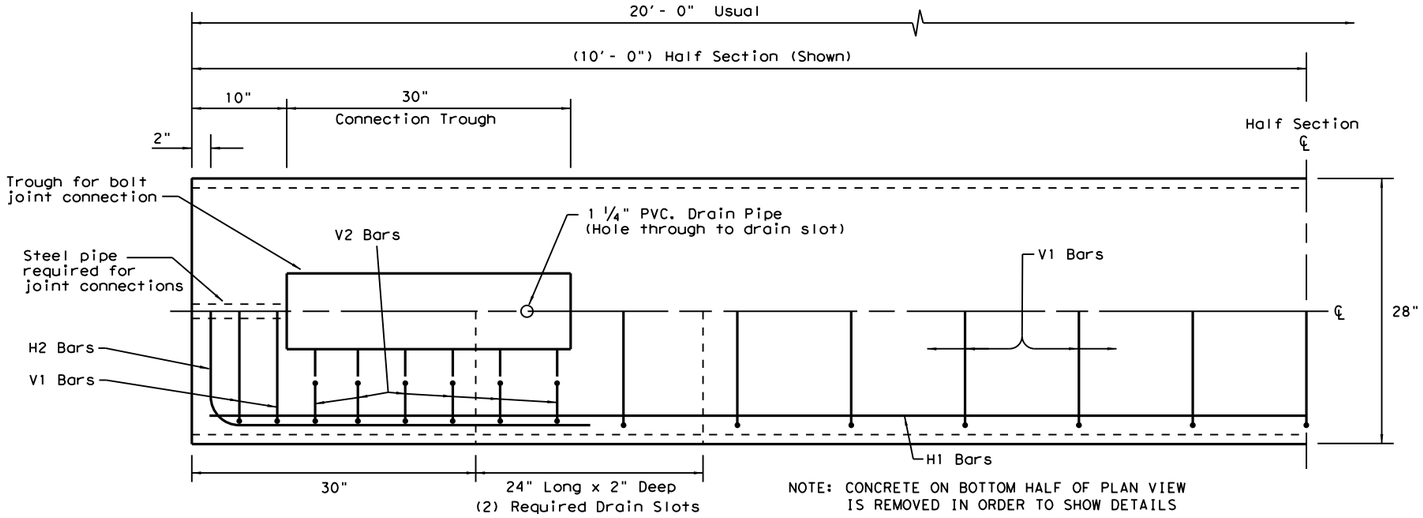
Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

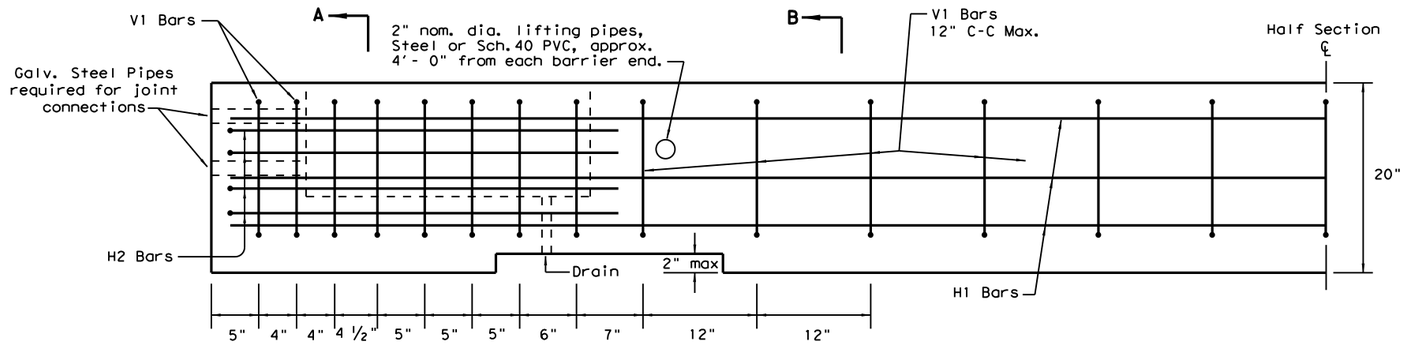
WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	LRD	WEBB		41

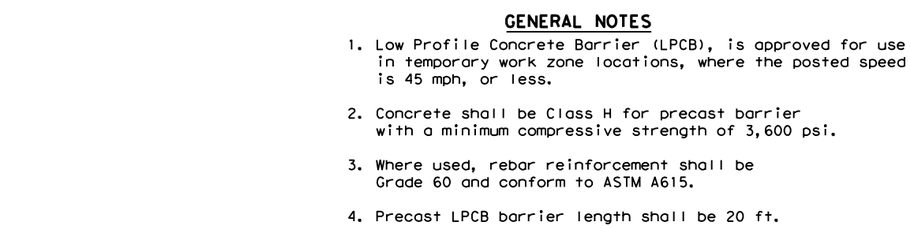
DATE:
FILE:



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



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



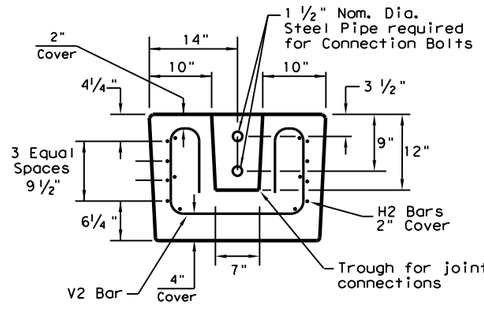
(8)~H2 Bars (#5) Bars

(12)~V2 Bars (#4) Bars

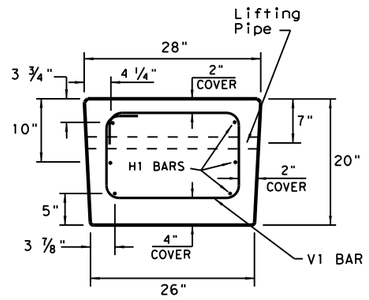
(17)~V1 Bars (#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

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



SECTION A-A



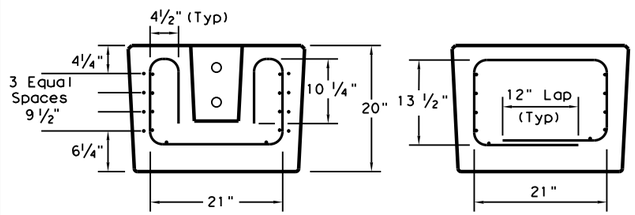
SECTION B-B

GENERAL NOTES

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

FOR CONTRACTORS INFORMATION ONLY

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



SECTION A-A

SECTION B-B

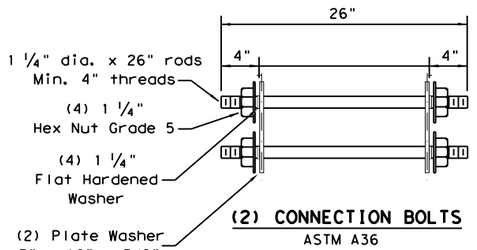
(WWR) GENERAL NOTES

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

REQUIRED (WWR) WIRE DESIGN

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

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

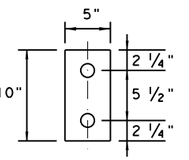


PLATE WASHER
5" x 10" x ⅜"

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

SHEET 1 OF 2

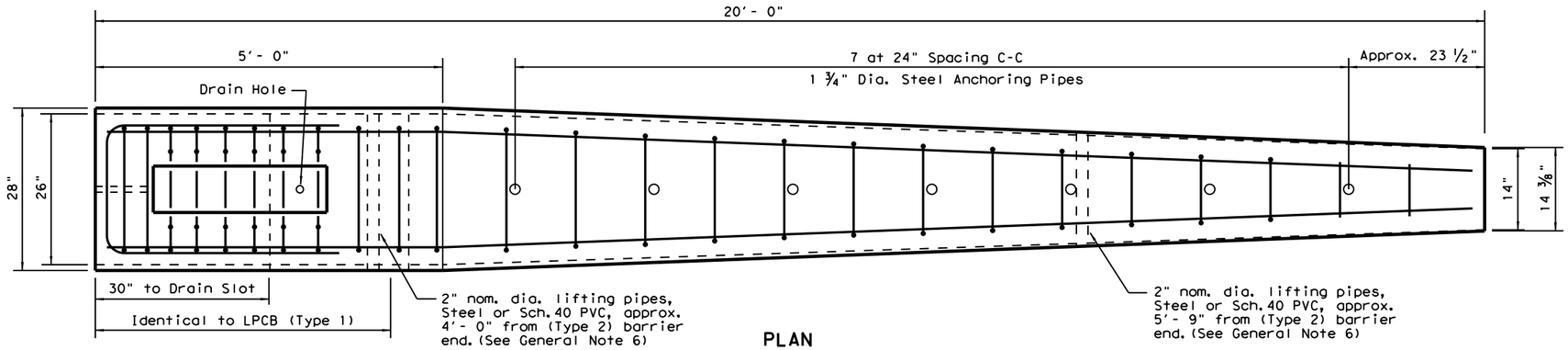
Texas Department of Transportation

Design Division Standard

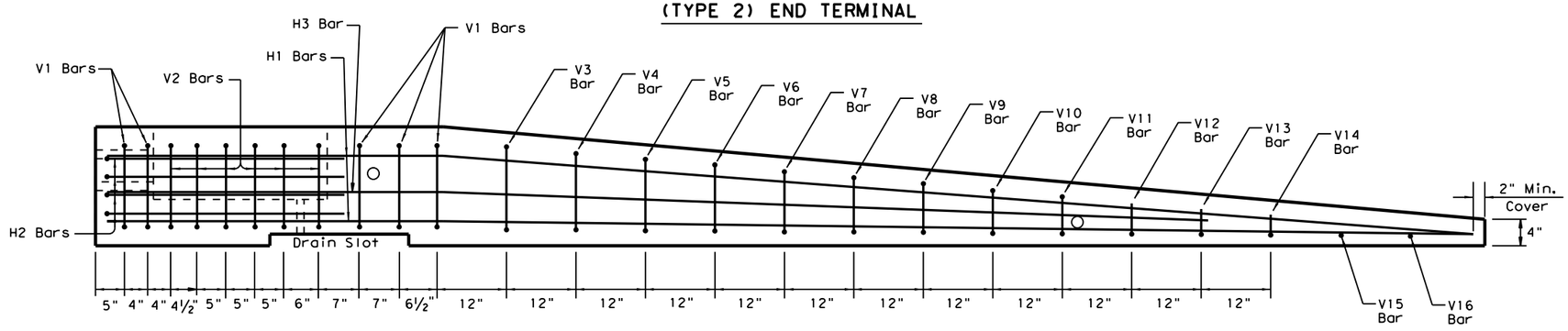
LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		42

DATE:
FILE:

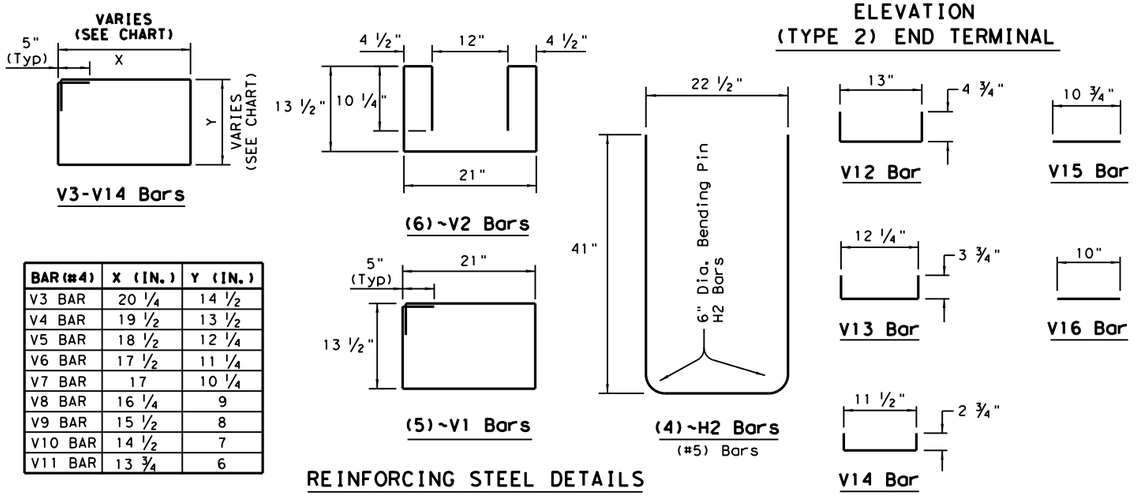


PLAN
(TYPE 2) END TERMINAL



ELEVATION
(TYPE 2) END TERMINAL

Note:
Anchoring pipes not shown in Elevation View



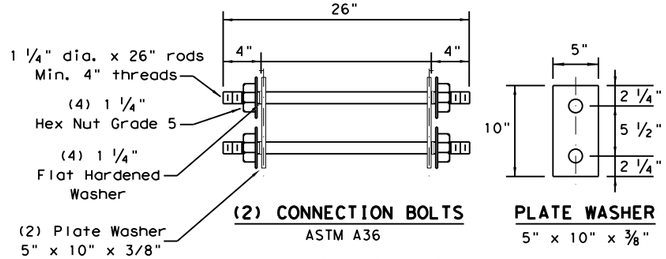
BAR (#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL

Note: All V Bars are (#4)

Section A-A
(Head of Anchoring Pin)

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

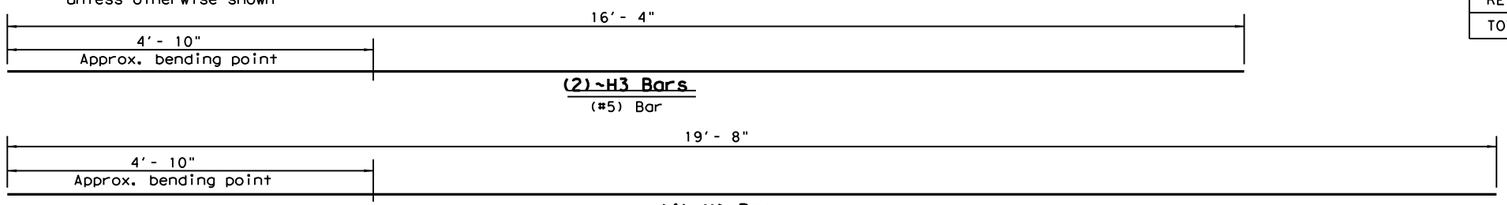


(2) CONNECTION BOLTS
ASTM A36

PLATE WASHER
5" x 10" x ⅜"

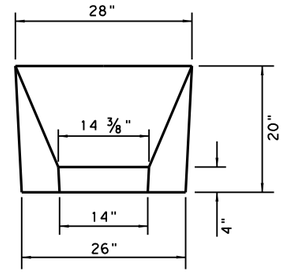
Note: Rods, Hex nuts and Washers shall be Galvanized.

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



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

APPROACH VIEW



TYPE 2 - NOTES

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

FOR CONTRACTORS INFORMATION ONLY

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

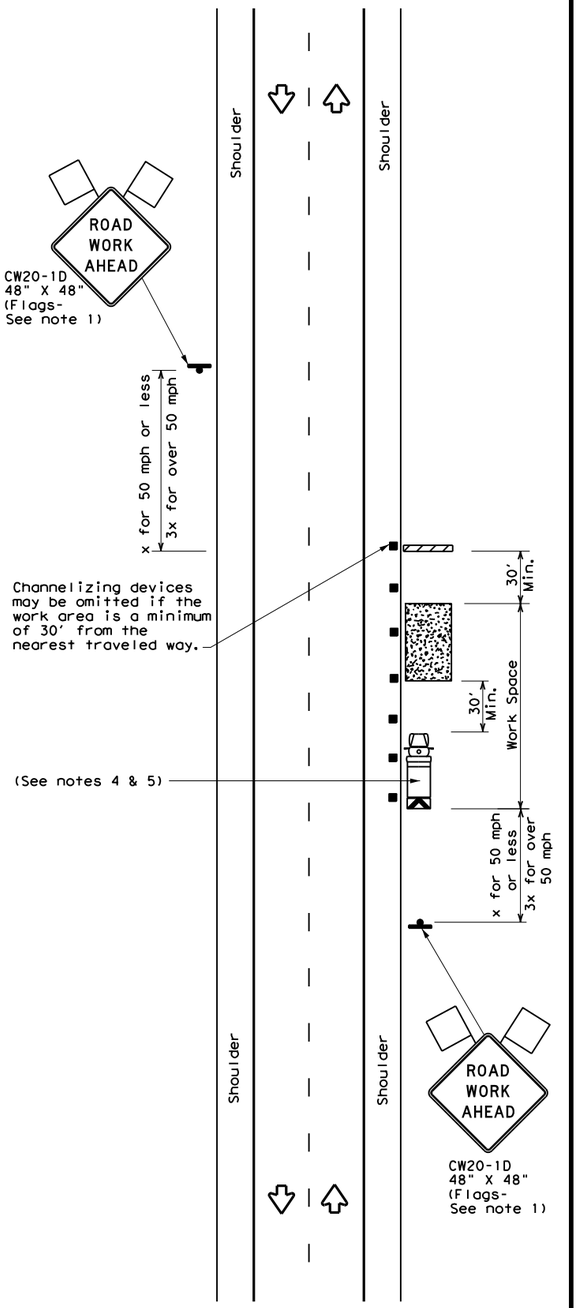
Texas Department of Transportation

Design Division Standard

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

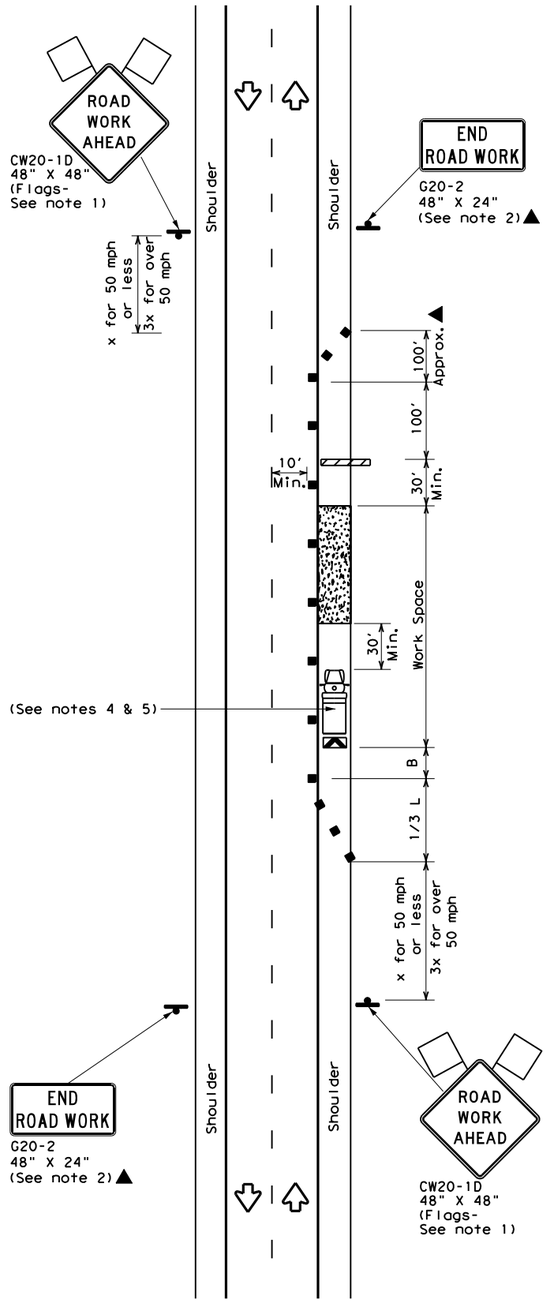
FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		43

DATE:
FILE:



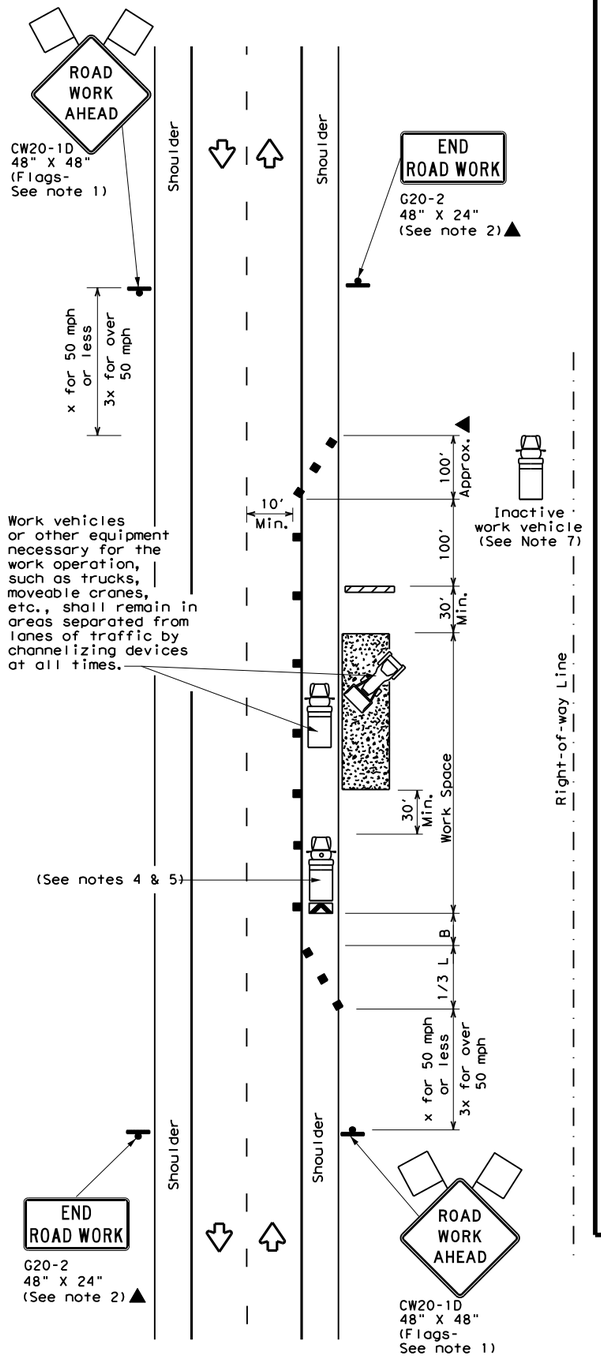
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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 in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

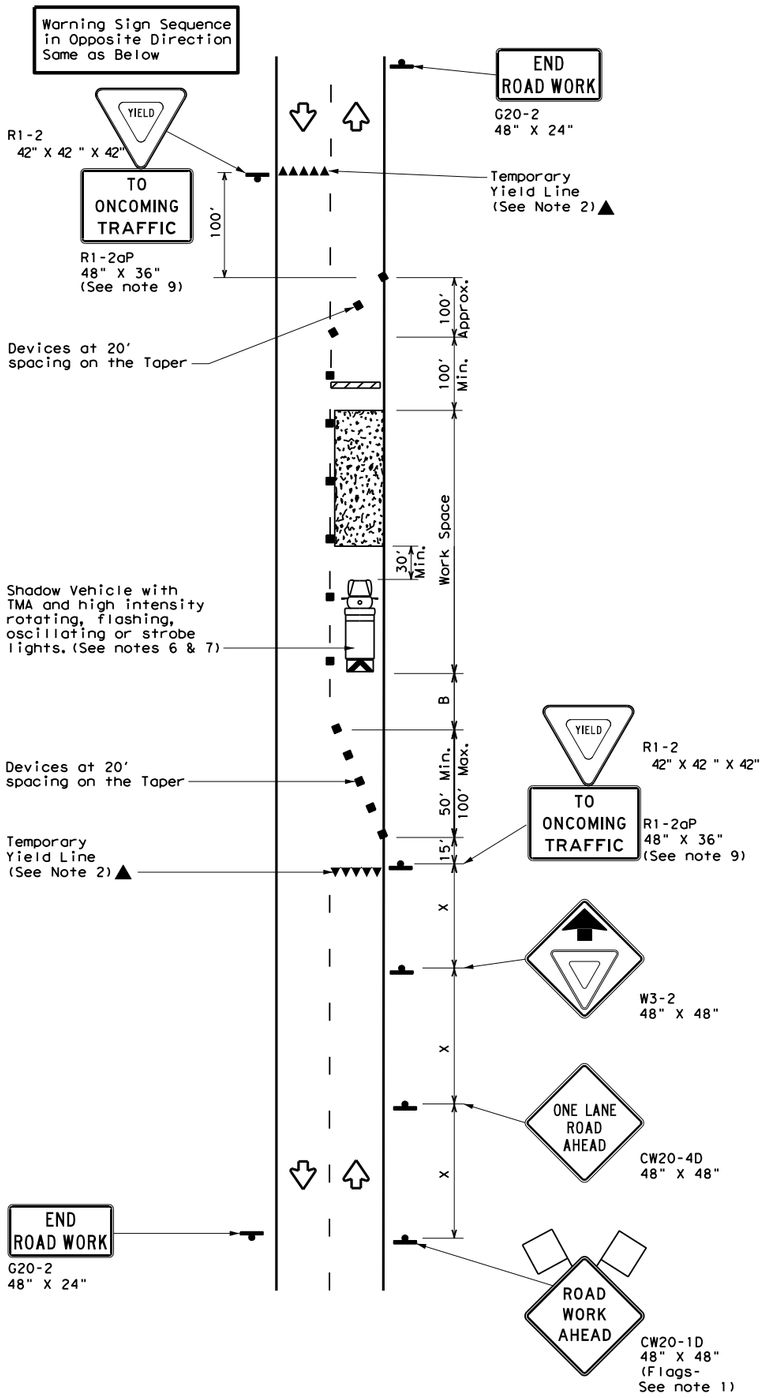
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

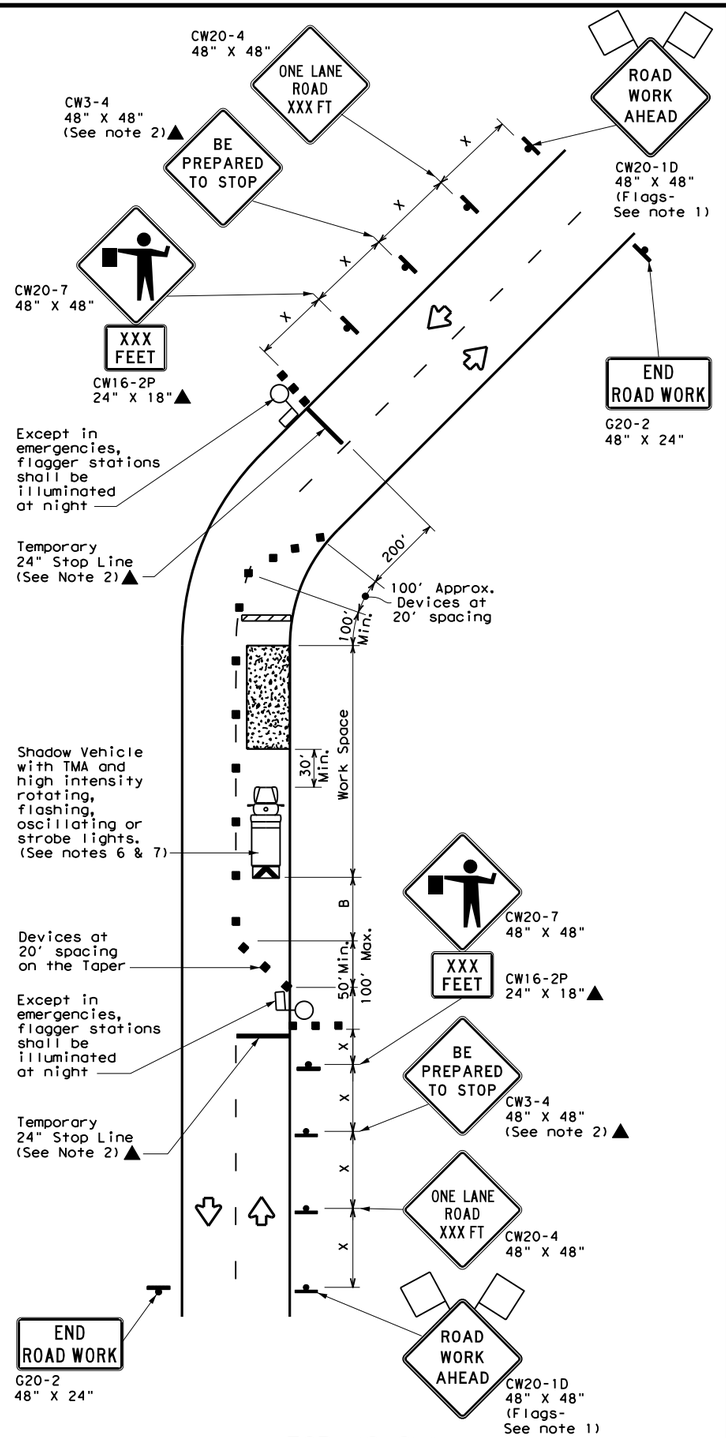
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LRD	WEBB		44
1-97 2-18				

DATE:
FILE:



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

LEGEND

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

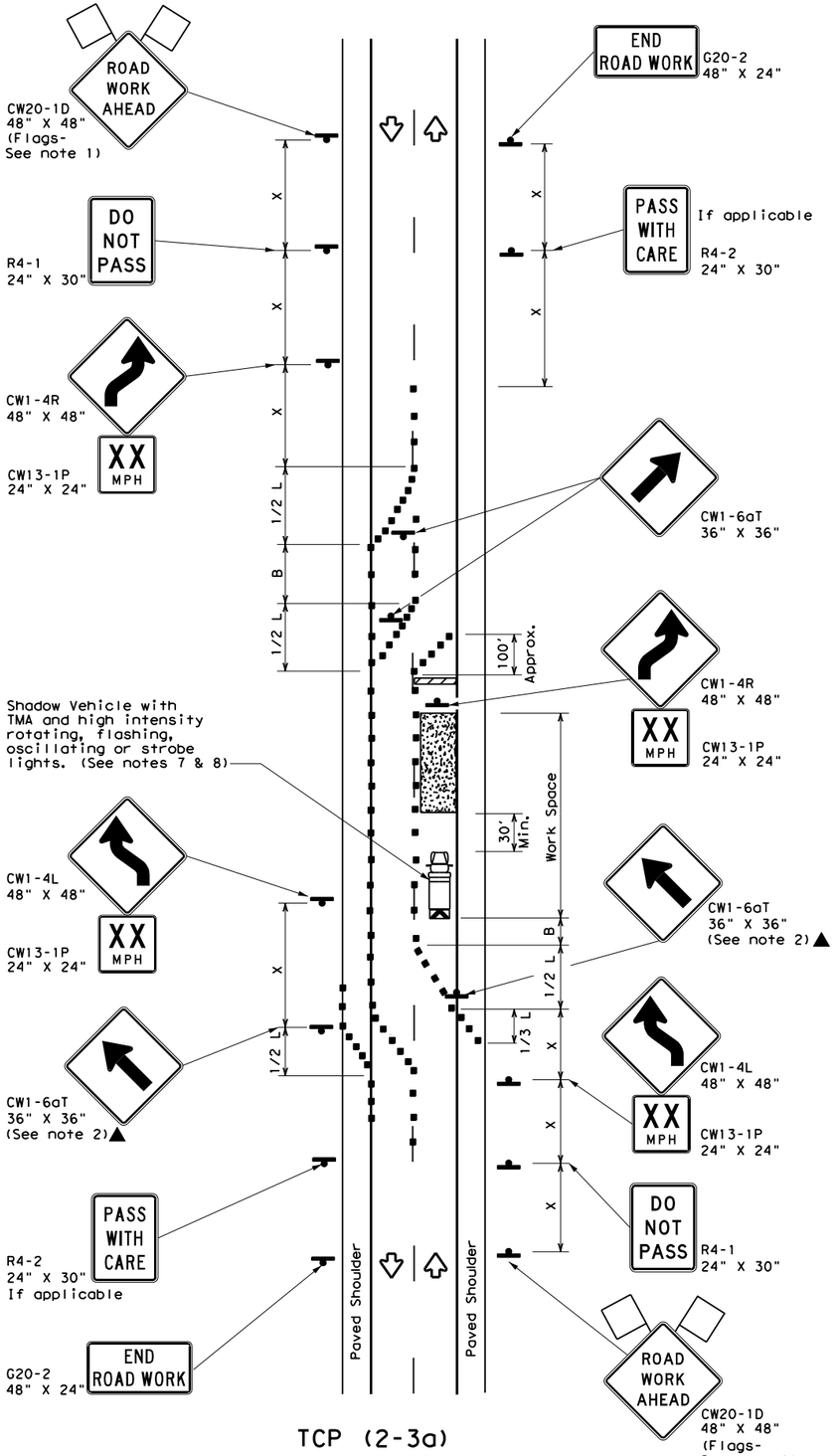
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

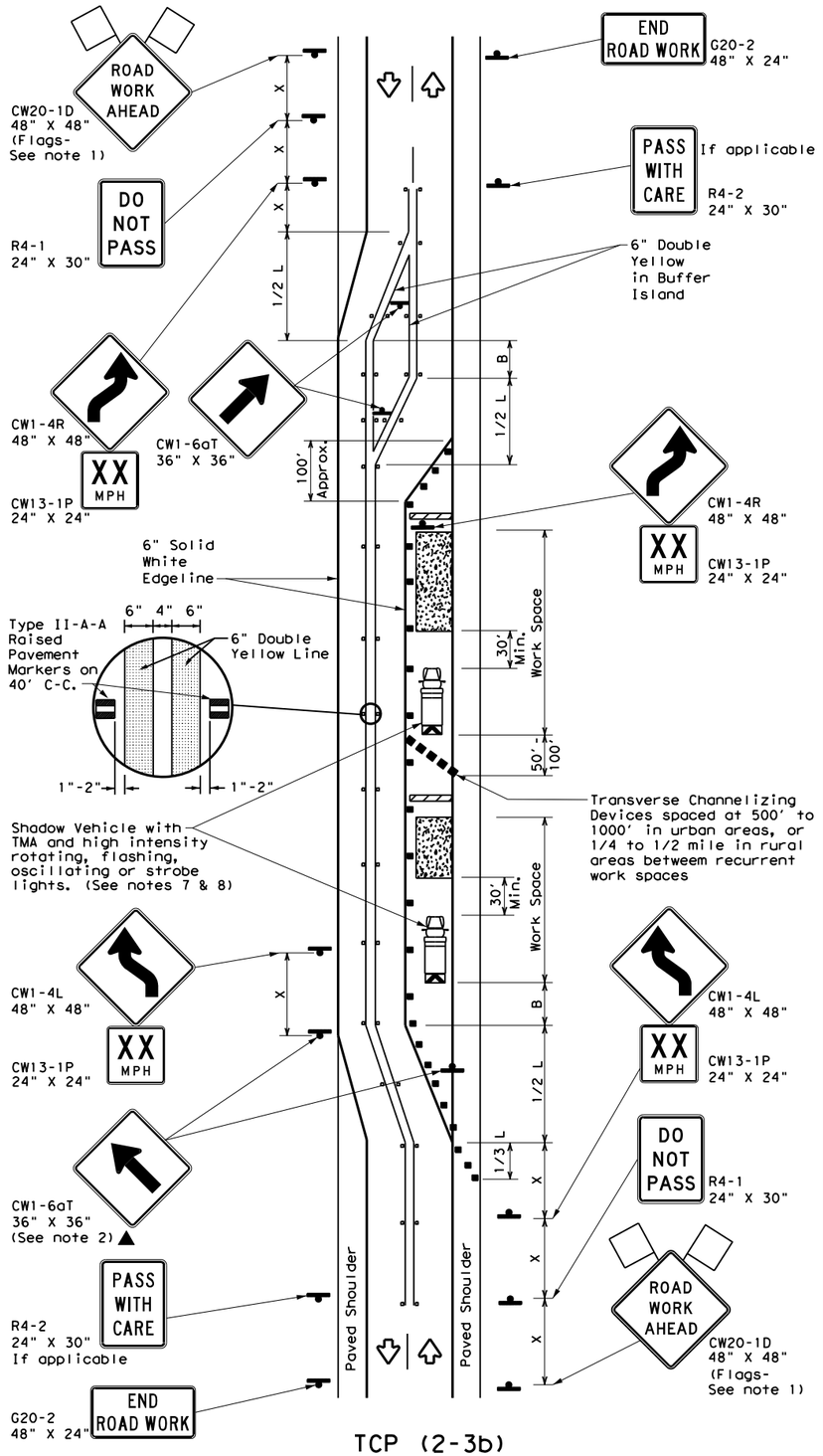
FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	LRD	WEBB		45
4-98 2-18				

DATE:
FILE:



TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	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
				TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

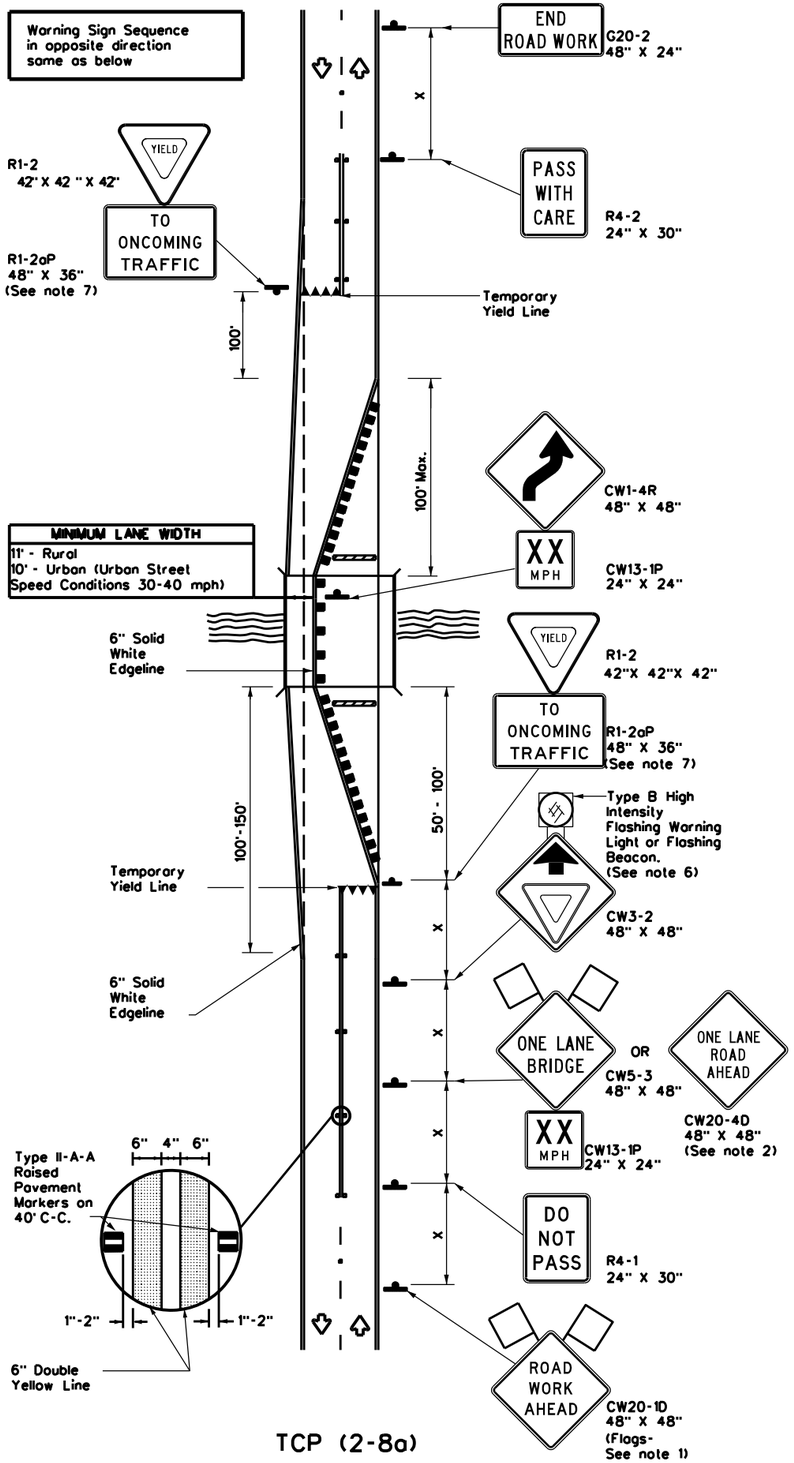
9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation — *Traffic Safety Division Standard*

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

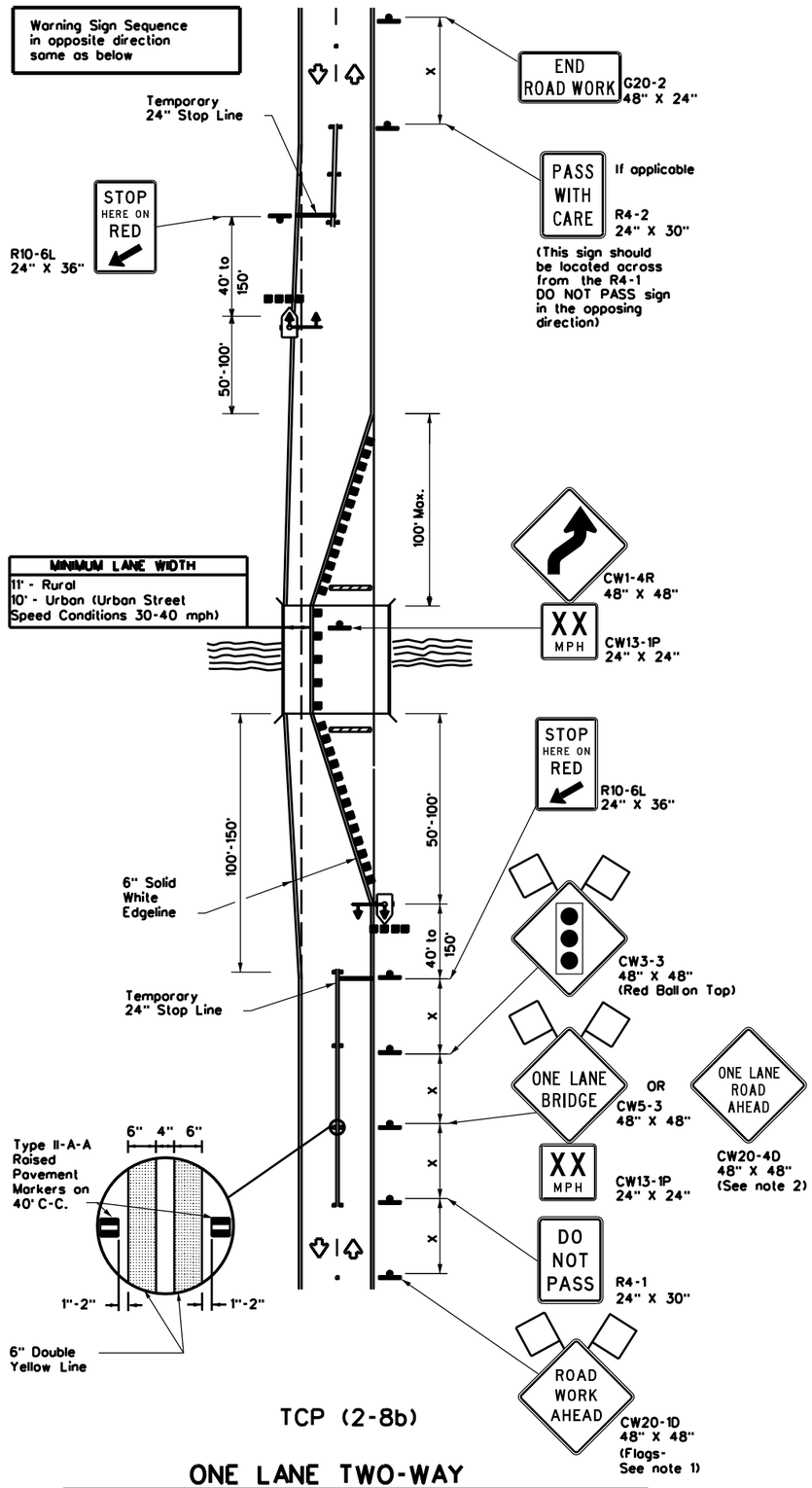
TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
12-85 4-98 2-18	DIST	COUNTY		SHEET NO.
8-95 3-03 4-23	LRD	WEBB		46
1-97 2-12				



TCP (2-8a)

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



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-8a)

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

TCP (2-8b)

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

Texas Department of Transportation

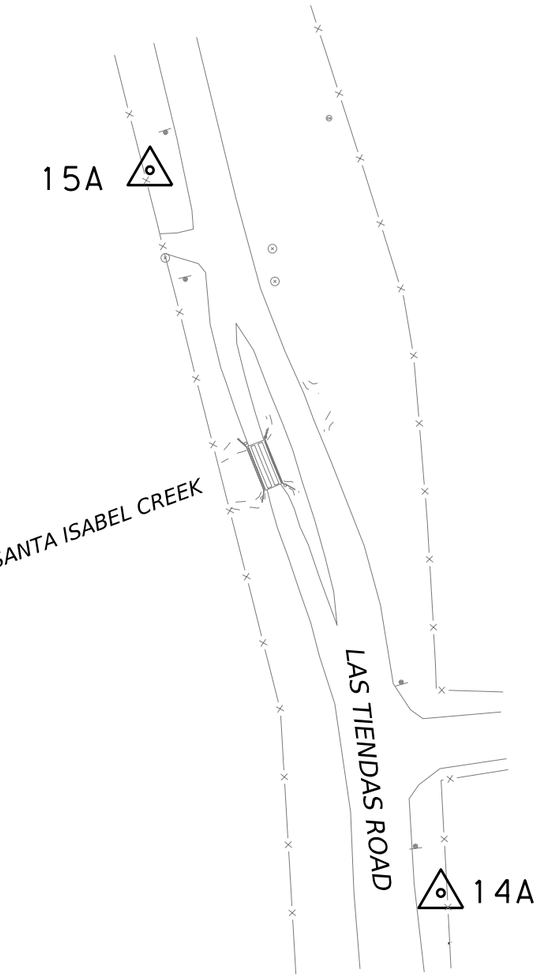
Traffic Safety Division Standard

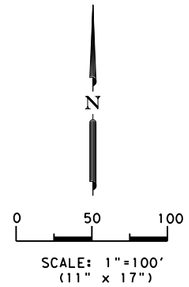
TRAFFIC CONTROL PLAN LONG TERM ONE-LANE TWO-WAY CONTROL

TCP(2-8)-23

FILE: tcp2-8-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	22	WEBB		47

DATE: $DATE$ $TIME$
FILE: $FILE$





SCALE: 1"=100'
(11" x 17")

CONTROL POINT	SURFACE VALUES		GRID VALUES		ELEV.	MONUMENT DESCRIPTION
	NORTHING	EASTING	NORTHING	EASTING		
14A	17,180,998.14	617,944.38	17,180,482.73	617,925.84	508.11	SET 5/8" IRON ROD W/ TXDOT ALUM CAP
15A	17,181,475.40	617,752.24	17,180,959.98	617,733.70	509.68	SET 5/8" IRON ROD W/ TXDOT ALUM CAP

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

STATE OF TEXAS
REGISTERED
HRISTINA PROEVA-PAVLINA
6947
PROFESSIONAL
LAND SURVEYOR

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

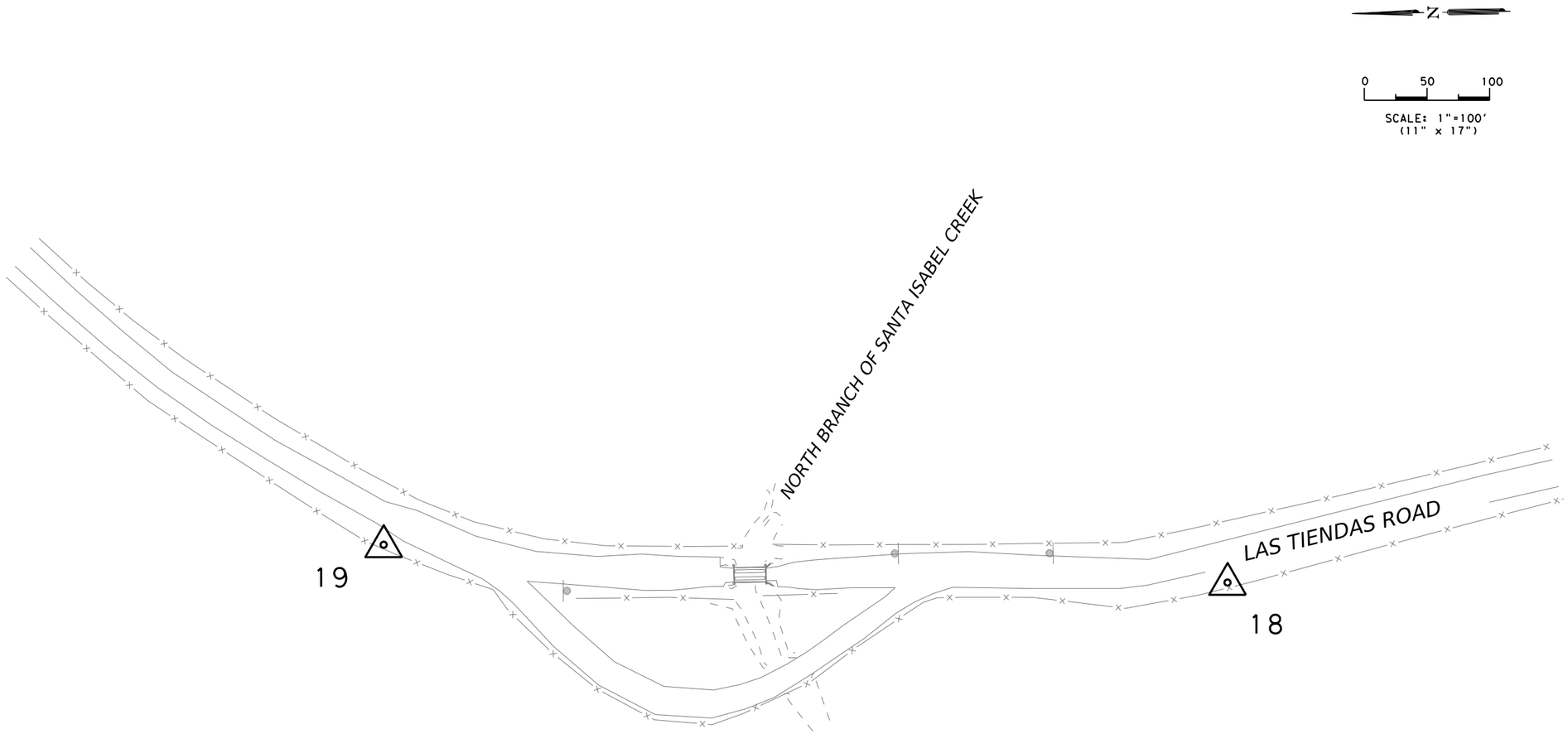
Texas Department of Transportation

LAS TIENDAS ROAD AT SOUTH BRANCH OF SANTA ISABEL CREEK

SURVEY CONTROL INDEX SHEET

SHEET 1 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		48



NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

STATE OF TEXAS
REGISTERED
HRISTINA PROEVA-PAVLINA
6947
PROFESSIONAL
LAND SURVEYOR

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS ROAD AT NORTH BRANCH OF SANTA ISABEL CREEK

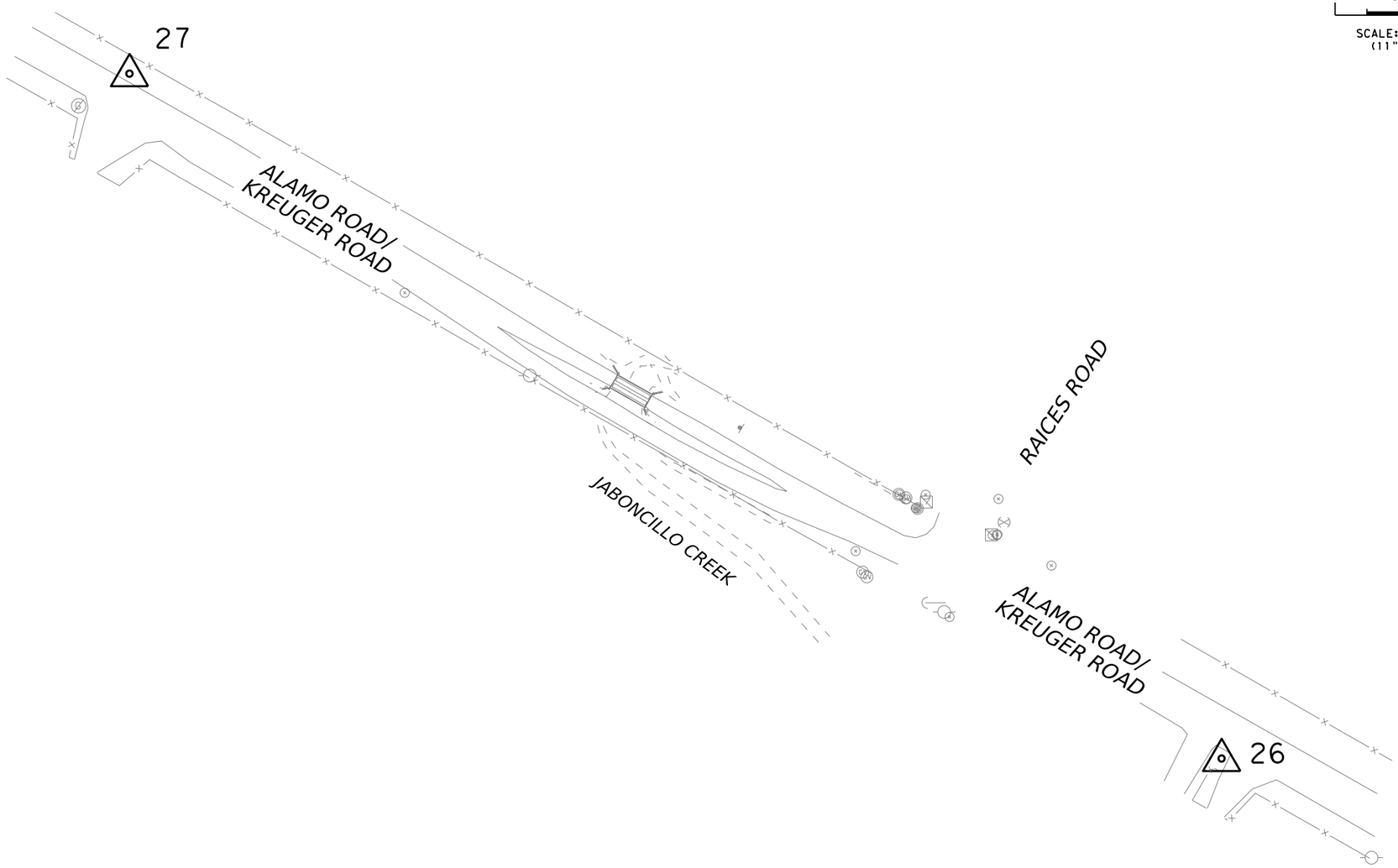
SURVEY CONTROL INDEX SHEET

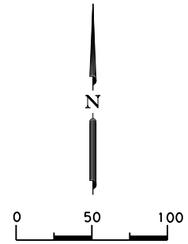
SHEET 2 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		49

CONTROL POINT	SURVEY CONTROL MONUMENTATION TABLE - GRID VALUES									
	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	NORTHING	EASTING	ELEV.	NORTHING	EASTING	ELEV.	Δ NORTHING	Δ EASTING	Δ ELEV.	
18	17,209,682.66	615,507.81	557.10	17,209,682.73	615,507.77	557.14	0.07	-0.04	0.04	FND TXDOT ALUM CAP IN CONCRETE
19	17,210,354.84	615,547.97	553.45	17,210,354.92	615,547.99	553.51	0.08	0.02	0.06	FND TXDOT ALUM CAP IN CONCRETE

CONTROL POINT	SURVEY CONTROL MONUMENTATION TABLE - SURFACE VALUES									
	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	NORTHING	EASTING	ELEV.	NORTHING	EASTING	ELEV.	Δ NORTHING	Δ EASTING	Δ ELEV.	
18	17,210,198.95	615,526.28	557.10	17,210,199.02	615,526.24	557.14	0.07	-0.04	0.04	FND TXDOT ALUM CAP IN CONCRETE
19	17,210,871.15	615,566.44	553.45	17,210,871.23	615,566.46	553.51	0.08	0.02	0.06	FND TXDOT ALUM CAP IN CONCRETE





SCALE: 1"=100'
(11" x 17")

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

CONTROL POINT	SURFACE VALUES		GRID VALUES		ELEV.	MONUMENT DESCRIPTION
	NORTHING	EASTING	NORTHING	EASTING		
26	17,288,778.18	687,794.61	17,288,259.53	687,773.98	625.09	SET 5/8" IRON ROD W/ TXDOT ALUM CAP
27	17,289,316.85	686,935.65	17,288,798.19	686,915.04	632.36	SET 5/8" IRON ROD W/ TXDOT ALUM CAP

HristinaPavlin 05-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

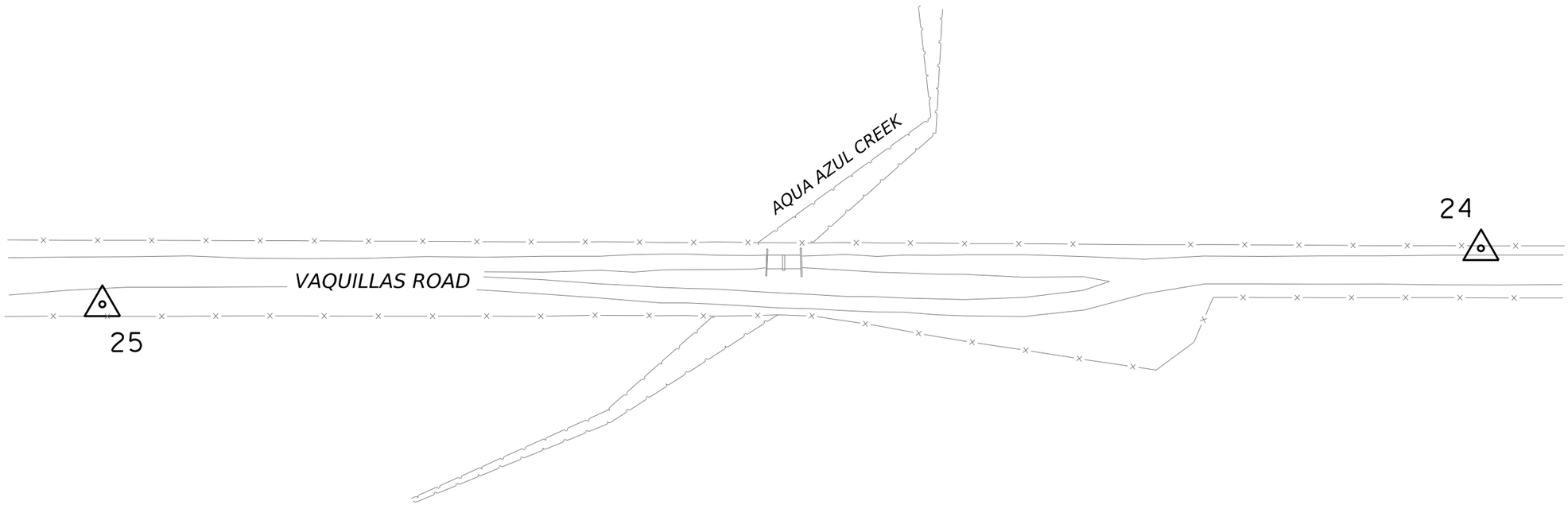
Texas Department of Transportation

KREUGER ROAD AT
JABONCILLO CREEK

SURVEY CONTROL
INDEX SHEET

SHEET 3 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		50



0 50 100

SCALE: 1"=100'
(11" x 17")

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS ROAD AT
AQUA AZUL CREEK

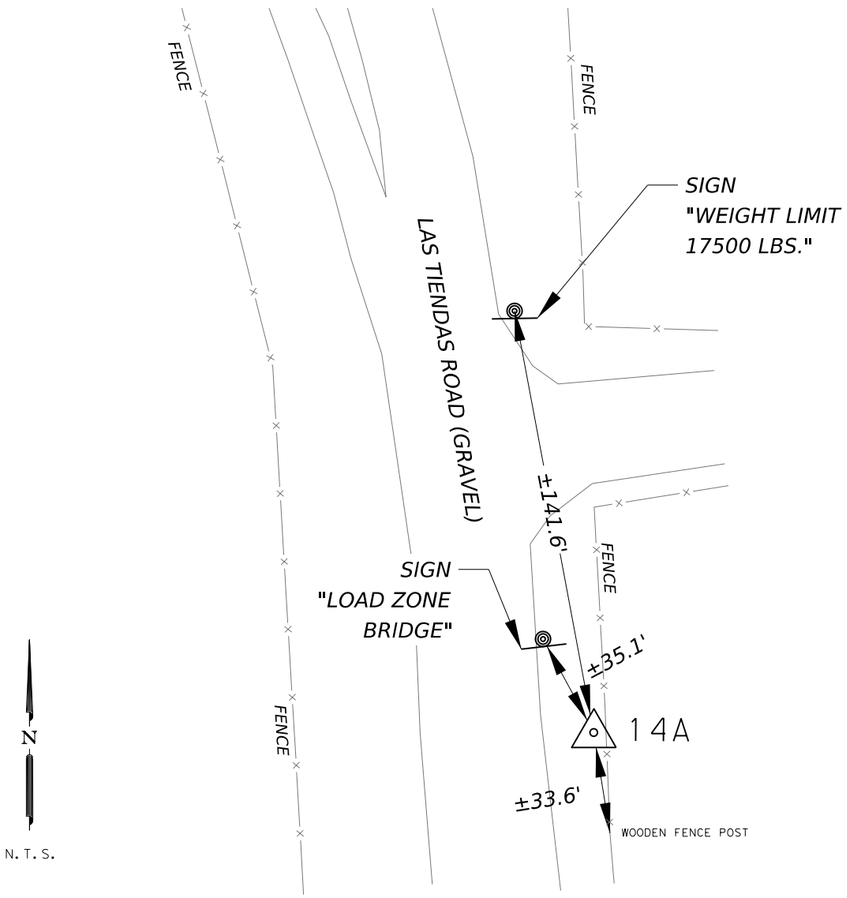
SURVEY CONTROL
INDEX SHEET

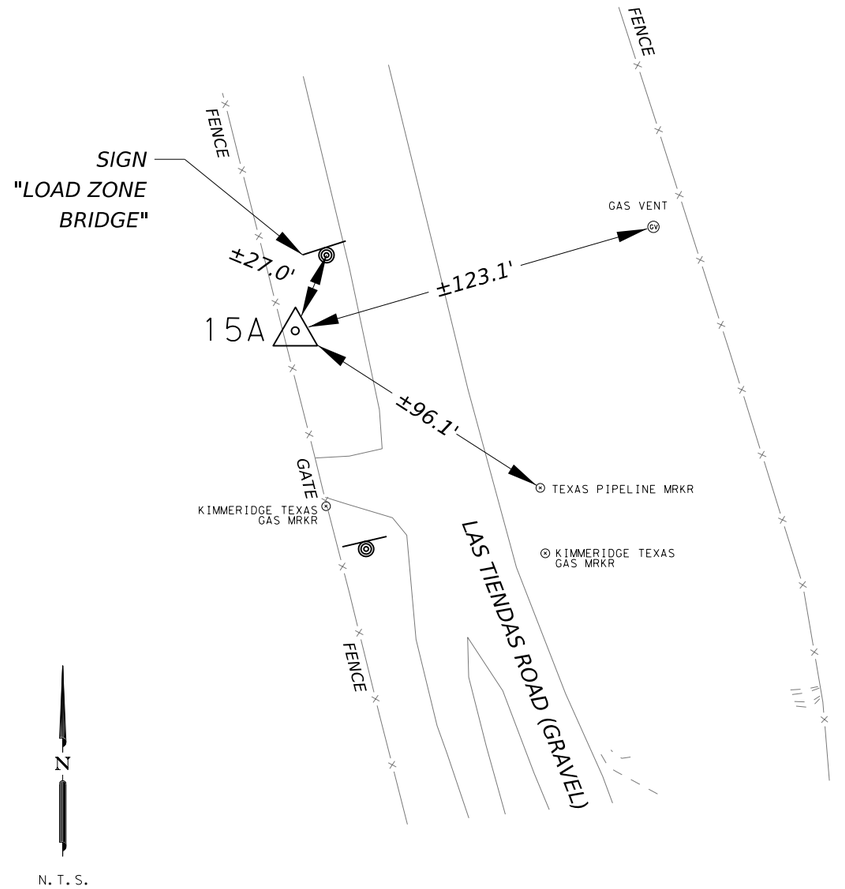
SHEET 4 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		51

CONTROL POINT	SURVEY CONTROL MONUMENTATION TABLE - GRID VALUES									
	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	NORTHING	EASTING	ELEV.	NORTHING	EASTING	ELEV.	Δ NORTHING	Δ EASTING	Δ ELEV.	
24	17,021,101.06	812,473.20	686.26	17,021,101.07	812,473.23	686.42	0.01	0.03	0.16	FND TXDOT ALUM CAP IN CONCRETE
25	17,022,060.70	811,847.04	678.02	17,022,060.74	811,847.16	678.13	0.04	0.12	0.11	FND TXDOT ALUM CAP IN CONCRETE

CONTROL POINT	SURVEY CONTROL MONUMENTATION TABLE - SURFACE VALUES									
	PUBLISHED INFORMATION			OBSERVED INFORMATION			DIFFERENCE			MONUMENT DESCRIPTION
	NORTHING	EASTING	ELEV.	NORTHING	EASTING	ELEV.	Δ NORTHING	Δ EASTING	Δ ELEV.	
24	17,021,611.69	812,497.57	686.26	17,021,611.70	812,497.60	686.42	0.01	0.03	0.16	FND TXDOT ALUM CAP IN CONCRETE
25	17,022,571.36	811,871.40	678.02	17,022,571.40	811,871.51	678.13	0.04	0.12	0.11	FND TXDOT ALUM CAP IN CONCRETE





NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

STATE OF TEXAS
REGISTERED
HRISTINA PROEVA-PAVLINA
6947
PROFESSIONAL
LAND SURVEYOR

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

CONTROL POINT NO. 14A

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF CAMINO COLOMBIA ROAD (TX-255) AND LAS TIENDAS ROAD, PROCEED NORTH ALONG LAS TIENDAS ROAD FOR 2.99 MI.
MONUMENT IS ON THE RIGHT SIDE OF THE ROAD.

MONUMENT: 5/8" IRON ROD W/TXDOT ALUM CAP
ELEVATION = 508.11'
NORTHING (SURFACE) = 17,180,998.14
EASTING (SURFACE) = 617,944.38
NORTHING (GRID) = 17,180,482.73
EASTING (GRID) = 617,925.84

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

CONTROL POINT NO. 15A

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF CAMINO COLOMBIA ROAD (TX-255) AND LAS TIENDAS ROAD, PROCEED NORTH ALONG LAS TIENDAS ROAD FOR 3.01 MI.
MONUMENT IS ON THE LEFT SIDE OF THE ROAD.

MONUMENT: 5/8" IRON ROD W/TXDOT ALUM CAP
ELEVATION = 509.68'
NORTHING (SURFACE) = 17,181,475.40
EASTING (SURFACE) = 617,752.24
NORTHING (GRID) = 17,180,959.98
EASTING (GRID) = 617,733.70

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

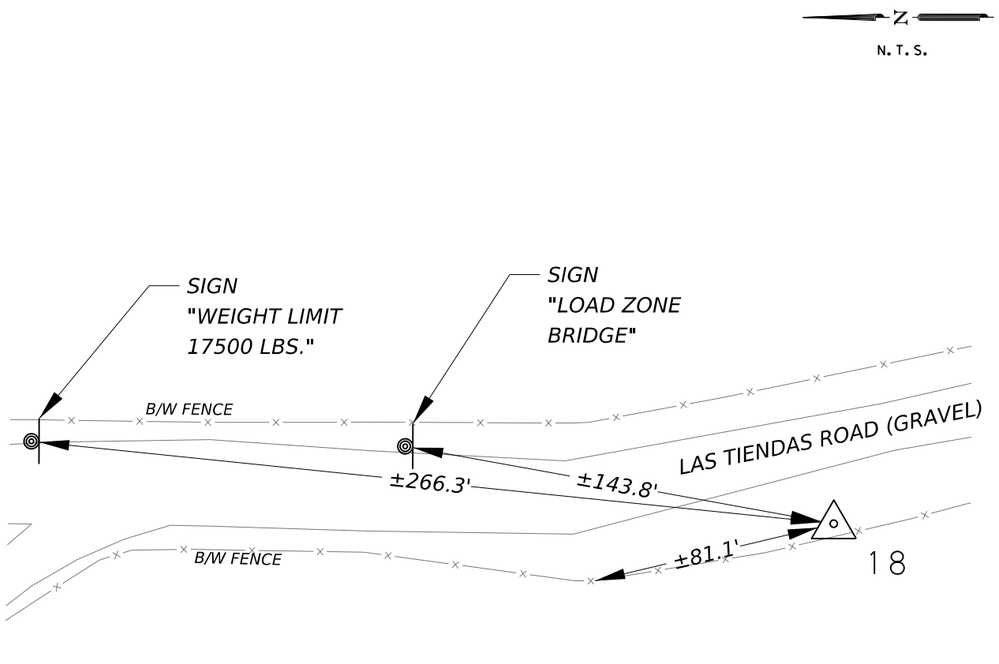
Texas Department of Transportation

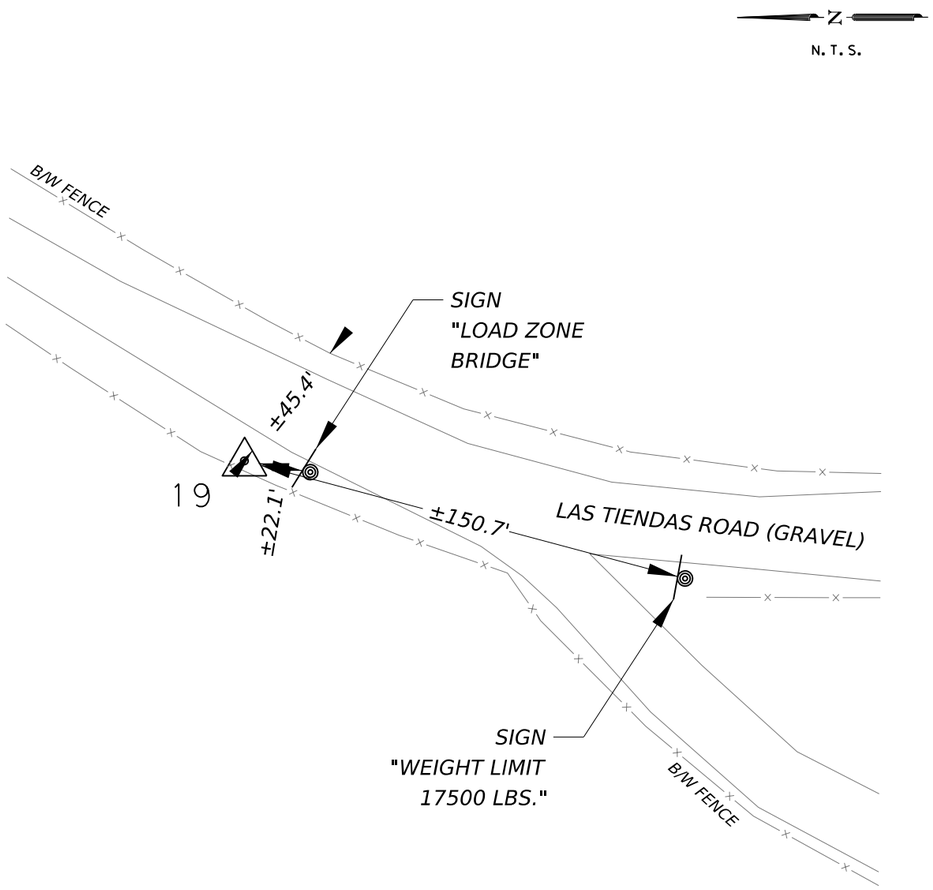
LAS TIENDAS ROAD AT SOUTH BRANCH OF SANTA ISABEL CREEK

HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 5 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		52





NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

STATE OF TEXAS
REGISTERED
HRISTINA PROEVA-PAVLINA
6947
PROFESSIONAL
LAND SURVEYOR

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

CONTROL POINT NO.18

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF CAMINO COLOMBIA ROAD (TX-255) AND LAS TIENDAS ROAD, PROCEED NORTH ALONG LAS TIENDAS ROAD FOR 8.50 MI. MONUMENT IS ON THE LEFT SIDE OF THE ROAD.

MONUMENT: FND TXDOT ALUM CAP IN CONCRETE
ELEVATION = 686.26′ (*)
NORTHING (SURFACE) = 17,021,611.69 (*)
EASTING (SURFACE) = 812,497.57 (*)
NORTHING (GRID) = 17,021,101.06 (*)
EASTING (GRID) = 812,473.20 (*)

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

(*) AS SET BY OTHERS

CONTROL POINT NO.19

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF CAMINO COLOMBIA ROAD (TX-255) AND LAS TIENDAS ROAD, PROCEED NORTH ALONG LAS TIENDAS ROAD FOR 8.63 MI. MONUMENT IS ON THE LEFT SIDE OF THE ROAD.

MONUMENT: FND TXDOT ALUM CAP IN CONCRETE
ELEVATION = 678.02′ (*)
NORTHING (SURFACE) = 17,022,571.36 (*)
EASTING (SURFACE) = 811,871.40 (*)
NORTHING (GRID) = 17,022,060.70 (*)
EASTING (GRID) = 811,847.04 (*)

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

(*) AS SET BY OTHERS

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

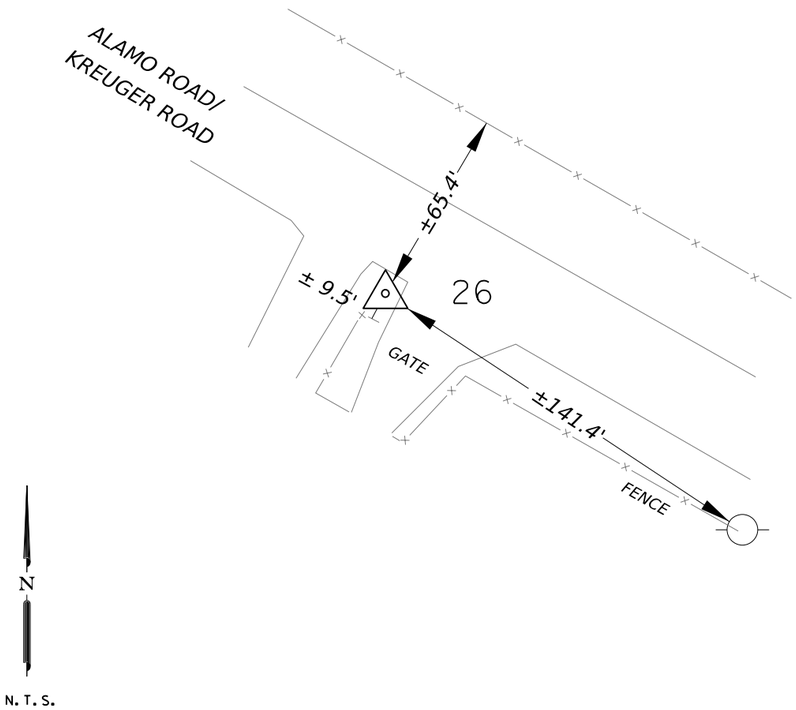
Texas Department of Transportation

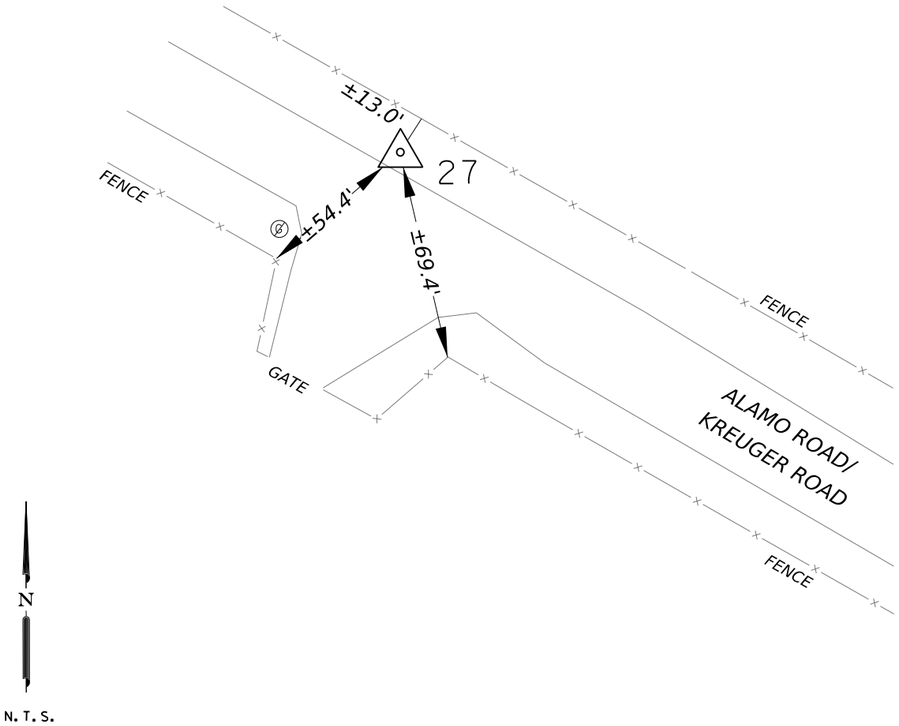
LAS TIENDAS ROAD AT NORTH BRANCH OF SANTA ISABEL CREEK

HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 6 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		53





NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

STATE OF TEXAS
REGISTERED
HRISTINA PROEVA-PAVLINA
6947
PROFESSIONAL
LAND SURVEYOR

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

CONTROL POINT NO.26

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF TX-44 AND KREUGER ROAD,
PROCEED NORTHWEST ALONG KREUGER ROAD THEN ALAMO
ROAD FOR 5.20 MI.
THE MONUMENT IS ON THE LEFT SIDE OF ALAMO ROAD,
265 FEET SOUTHEAST OF THE INTERSECTION WITH RAICES ROAD.

MONUMENT: 5/8" IRON ROD W/TXDOT ALUM CAP
ELEVATION = 625.09'
NORTHING (SURFACE) = 17,288,778.18
EASTING (SURFACE) = 687,794.61
NORTHING (GRID) = 17,288,259.53
EASTING (GRID) = 687,773.98

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

CONTROL POINT NO.27

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF TX-44 AND KREUGER ROAD, PROCEED
NORTHWEST ALONG KREUGER ROAD AND THEN ALAMO ROAD FOR
5.25 MI. TO THE INTERSECTION WITH RAICES ROAD, THEN CONTINUE
ALONG ALAMO ROAD FOR 0.14 MI.
THE MONUMENT IS ON THE RIGHT SIDE OF THE ROAD.

MONUMENT: 5/8" IRON ROD W/TXDOT ALUM CAP
ELEVATION = 632.36'
NORTHING (SURFACE) = 17,289,316.85
EASTING (SURFACE) = 686,935.65
NORTHING (GRID) = 17,288,798.19
EASTING (GRID) = 686,915.04

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

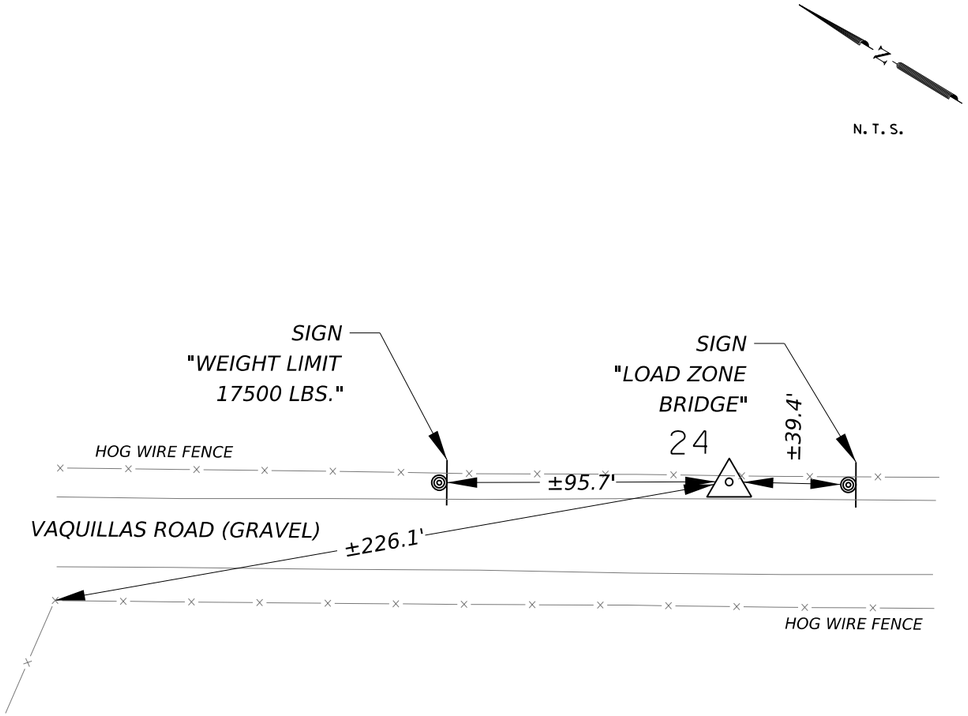
Texas Department of Transportation

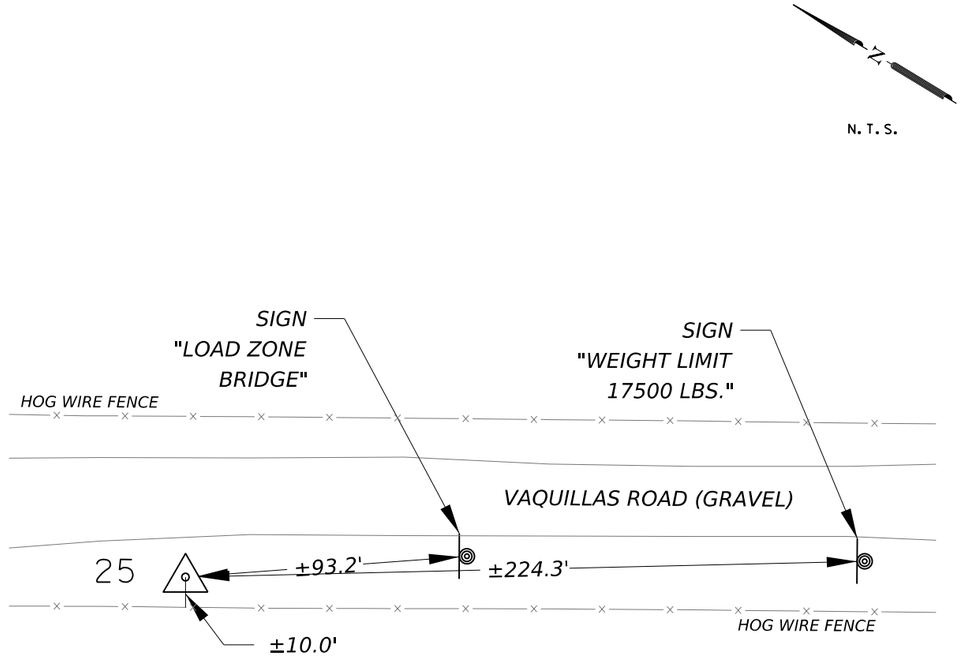
KREUGER ROAD AT JABONCILLO CREEK

HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 7 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		54





NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NORTH AMERICAN DATUM OF 1983 (NAD 83) (2011 ADJ.), AS REFERENCED TO GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS VIA THE TXDOT VIRTUAL REFERENCE STATION (VRS) NETWORK.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

3. CONTROL POINTS 14A, 15A, 26, AND 27 WERE SET BY ATKINSREALIS. CONTROL POINTS 18, 19, 24, AND 25 WERE SET BY OTHERS.

4. THE UNIT OF MEASURE IS THE U.S. SURVEY FOOT.

5. ALL COORDINATES AND DISTANCES ARE SURFACE VALUES AND CAN BE CONVERTED TO GRID VALUES BY DIVIDING BY TXDOT ADJUSTMENT FACTOR OF 1.00003.

STATE OF TEXAS
REGISTERED
HRISTINA PROEVA-PAVLINA
6947
PROFESSIONAL
LAND SURVEYOR

HristinaPavlin 03-28-2024

HRISTINA PROEVA-PAVLINA
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6947

SURVEY DATE: OCT 2023

CONTROL POINT NO.24

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF JENNINGS ROAD AND VAQUILLAS ROAD, PROCEED SOUTHEASTERLY ALONG VAQUILLAS ROAD FOR 7.10 MI. MONUMENT IS ON THE LEFT SIDE OF THE ROAD.

MONUMENT: FND TXDOT ALUM CAP IN CONCRETE
ELEVATION = 686.26′ (*)
NORTHING (SURFACE) = 17,021,611.69 (*)
EASTING (SURFACE) = 812,497.57 (*)
NORTHING (GRID) = 17,021,101.06 (*)
EASTING (GRID) = 812,473.20 (*)

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

(*) AS SET BY OTHERS

CONTROL POINT NO.25

APPROXIMATE LOCATION:
FROM THE INTERSECTION OF JENNINGS ROAD AND VAQUILLAS ROAD, PROCEED SOUTHEASTERLY ALONG VAQUILLAS ROAD FOR 6.88 MI. MONUMENT IS ON THE RIGHT SIDE OF THE ROAD.

MONUMENT: FND TXDOT ALUM CAP IN CONCRETE
ELEVATION = 678.02′ (*)
NORTHING (SURFACE) = 17,022,571.36 (*)
EASTING (SURFACE) = 811,871.40 (*)
NORTHING (GRID) = 17,022,060.70 (*)
EASTING (GRID) = 811,847.04 (*)

UNITS: U.S. SURVEY FEET
SCALE FACTOR = 1.00003

(*) AS SET BY OTHERS

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS ROAD AT
AQUA AZUL CREEK

HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 8 OF 8

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		55

100% SUBMITTAL

DN: | CF | CK: RW | DW: MG | CK: RW

LOCATION #1- LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)
CSJ: 0922-33-185
HORIZONTAL DATA

Alignment Name:	CL_LasTiendasSouth		
Alignment Description:			
Alignment Style:	Alignment\Baseline		
	Station	**Northing**	**Easting**
Element: Linear			
POT	( ) 10+00.000 R1	17180432.28	617887.485
PC	( ) 10+76.738 R1	17180508.69	617880.48
Tangential Direction:	N05°14'16.203"W		
Tangential Length:	76.738		
Element: Circular			
PC	( ) 10+76.738 R1	17180508.69	617880.48
PI	( ) 11+59.977 R1	17180591.59	617872.881
CC	( )	17180444.79	617183.403
PT	( ) 12+42.438 R1	17180670.38	617846.055
Radius:	700		
Delta:	13°33'45.738"	Left	
Degree of Curvature (Arc):	08°11'06.401"		
Length:	165.7		
Tangent:	83.239		
Chord:	165.313		
Middle Ordinate:	4.897		
External:	4.932		
Back Tangent Direction:	N05°14'16.203"W		
Back Radial Direction:	N84°45'43.797"E		
Chord Direction:	N12°01'09.071"W		
Ahead Radial Direction:	N71°11'58.060"E		
Ahead Tangent Direction:	N18°48'01.940"W		
Element: Linear			
PT	( ) 12+42.438 R1	17180670.38	617846.055
PC	( ) 13+79.294 R1	17180799.94	617801.95
Tangential Direction:	N18°48'01.940"W		
Tangential Length:	136.856		
Element: Circular			
PC	( ) 13+79.294 R1	17180799.94	617801.95
PI	( ) 14+49.944 R1	17180866.82	617779.181
CC	( )	17181025.53	618464.602
PT	( ) 15+20.118 R1	17180936.9	617770.236
Radius:	700		
Delta:	11°31'35.726"	Right	
Degree of Curvature (Arc):	08°11'06.401"		
Length:	140.824		
Tangent:	70.65		
Chord:	140.587		
Middle Ordinate:	3.538		
External:	3.556		
Back Tangent Direction:	N18°48'01.940"W		
Back Radial Direction:	N71°11'58.060"E		
Chord Direction:	N13°02'14.077"W		
Ahead Radial Direction:	N82°43'33.786"E		
Ahead Tangent Direction:	N07°16'26.214"W		
Element: Linear			
PT	( ) 15+20.118 R1	17180936.9	617770.236
PC	( ) 15+39.173 R1	17180955.8	617767.823
Tangential Direction:	N07°16'26.214"W		
Tangential Length:	19.055		
Element: Circular			
PC	( ) 15+39.173 R1	17180955.8	617767.823
PI	( ) 15+78.515 R1	17180994.83	617762.842
CC	( )	17180867.17	617073.457
PT	( ) 16+17.774 R1	17181033.05	617753.519
Radius:	700		
Delta:	06°26'00.834"	Left	
Degree of Curvature (Arc):	08°11'06.401"		
Length:	78.601		
Tangent:	39.342		
Chord:	78.56		
Middle Ordinate:	1.103		
External:	1.105		
Back Tangent Direction:	N07°16'26.214"W		
Back Radial Direction:	N82°43'33.786"E		
Chord Direction:	N10°29'26.631"W		
Ahead Radial Direction:	N76°17'32.952"E		
Ahead Tangent Direction:	N13°42'27.048"W		
Element: Linear			
PT	( ) 16+17.774 R1	17181033.05	617753.519
POT	( ) 16+30.972 R1	17181045.87	617750.392
Tangential Direction:	N13°42'27.048"W		
Tangential Length:	13.198		

LOCATION #1- LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)
CSJ: 0922-33-185
VERTICAL DATA

Horizontal Alignment:	CL_LasTiendasSouth	
Horizontal Description:		
Horizontal Style:	Alignment\Baseline	
Vertical Alignment:	PRO_Tiendas_S	
Vertical Description:		
Vertical Style:	Alignment\Baseline	
	Station	**Elevation**
Element: Linear		
POT	12+08.440 R1	507.767
VPC	12+18.934 R1	507.899
Tangent Grade:	1.25%	
Tangent Length:	10.494	
Element: Symmetrical Parabola		
VPC	12+18.934 R1	507.899
VPI	12+58.934 R1	508.399
VPT	12+98.934 R1	510.399
Length:	80	
Entrance Grade:	1.25%	
Exit Grade:	5.00%	
r = 100 * (g2 - g1) / L:	4.688	
K = l / (g2 - g1):	21.333	
Middle Ordinate:	0.375	
Element: Linear		
VPT	12+98.934 R1	510.399
VPC	13+10.060 R1	510.955
Tangent Grade:	5.00%	
Tangent Length:	11.126	
Element: Symmetrical Parabola		
VPC	13+10.060 R1	510.955
VPI	13+40.060 R1	512.455
VPT	13+70.060 R1	511.405
VHP	13+45.354 R1	511.837
Length:	60	
Entrance Grade:	5.00%	
Exit Grade:	-3.50%	
r = 100 * (g2 - g1) / L:	-14.167	
K = l / (g2 - g1):	7.059	
Middle Ordinate:	-0.637	
Element: Linear		
VPT	13+70.060 R1	511.405
VPC	13+95.435 R1	510.517
Tangent Grade:	-3.50%	
Tangent Length:	25.376	
Element: Symmetrical Parabola		
VPC	13+95.435 R1	510.517
VPI	14+25.435 R1	509.467
VPT	14+55.435 R1	509.242
Length:	60	
Entrance Grade:	-3.50%	
Exit Grade:	-0.75%	
r = 100 * (g2 - g1) / L:	4.583	
K = l / (g2 - g1):	21.818	
Middle Ordinate:	0.206	
Element: Linear		
VPT	14+55.435 R1	509.242
POT	14+61.543 R1	509.196
Tangent Grade:	-0.75%	
Tangent Length:	6.108	

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT
SANTA ISABEL CK BRANCH (SOUTH)

GEOMETRIC DATA

SCALE: N.T.S.

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		56

DATE: 5/2/2024 5:20:45 PM
FILE: ...\LasTiendasSouth_Geometrics

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

LOCATION #2- LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)
CSJ: 0922-33-196
HORIZONTAL DATA

Alignment Name:	CL_Tiendas_N		
Alignment Description:			
Alignment Style:	Alignment\Baseline		
	Station	**Northing**	**Easting**
Element: Linear			
POT	( ) 10+00.000 R1	17209769.96	615516.491
PC	( ) 11+19.640 R1	17209889.58	615519.087
Tangential Direction:	N01°14'36.258"E		
Tangential Length:	119.64		
Element: Circular			
PC	( ) 11+19.640 R1	17209889.58	615519.087
PI	( ) 11+74.178 R1	17209944.1	615520.27
CC	( )	17209917.35	614239.388
PT	( ) 12+28.650 R1	17209998.53	615516.811
Radius:	1280		
Delta:	04°52'46.367"	Left	
Degree of Curvature (Arc):	04°28'34.438"		
Length:	109.01		
Tangent:	54.538		
Chord:	108.977		
Middle Ordinate:	1.16		
External:	1.161		
Back Tangent Direction:	N01°14'36.258"E		
Back Radial Direction:	S88°45'23.742"E		
Chord Direction:	N01°11'46.926"W		
Ahead Radial Direction:	N86°21'49.891"E		
Ahead Tangent Direction:	N03°38'10.109"W		
Element: Linear			
PT	( ) 12+28.650 R1	17209998.53	615516.811
PC	( ) 13+22.425 R1	17210092.12	615510.864
Tangential Direction:	N03°38'10.109"W		
Tangential Length:	93.774		
Element: Circular			
PC	( ) 13+22.425 R1	17210092.12	615510.864
PI	( ) 14+39.075 R1	17210208.53	615503.466
CC	( )	17210120.65	615959.958
PT	( ) 15+50.701 R1	17210313.88	615553.555
Radius:	450		
Delta:	29°03'54.268"	Right	
Degree of Curvature (Arc):	12°43'56.624"		
Length:	228.277		
Tangent:	116.651		
Chord:	225.837		
Middle Ordinate:	14.398		
External:	14.873		
Back Tangent Direction:	N03°38'10.109"W		
Back Radial Direction:	N86°21'49.891"E		
Chord Direction:	N10°53'47.024"E		
Ahead Radial Direction:	S64°34'15.842"E		
Ahead Tangent Direction:	N25°25'44.158"E		
Element: Linear			
PT	( ) 15+50.701 R1	17210313.88	615553.555
POT	( ) 15+72.290 R1	17210333.38	615562.825
Tangential Direction:	N25°25'44.158"E		
Tangential Length:	21.589		

LOCATION #2- LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)
CSJ: 0922-33-196
VERTICAL DATA

Horizontal Alignment:	CL_Tiendas_N	
Horizontal Description:		
Horizontal Style:	Alignment\Baseline	
Vertical Alignment:	PRO_Tiendas_N	
Vertical Description:		
Vertical Style:	Alignment\Baseline	
	Station	**Elevation**
Element: Linear		
POT	11+78.140 R1	551.586
VPC	11+87.493 R1	551.642
Tangent Grade:	0.60%	
Tangent Length:	9.353	
Element: Symmetrical Parabola		
VPC	11+87.493 R1	551.642
VPI	12+17.493 R1	551.822
VPT	12+47.493 R1	552.422
Length:	60	
Entrance Grade:	0.60%	
Exit Grade:	2.00%	
r = 100 * (g2 - g1) / L:	2.333	
K = l / (g2 - g1):	42.857	
Middle Ordinate:	0.105	
Element: Linear		
VPT	12+47.493 R1	552.422
VPC	12+74.304 R1	552.958
Tangent Grade:	2.00%	
Tangent Length:	26.811	
Element: Symmetrical Parabola		
VPC	12+74.304 R1	552.958
VPI	13+04.304 R1	553.558
VPT	13+34.304 R1	552.958
VHP	13+04.304 R1	553.258
Length:	60	
Entrance Grade:	2.00%	
Exit Grade:	-2.00%	
r = 100 * (g2 - g1) / L:	-6.667	
K = l / (g2 - g1):	15	
Middle Ordinate:	-0.3	
Element: Linear		
VPT	13+34.304 R1	552.958
VPC	13+43.661 R1	552.771
Tangent Grade:	-2.00%	
Tangent Length:	9.357	
Element: Symmetrical Parabola		
VPC	13+43.661 R1	552.771
VPI	13+73.661 R1	552.171
VPT	14+03.661 R1	552.396
VLP	13+87.297 R1	552.335
Length:	60	
Entrance Grade:	-2.00%	
Exit Grade:	0.75%	
r = 100 * (g2 - g1) / L:	4.583	
K = l / (g2 - g1):	21.818	
Middle Ordinate:	0.206	
Element: Linear		
VPT	14+03.661 R1	552.396
POT	14+69.073 R1	552.887
Tangent Grade:	0.75%	
Tangent Length:	65.412	

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT
SANTA ISABEL CK BRANCH (NORTH)

GEOMETRIC DATA

SCALE: N.T.S.

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		57

DATE: 5/2/2024 5:20:50 PM
FILE: ...\LasTiendasNorth Geometrics

100% SUBMITTAL

DN: CF | CK: RW | DW: MG | CK: RW

LOCATION #3- KREUGER RD AT JABONCILLO CREEK BRANCH
CSJ: 0922-33-187
HORIZONTAL DATA

Alignment Name:	CL_Krueger		
Alignment Description:			
Alignment Style:	Alignment\Baseline		
	Station	**Northing**	**Easting**
Element: Linear			
POT	( ) 10+00.000 R1	17288791.	686887.112
PC	( ) 12+19.229 R1	17288682	687076.757
Tangential Direction:	S59°53'21.026"E		
Tangential Length:	219.229		
Element: Circular			
PC	( ) 12+19.229 R1	17288682	687076.757
PI	( ) 12+65.928 R1	17288658.	687117.155
CC	( )	17290048.	687869.403
PT	( ) 13+12.600 R1	17288637.	687158.865
Radius:	1580		
Delta:	03°23'09.369"	Left	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	93.371		
Tangent:	46.699		
Chord:	93.358		
Middle Ordinate:	0.69		
External:	0.69		
Back Tangent Direction:	S59°53'21.026"E		
Back Radial Direction:	S30°06'38.974"W		
Chord Direction:	S61°34'55.710"E		
Ahead Radial Direction:	S26°43'29.605"W		
Ahead Tangent Direction:	S63°16'30.395"E		
Element: Linear			
PT	( ) 13+12.600 R1	17288637.	687158.865
PC	( ) 13+55.549 R1	17288618.	687197.226
Tangential Direction:	S63°16'30.395"E		
Tangential Length:	42.949		
Element: Circular			
PC	( ) 13+55.549 R1	17288618.	687197.226
PI	( ) 13+97.000 R1	17288599.	687234.249
CC	( )	17287207	686486.689
PT	( ) 14+38.432 R1	17288579	687270.244
Radius:	1580		
Delta:	03°00'20.148"	Right	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	82.883		
Tangent:	41.451		
Chord:	82.873		
Middle Ordinate:	0.543		
External:	0.544		
Back Tangent Direction:	S63°16'30.395"E		
Back Radial Direction:	S26°43'29.605"W		
Chord Direction:	S61°46'20.321"E		
Ahead Radial Direction:	S29°43'49.753"W		
Ahead Tangent Direction:	S60°16'10.247"E		
Element: Linear			
PT	( ) 14+38.432 R1	17288579	687270.244
PC	( ) 15+27.984 R1	17288534.	687348.008
Tangential Direction:	S60°16'10.247"E		
Tangential Length:	89.552		
Element: Circular			
PC	( ) 15+27.984 R1	17288534.	687348.008
PI	( ) 15+66.049 R1	17288515.	687381.062
CC	( )	17287162.	686564.453
PT	( ) 16+04.098 R1	17288495.	687413.169
Radius:	1580		
Delta:	02°45'36.529"	Right	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	76.114		
Tangent:	38.065		
Chord:	76.107		
Middle Ordinate:	0.458		
External:	0.458		
Back Tangent Direction:	S60°16'10.247"E		
Back Radial Direction:	S29°43'49.753"W		
Chord Direction:	S58°53'21.983"E		
Ahead Radial Direction:	S32°29'26.282"W		
Ahead Tangent Direction:	S57°30'33.718"E		
Element: Linear			
PT	( ) 16+04.098 R1	17288495.	687413.169
PC	( ) 16+74.711 R1	17288457.	687472.729
Tangential Direction:	S57°30'33.718"E		
Tangential Length:	70.612		
Element: Circular			
PC	( ) 16+74.711 R1	17288457.	687472.729
PI	( ) 17+14.795 R1	17288435.	687506.539
CC	( )	17289790.	688321.444
PT	( ) 17+54.863 R1	17288416	687541.398
Radius:	1580		
Delta:	02°54'23.693"	Left	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	80.152		
Tangent:	40.085		
Chord:	80.144		
Middle Ordinate:	0.508		
External:	0.508		
Back Tangent Direction:	S57°30'33.718"E		
Back Radial Direction:	S32°29'26.282"W		
Chord Direction:	S58°57'45.565"E		
Ahead Radial Direction:	S29°35'02.589"W		
Ahead Tangent Direction:	S60°24'57.411"E		
Element: Linear			
PT	( ) 17+54.863 R1	17288416	687541.398
POT	( ) 21+54.255 R1	17288218.	687888.722
Tangential Direction:	S60°24'57.411"E		
Tangential Length:	399.391		

LOCATION #3- KREUGER RD AT JABONCILLO CREEK BRANCH
CSJ: 0922-33-187
VERTICAL DATA

Horizontal Alignment:	CL_Krueger	
Horizontal Description:		
Horizontal Style:	Alignment\Baseline	
Vertical Alignment:	PRO_Kreuger	
Vertical Description:		
Vertical Style:	Alignment\Baseline	
	Station	**Elevation**
Element: Linear		
POT	13+21.040 R1	629.332
VPC	13+40.354 R1	629.235
Tangent Grade:	-0.50%	
Tangent Length:	19.314	
Element: Symmetrical Parabola		
VPC	13+40.354 R1	629.235
VPI	13+87.104 R1	629.001
VPT	14+33.854 R1	631.339
VLP	13+48.854 R1	629.214
Length:	93.5	
Entrance Grade:	-0.50%	
Exit Grade:	5.00%	
r = 100 * (g2 - g1) / L:	5.882	
K = l / (g2 - g1):	17	
Middle Ordinate:	0.643	
Element: Linear		
VPT	14+33.854 R1	631.339
VPC	14+52.388 R1	632.266
Tangent Grade:	5.00%	
Tangent Length:	18.535	
Element: Symmetrical Parabola		
VPC	14+52.388 R1	632.266
VPI	14+87.388 R1	634.016
VPT	15+22.388 R1	632.266
VHP	14+87.388 R1	633.141
Length:	70	
Entrance Grade:	5.00%	
Exit Grade:	-5.00%	
r = 100 * (g2 - g1) / L:	-14.286	
K = l / (g2 - g1):	7	
Middle Ordinate:	-0.875	
Element: Linear		
VPT	15+22.388 R1	632.266
VPC	15+58.268 R1	630.472
Tangent Grade:	-5.00%	
Tangent Length:	35.88	
Element: Symmetrical Parabola		
VPC	15+58.268 R1	630.472
VPI	15+93.118 R1	628.729
VPT	16+27.968 R1	628.415
Length:	69.7	
Entrance Grade:	-5.00%	
Exit Grade:	-0.90%	
r = 100 * (g2 - g1) / L:	5.882	
K = l / (g2 - g1):	17	
Middle Ordinate:	0.357	
Element: Linear		
VPT	16+27.968 R1	628.415
POT	16+46.620 R1	628.247
Tangent Grade:	-0.90%	

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD AT JABONCILLO CK BRANCH

GEOMETRIC DATA

SCALE: N.T.S.

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		58

DATE: 5/2/2024 5:20:55 PM
FILE: ...\Geometry\Kreuger Geometrics

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

LOCATION #4- VAQUILLAS RD AT AGUA AZUL CREEK
CSJ: 0922-33-197
HORIZONTAL DATA

Alignment Name:	CL_Vaquillas		
Alignment Description:			
Alignment Style:	Alignment\Baseline		
	Station	Northing	Easting
Element: Linear			
POT	( ) 10+00.000 R1	17021365.	812300.464
PC	( ) 10+22.605 R1	17021384.	812288.87
Tangential Direction:	N30°51'18.807"W		
Tangential Length:	22.605		
Element: Circular			
PC	( ) 10+22.605 R1	17021384.	812288.87
PI	( ) 10+56.695 R1	17021414.	812271.386
CC	( )	17020574.	810932.494
PT	( ) 10+90.774 R1	17021442.	812252.657
Radius:	1580		
Delta:	02°28'19.180"	Left	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	68.168		
Tangent:	34.089		
Chord:	68.163		
Middle Ordinate:	0.368		
External:	0.368		
Back Tangent Direction:	N30°51'18.807"W		
Back Radial Direction:	N59°08'41.193"E		
Chord Direction:	N32°05'28.397"W		
Ahead Radial Direction:	N56°40'22.013"E		
Ahead Tangent Direction:	N33°19'37.987"W		
Element: Linear			
PT	( ) 10+90.774 R1	17021442.	812252.657
PC	( ) 11+40.774 R1	17021484.	812225.186
Tangential Direction:	N33°19'37.987"W		
Tangential Length:	50		
Element: Circular			
PC	( ) 11+40.774 R1	17021484.	812225.186
PI	( ) 11+78.682 R1	17021516.	812204.359
CC	( )	17022352.	813545.35
PT	( ) 12+16.575 R1	17021548.	812185.074
Radius:	1580		
Delta:	02°44'55.724"	Right	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	75.802		
Tangent:	37.908		
Chord:	75.795		
Middle Ordinate:	0.455		
External:	0.455		
Back Tangent Direction:	N33°19'37.987"W		
Back Radial Direction:	N56°40'22.013"E		
Chord Direction:	N31°57'10.125"W		
Ahead Radial Direction:	N59°25'17.737"E		
Ahead Tangent Direction:	N30°34'42.263"W		
Element: Linear			
PT	( ) 12+16.575 R1	17021548.	812185.074
PC	( ) 13+20.244 R1	17021638.	812132.336
Tangential Direction:	N30°34'42.263"W		
Tangential Length:	103.669		
Element: Circular			
PC	( ) 13+20.244 R1	17021638.	812132.336
PI	( ) 13+46.244 R1	17021660.	812119.109
CC	( )	17022441.	813492.611
PT	( ) 13+72.240 R1	17021683.	812106.626
Radius:	1580		
Delta:	01°53'07.897"	Right	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	51.996		
Tangent:	26		
Chord:	51.993		
Middle Ordinate:	0.214		
External:	0.214		
Back Tangent Direction:	N30°34'42.263"W		
Back Radial Direction:	N59°25'17.737"E		
Chord Direction:	N29°38'08.314"W		
Ahead Radial Direction:	N61°18'25.635"E		
Ahead Tangent Direction:	N28°41'34.365"W		
Element: Linear			
PT	( ) 13+72.240 R1	17021683.	812106.626
PC	( ) 14+34.421 R1	17021737.	812076.772
Tangential Direction:	N28°41'34.365"W		
Tangential Length:	62.181		
Element: Circular			
PC	( ) 14+34.421 R1	17021737.	812076.772
PI	( ) 14+64.240 R1	17021763.	812062.456
CC	( )	17020979.	810690.787
PT	( ) 14+94.051 R1	17021789.	812047.163
Radius:	1580		
Delta:	02°09'44.441"	Left	
Degree of Curvature (Arc):	03°37'34.735"		
Length:	59.629		
Tangent:	29.818		
Chord:	59.626		
Middle Ordinate:	0.281		
External:	0.281		
Back Tangent Direction:	N28°41'34.365"W		
Back Radial Direction:	N61°18'25.635"E		
Chord Direction:	N29°46'26.586"W		
Ahead Radial Direction:	N59°08'41.193"E		
Ahead Tangent Direction:	N30°51'18.807"W		
Element: Linear			
PT	( ) 14+94.051 R1	17021789.	812047.163
POT	( ) 15+45.355 R1	17021833.	812020.851
Tangential Direction:	N30°51'18.807"W		
Tangential Length:	51.304		

LOCATION #4- VAQUILLAS RD AT AGUA AZUL CREEK
CSJ: 0922-33-197
VERTICAL DATA

Horizontal Alignment:	CL_Vaquillas	
Horizontal Description:		
Horizontal Style:	Alignment\Baseline	
Vertical Alignment:	PRO_Vaquillas	
Vertical Description:		
Vertical Style:	Alignment\Baseline	
	Station	Elevation
Element: Linear		
POT	11+25.828 R1	680.956
VPI	11+75.828 R1	680.735
Tangent Grade:	-0.44%	
Tangent Length:	50	
Element: Linear		
VPI	11+75.828 R1	680.735
VPC	11+77.874 R1	680.743
Tangent Grade:	0.40%	
Tangent Length:	2.047	
Element: Symmetrical Parabola		
VPC	11+77.874 R1	680.743
VPI	12+07.874 R1	680.863
VPT	12+37.874 R1	681.388
Length:	60	
Entrance Grade:	0.40%	
Exit Grade:	1.75%	
r = 100 * (g2 - g1) / L:	2.25	
K = l / (g2 - g1):	44.444	
Middle Ordinate:	0.101	
Element: Linear		
VPT	12+37.874 R1	681.388
VPC	12+39.266 R1	681.412
Tangent Grade:	1.75%	
Tangent Length:	1.391	
Element: Symmetrical Parabola		
VPC	12+39.266 R1	681.412
VPI	12+69.266 R1	681.937
VPT	12+99.266 R1	680.812
VHP	12+58.356 R1	681.579
Length:	60	
Entrance Grade:	1.75%	
Exit Grade:	-3.75%	
r = 100 * (g2 - g1) / L:	-9.167	
K = l / (g2 - g1):	10.909	
Middle Ordinate:	-0.412	
Element: Linear		
VPT	12+99.266 R1	680.812
VPC	13+06.029 R1	680.558
Tangent Grade:	-3.75%	
Tangent Length:	6.764	
Element: Symmetrical Parabola		
VPC	13+06.029 R1	680.558
VPI	13+36.029 R1	679.433
VPT	13+66.029 R1	679.313
Length:	60	
Entrance Grade:	-3.75%	
Exit Grade:	-0.40%	
r = 100 * (g2 - g1) / L:	5.583	
K = l / (g2 - g1):	17.91	
Middle Ordinate:	0.251	
Element: Linear		
VPT	13+66.029 R1	679.313
VPI	13+87.993 R1	679.226
Tangent Grade:	-0.40%	
Tangent Length:	21.963	
Element: Linear		
VPI	13+87.993 R1	679.226
POT	14+37.993 R1	679.064
Tangent Grade:	-0.32%	
Tangent Length:	50	

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/3/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

GEOMETRIC DATA

SCALE: N.T.S.

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		59

DATE: 5/3/2024 10:20:19 AM
FILE: ...\Geometry\Vaquillas Geometrics

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW

CURVE DATA	
PI	11+59.98
Δ	13°33'45.7" (LT)
D	08°11'06.4"
T	83.24'
L	165.70'
R	700.00'
PC	10+76.74
PT	12+42.44

CURVE DATA	
PI	14+49.94
Δ	11°31'35.7" (RT)
D	08°11'06.4"
T	70.65'
L	140.82'
R	700.00'
PC	13+79.29
PT	15+20.12

CURVE DATA	
PI	15+78.51
Δ	06°26'00.8" (LT)
D	08°11'06.4"
T	39.34'
L	78.60'
R	700.00'
PC	15+39.17
PT	16+17.77

POT 10+00.00
PC 10+76.74
N05°14'16.2"W
76.74
11+00
12+00
BEGIN PROJECT
CSJ 0922-33-185
STA 12+08.44
BEGIN TRANSITION
MATCH EXISTING CROSS SLOPE
PT 12+42.44
N18°48'01.9"W
136.86
13+00
14+00
28
N07°16'26.2"W
19.05
15+00
PC 15+39.17
PT 15+20.12
PC 13+79.29
FLOW

END MBGF
BEGIN T631 RAIL
STATION: 13+07.22
RIPRAP (MOW STRIP) (4 IN)
APPROX 1.5 CY
INSTALL DAT
BEGIN MBGF
STATION: 12+82.22
STATION: 12+58.44
OFFSET: 14.00' LT
END TRANSITION
BEGIN NORMAL CROWN
STATION: 14+11.54
OFFSET: 14.00' LT
BEGIN TRANSITION
END NORMAL CROWN
RIPRAP (MOW STRIP) (4 IN)
APPROX 1.7 CY
END T631 RAIL
BEGIN MBGF
STATION: 13+72.06
T631 RAIL
APPROX 65 LF
EXIST. FENCE LINE
END MBGF
INSTALL SGT
STATION: 14+22.06
END MBGF
INSTALL DAT
STATION: 14+06.08
REMOVE SIGN
REMOVE SIGN
REMOVE SIGN
℄ LAS TIENDAS RD (SOUTH)
STATION: 12+58.44
OFFSET: 14.00' RT
END TRANSITION
BEGIN NORMAL CROWN
INSTALL SGT
BEGIN MBGF
STATION: 12+66.63
RIPRAP (MOW STRIP) (4 IN)
APPROX 4.3 CY
BEGIN BRIDGE
STA 13+21.25
22-240-0-AA03-52-103
END MBGF
BEGIN T631 RAIL
STATION: 13+16.63
SANTA ISABEL CK BRANCH (SOUTH)
T631 RAIL
APPROX 65 LF
STATION: 14+11.54
OFFSET: 14.00' RT
BEGIN TRANSITION
END NORMAL CROWN
RIPRAP (MOW STRIP)
(4 IN)
APPROX 1.5 CY
END T631 RAIL
BEGIN MBGF
STATION: 13+81.08
END BRIDGE
STA 13+67.19
22-240-0-AA03-52-103
CULVERT #1
STA 13+45.43
EXIST. TIMBER DECKED BRIDGE TO BE REMOVED
PROP. 5-7'X3' MBC W/2 - PARALLEL WINGWALLS
END PROJECT
CSJ 0922-33-185
STA 14+61.54
END TRANSITION
MATCH EXISTING CROSS SLOPE

LEGEND

DIRECTION OF TRAVEL

MBGF - METAL BEAM GUARD FENCE

DAT - DOWNSTREAM ANCHOR TERMINAL

SGT - SINGLE GUARDRAIL TERMINAL

NOTES:

1. SEE "GEOMETRIC DATA" SHEET(S) FOR HORIZONTAL AND VERTICAL ALIGNMENT DATA
2. SEE "CULVERT LAYOUT" SHEET(S) FOR DRAINAGE STRUCTURE INFORMATION
3. SEE "SURVEY CONTROL" SHEET(S) FOR BENCH MARK DATA
4. SEE "D&OM" STANDARDS FOR D&OM INFORMATION. SEE "QUANTITY SHEETS" FOR DELINETOR TYPE AND QUANTITIES

VERTICAL CURVE DATA	
STA	12+58.93
EL	508.40'
ex	0.37'
K	21
L	80.00'

VERTICAL CURVE DATA	
STA	13+40.06
EL	512.45'
ex	-0.64'
K	7
L	60.00'

VERTICAL CURVE DATA	
STA	14+25.44
EL	509.47'
ex	0.21'
K	22
L	60.00'

℄ LAS TIENDAS RD (SOUTH)
VPI 12+08.44
EL 507.77
VPC 12+18.93
EL 507.90
VPT 12+98.93
EL 510.40
VPI 13+40.06
EL 512.45'
VPC 13+95.44
EL 510.52
VPT 14+55.44
EL 509.24
VPI 14+61.54
EL 509.20
EXISTING TERRAIN
+1.250%
+1.250%
+5.000%
+5.000%
+5.000%
-3.500%
-3.500%
-3.500%
-0.750%
-0.750%
BEGIN PROJECT
CSJ:0922-33-185
STA 12+08.44
ELE 507.77
VPI 12+58.93
EL 508.40'
VPC 13+10.06
EL 510.95
PROP. 5-7'X3' MBC
VPT 13+70.06
EL 511.40
VPI 14+25.44
EL 509.47'
END PROJECT
CSJ:0922-33-185
STA 14+61.54
ELE 509.20

507.04 507.28 507.72 507.77 510.45 509.34 510.36 509.48 509.20 509.24 509.70

520 515 510 505 500

10+00 11+00 12+00 13+00 14+00 15+00 16+00

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT SANTA ISABEL CREEK BRANCH SOUTH

PLAN AND PROFILE

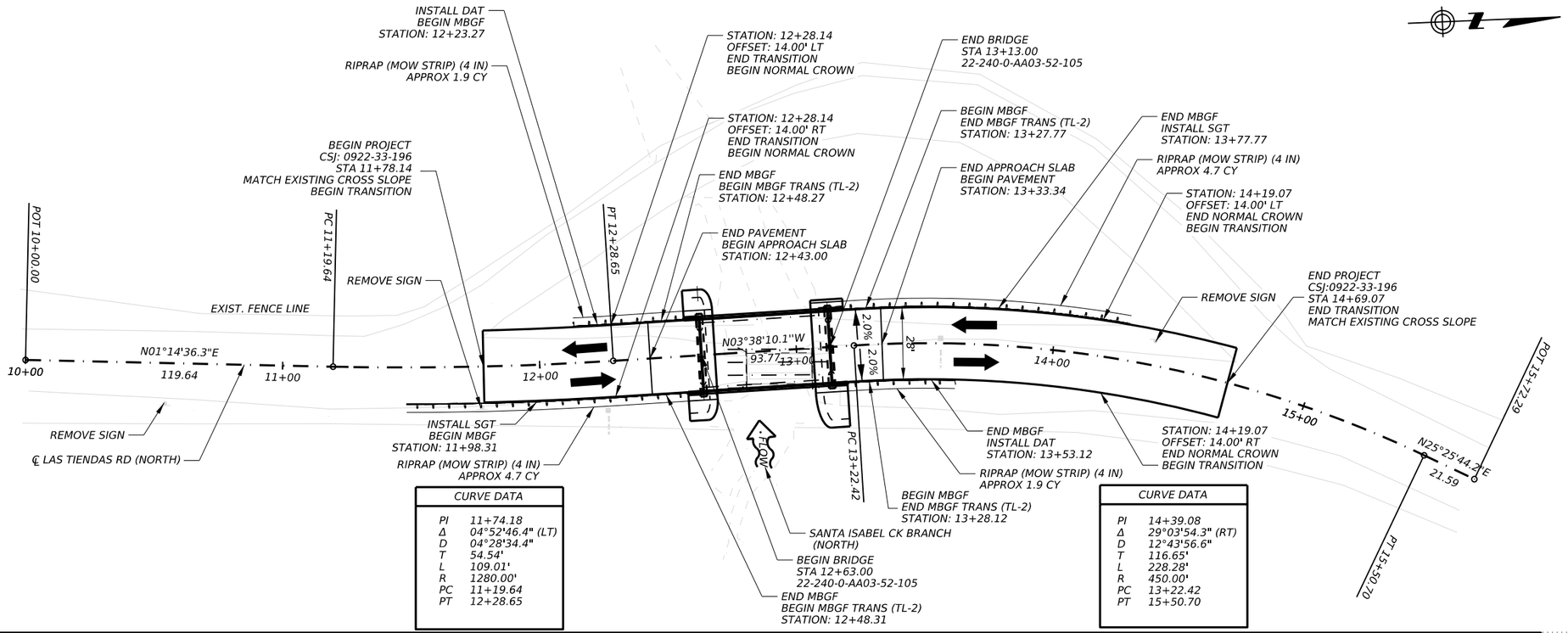
SCALE: 1" = 50' H, 1" = 5' V SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		60

DATE: 5/2/2024 4:17:46 PM
FILE: ...\3 Roadway\RW_PP_LTSouth 100%

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



CURVE DATA	
PI	11+74.18
Δ	04°52'46.4" (LT)
D	04°28'34.4"
T	54.54'
L	109.01'
R	1280.00'
PC	11+19.64
PT	12+28.65

CURVE DATA	
PI	14+39.08
Δ	29°03'54.3" (RT)
D	12°43'56.6"
T	116.65'
L	228.28'
R	450.00'
PC	13+22.42
PT	15+50.70

LEGEND

DIRECTION OF TRAVEL

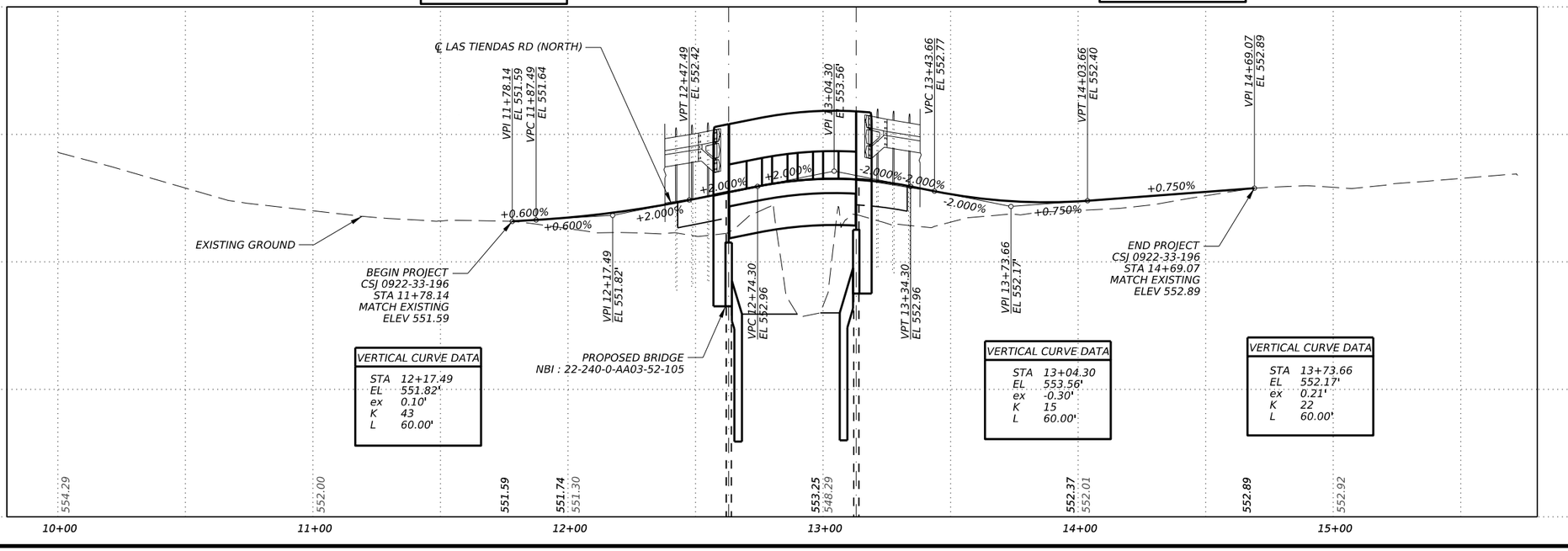
MBGF - METAL BEAM GUARD FENCE

DAT - DOWNSTREAM ANCHOR TERMINAL

SGT - SINGLE GUARDRAIL TERMINAL

NOTES:

1. SEE "GEOMETRIC DATA" SHEET(S) FOR HORIZONTAL AND VERTICAL ALIGNMENT DATA
2. SEE "CULVERT LAYOUT" SHEET(S) FOR DRAINAGE STRUCTURE INFORMATION
3. SEE "SURVEY CONTROL" SHEET(S) FOR BENCH MARK DATA
4. SEE "D&OM" STANDARDS FOR D&OM INFORMATION. SEE "QUANTITY SHEETS" FOR DELINEATOR TYPE AND QUANTITIES



VERTICAL CURVE DATA	
STA	12+17.49
EL	551.82'
ex	0.10'
K	43
L	60.00'

VERTICAL CURVE DATA	
STA	13+04.30
EL	553.56'
ex	-0.30'
K	15
L	60.00'

VERTICAL CURVE DATA	
STA	13+73.66
EL	552.17'
ex	0.21'
K	22
L	60.00'

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

Christopher Fournier

3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

LAS TIENDAS RD AT SANTA ISABEL CREEK BRANCH NORTH

PLAN AND PROFILE

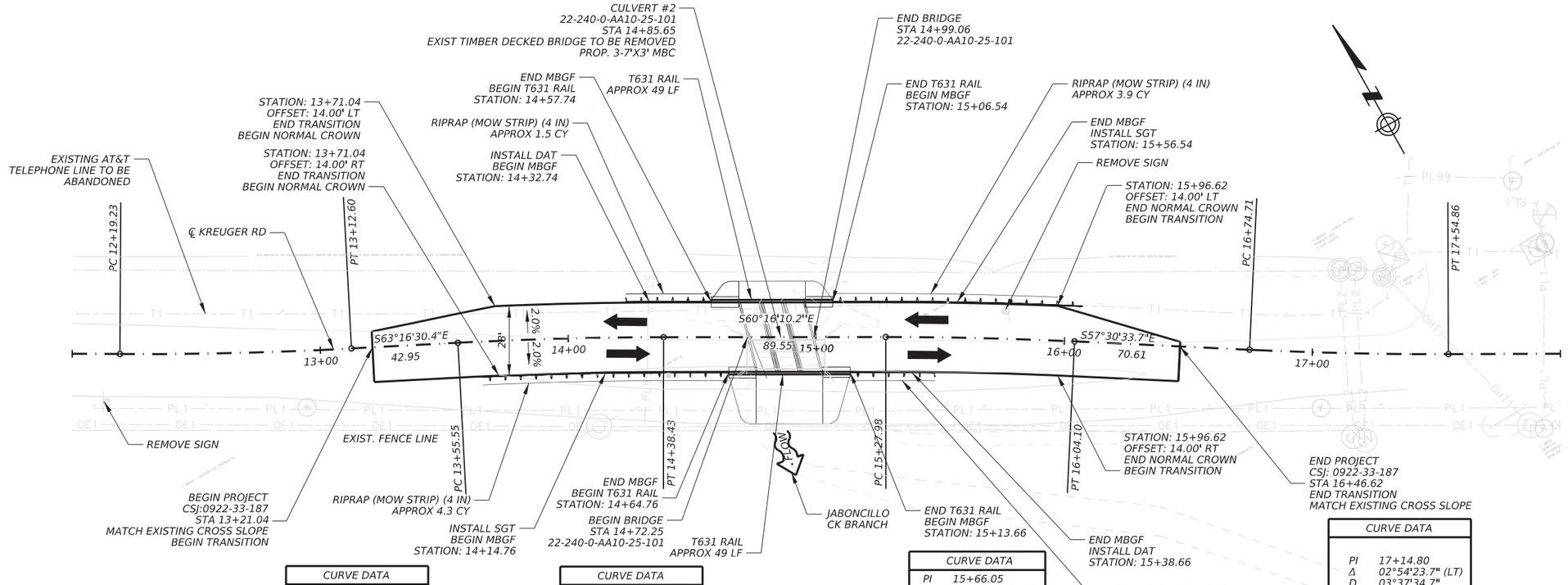
SCALE: 1" = 50' H, 1" = 5' V SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		61

DATE: 3/28/2024 3:24:12 PM
FILE: ...\3. Roadway\RW PP LTNorth 100%

100% SUBMITTAL

DN: CF CK: RW DW: MG CK: RW



CURVE DATA	
PI	12+65.93
Δ	03°23'09.4" (LT)
D	03°37'34.7"
T	46.70'
L	93.37'
R	1580.00'
PC	12+19.23
PT	13+12.60

CURVE DATA	
PI	13+97.00
Δ	03°00'20.1" (RT)
D	03°37'34.7"
T	41.45'
L	82.88'
R	1580.00'
PC	13+55.55
PT	14+38.43

CURVE DATA	
PI	15+66.05
Δ	02°45'36.5" (RT)
D	03°37'34.7"
T	38.06'
L	76.11'
R	1580.00'
PC	15+27.98
PT	16+04.10

CURVE DATA	
PI	17+14.80
Δ	02°54'23.7" (LT)
D	03°37'34.7"
T	40.08'
L	80.15'
R	1580.00'
PC	16+74.71
PT	17+54.86

LEGEND

← DIRECTION OF TRAVEL

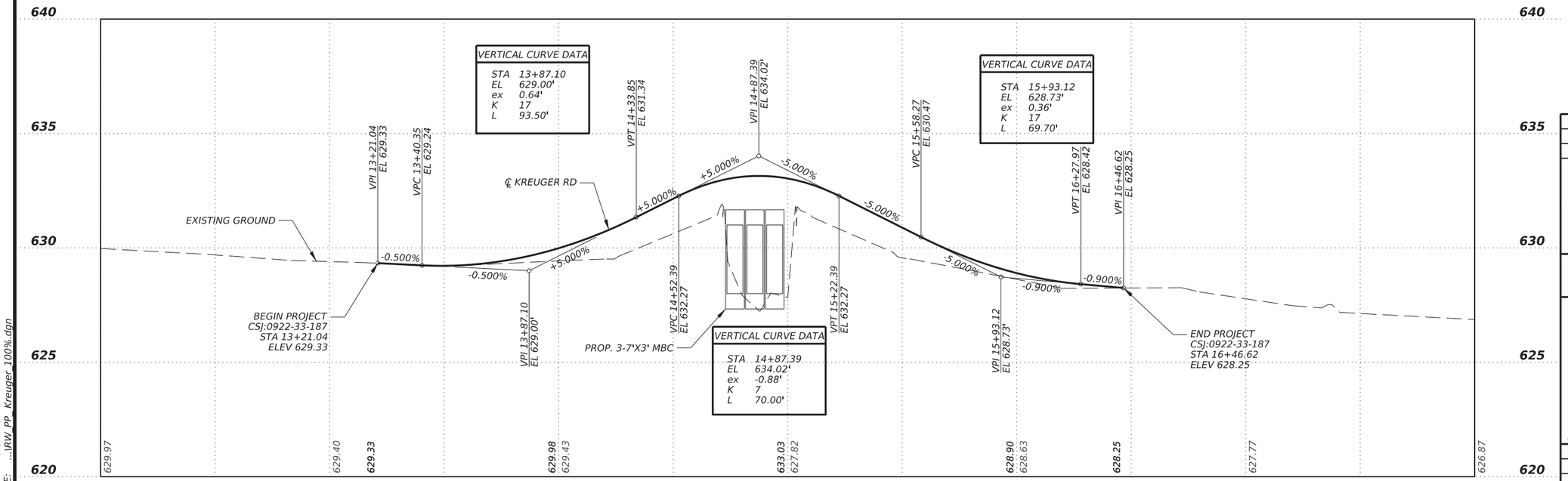
MBGF - METAL BEAM GUARD FENCE

DAT - DOWNSTREAM ANCHOR TERMINAL

SGT - SINGLE GUARDRAIL TERMINAL

NOTES:

1. SEE "GEOMETRIC DATA" SHEET(S) FOR HORIZONTAL AND VERTICAL ALIGNMENT DATA
2. SEE "CULVERT LAYOUT" SHEET(S) FOR DRAINAGE STRUCTURE INFORMATION
3. SEE "SURVEY CONTROL" SHEET(S) FOR BENCH MARK DATA
4. SEE "D&OM" STANDARDS FOR D&OM INFORMATION. SEE "QUANTITY SHEETS" FOR DELINETOR TYPE AND QUANTITIES



VERTICAL CURVE DATA	
STA	13+87.10
EL	629.00'
ex	0.64'
K	17
L	93.50'

VERTICAL CURVE DATA	
STA	14+87.39
EL	634.02'
ex	-0.88'
K	7
L	70.00'

VERTICAL CURVE DATA	
STA	15+93.12
EL	628.73'
ex	0.36'
K	17
L	69.70'

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

KREUGER RD AT JABONCILLO CREEK BRANCH

PLAN AND PROFILE

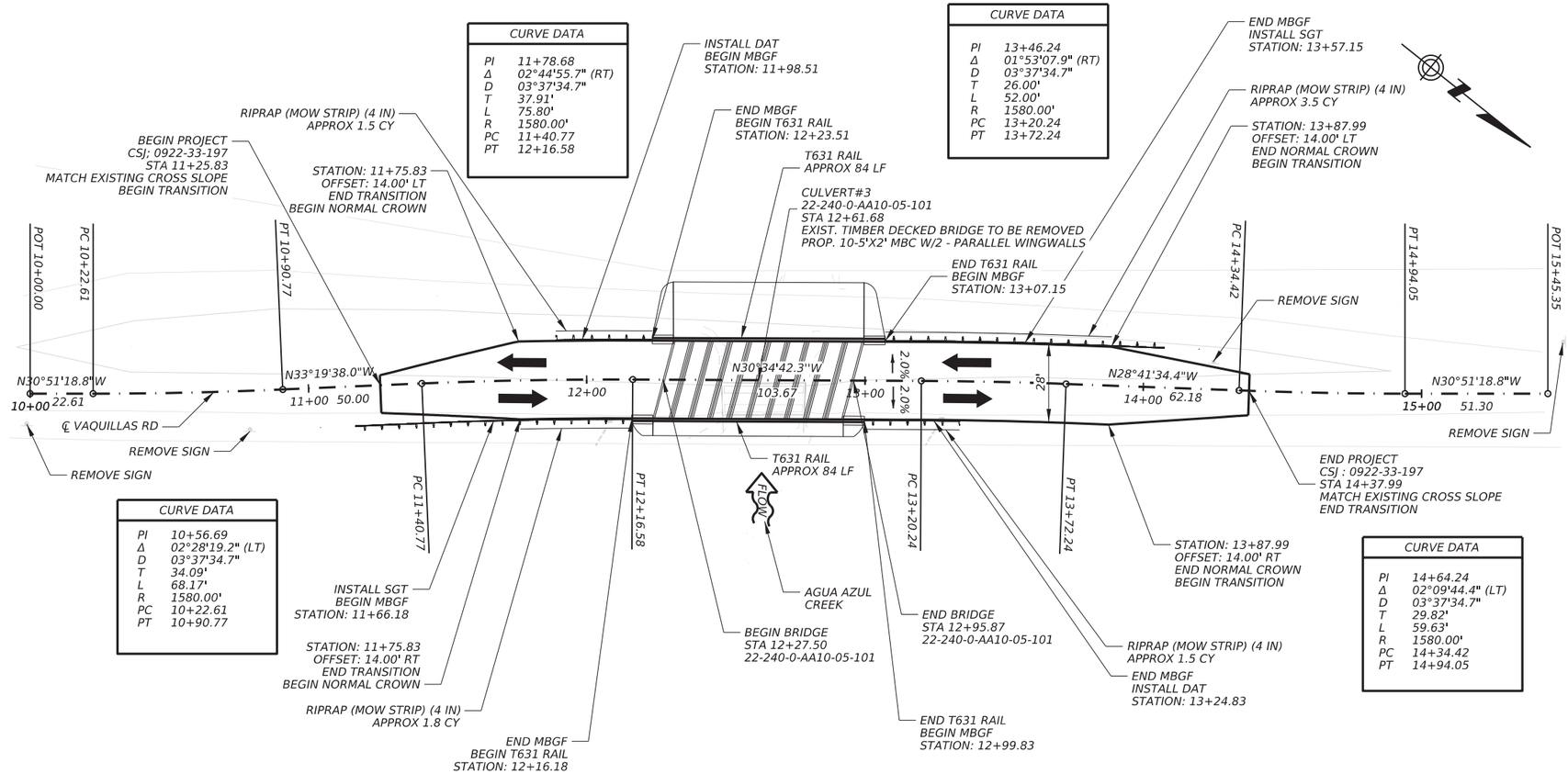
SCALE: 1" = 50' H, 1" = 5' V SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		62

DATE: 5/2/2024 4:18:05 PM
FILE: ...\RW_PP_Kreuger_100%.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



LEGEND

DIRECTION OF TRAVEL

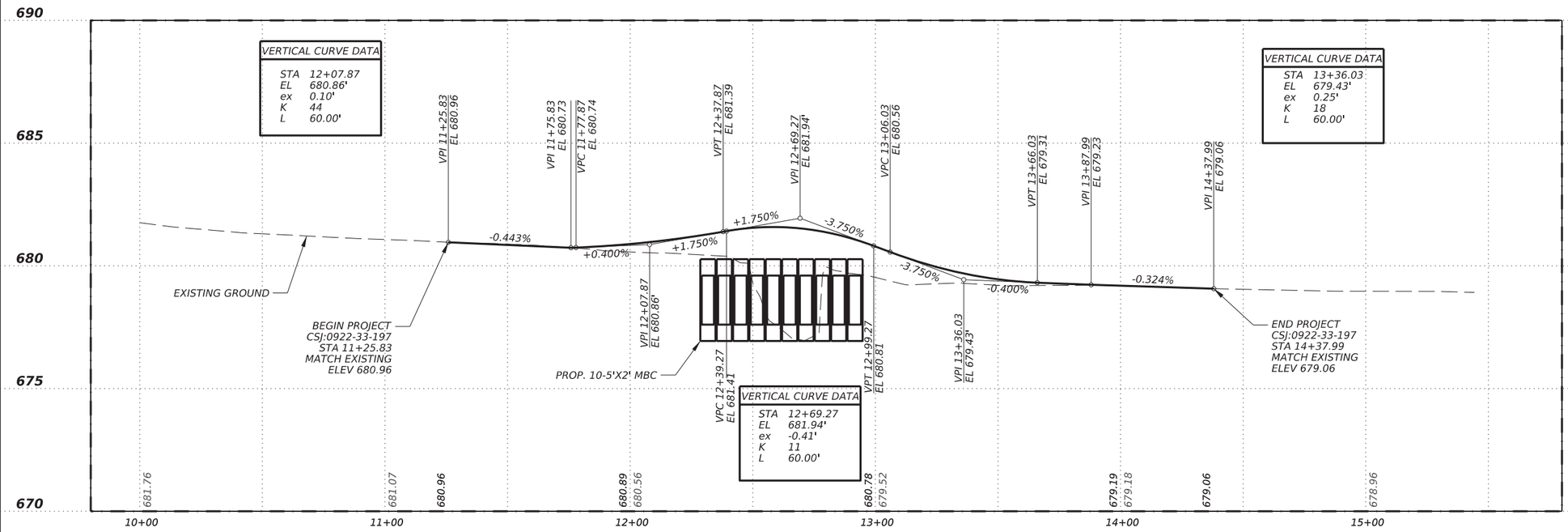
MBGF - METAL BEAM GUARD FENCE

DAT - DOWNSTREAM ANCHOR TERMINAL

SGT - SINGLE GUARDRAIL TERMINAL

NOTES:

1. SEE "GEOMETRIC DATA" SHEET(S) FOR HORIZONTAL AND VERTICAL ALIGNMENT DATA
2. SEE "CULVERT LAYOUT" SHEET(S) FOR DRAINAGE STRUCTURE INFORMATION
3. SEE "SURVEY CONTROL" SHEET(S) FOR BENCH MARK DATA
4. SEE "D&OM" STANDARDS FOR D&OM INFORMATION. SEE "QUANTITY SHEETS" FOR DELINETOR TYPE AND QUANTITIES



DATE: 5/2/2024 4:18:11 PM
FILE: ...\RW PP Vaquillas 100%

STATE OF TEXAS
CHRISTOPHER FOURNIER
123633
LICENSED
PROFESSIONAL ENGINEER

5/2/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

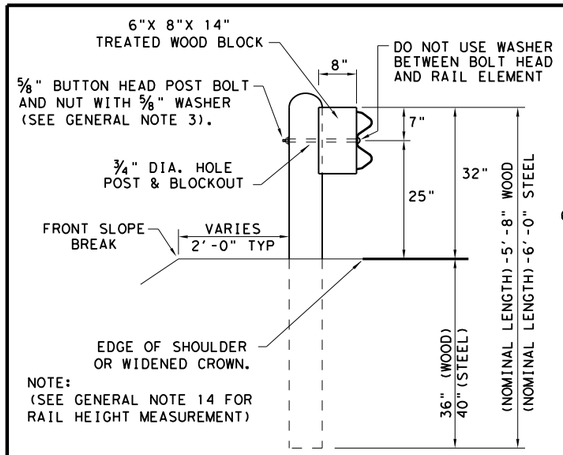
Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

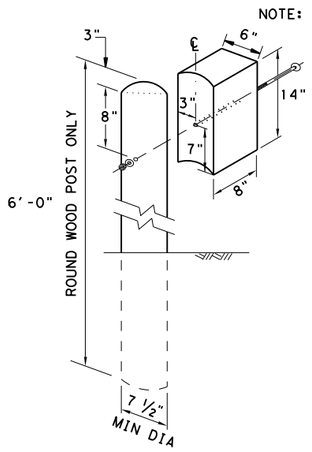
PLAN AND PROFILE

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

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		63

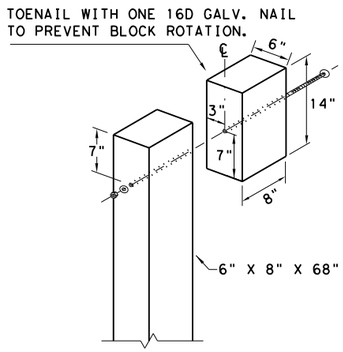


TYPICAL POST PLACEMENT

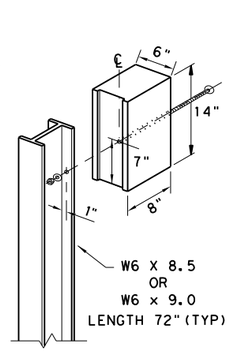


WOOD BLOCK TO ROUND WOOD POST

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

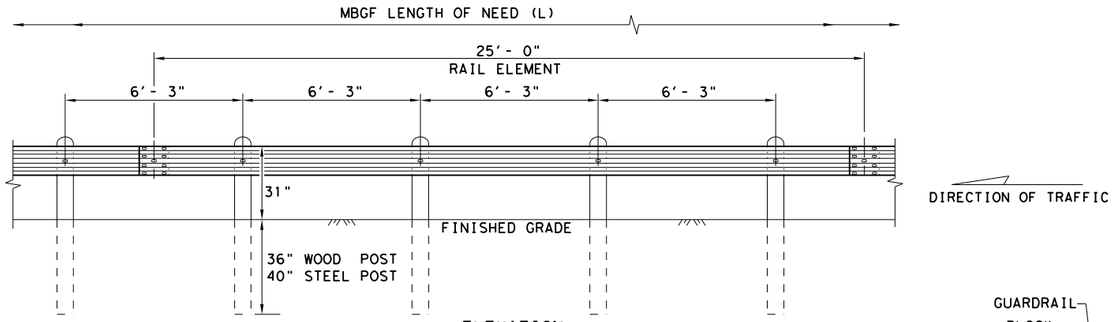


WOOD BLOCK TO RECTANGULAR WOOD POST



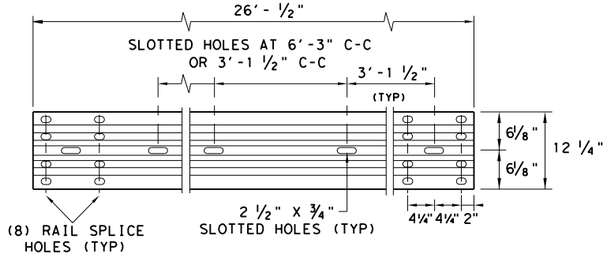
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



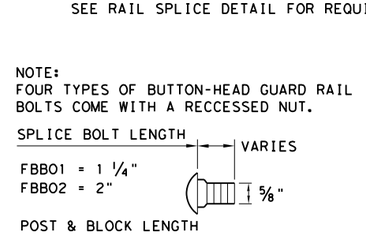
ELEVATION
MID-SPAN RAIL SPLICE

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



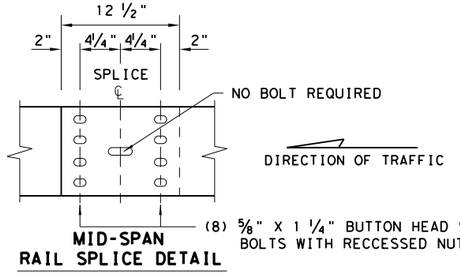
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



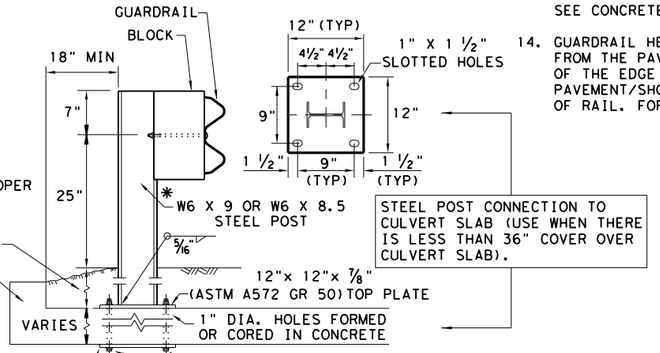
BUTTON HEAD BOLT

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).

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

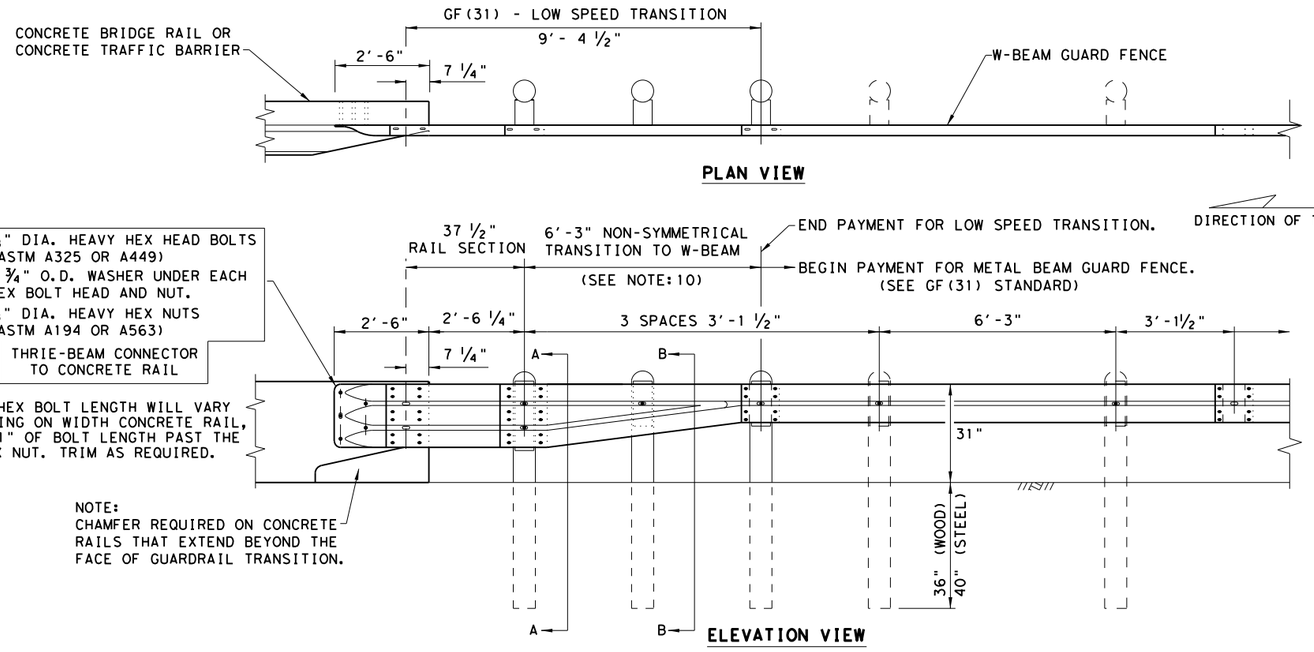
Texas Department of Transportation

Design Division Standard

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

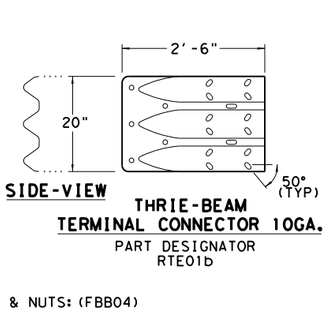
FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0922	33	185, ETC.	CR 352, ETC.	
	DIST	COUNTY		SHEET NO.	
	LRD	WEBB		64	

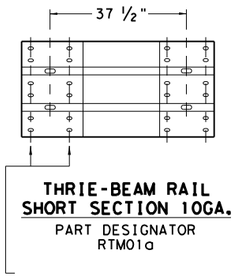
DATE: 3/28/2024
FILE: ...\Standards\gf3119.dgn

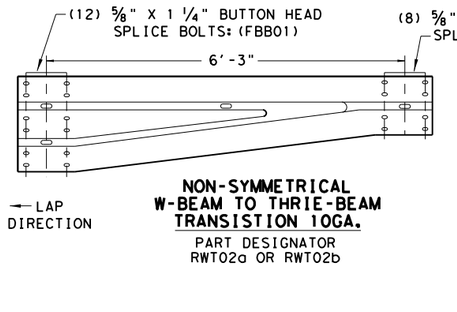


GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT, MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE TRANSITION.







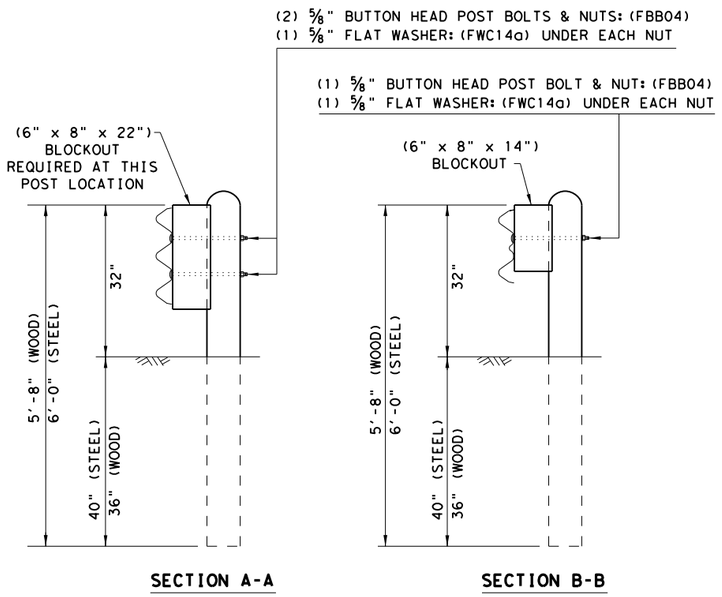
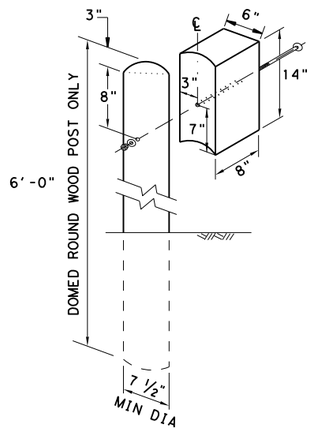
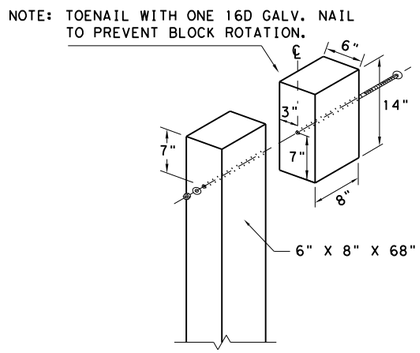
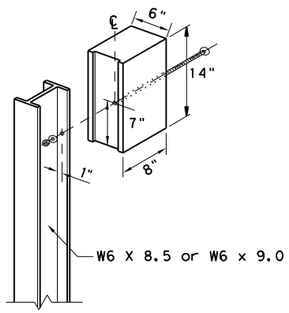


PLATE WASHER INSTRUCTIONS

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.







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

LOW-SPEED TRANSITION

Texas Department of Transportation | Design Division Standard

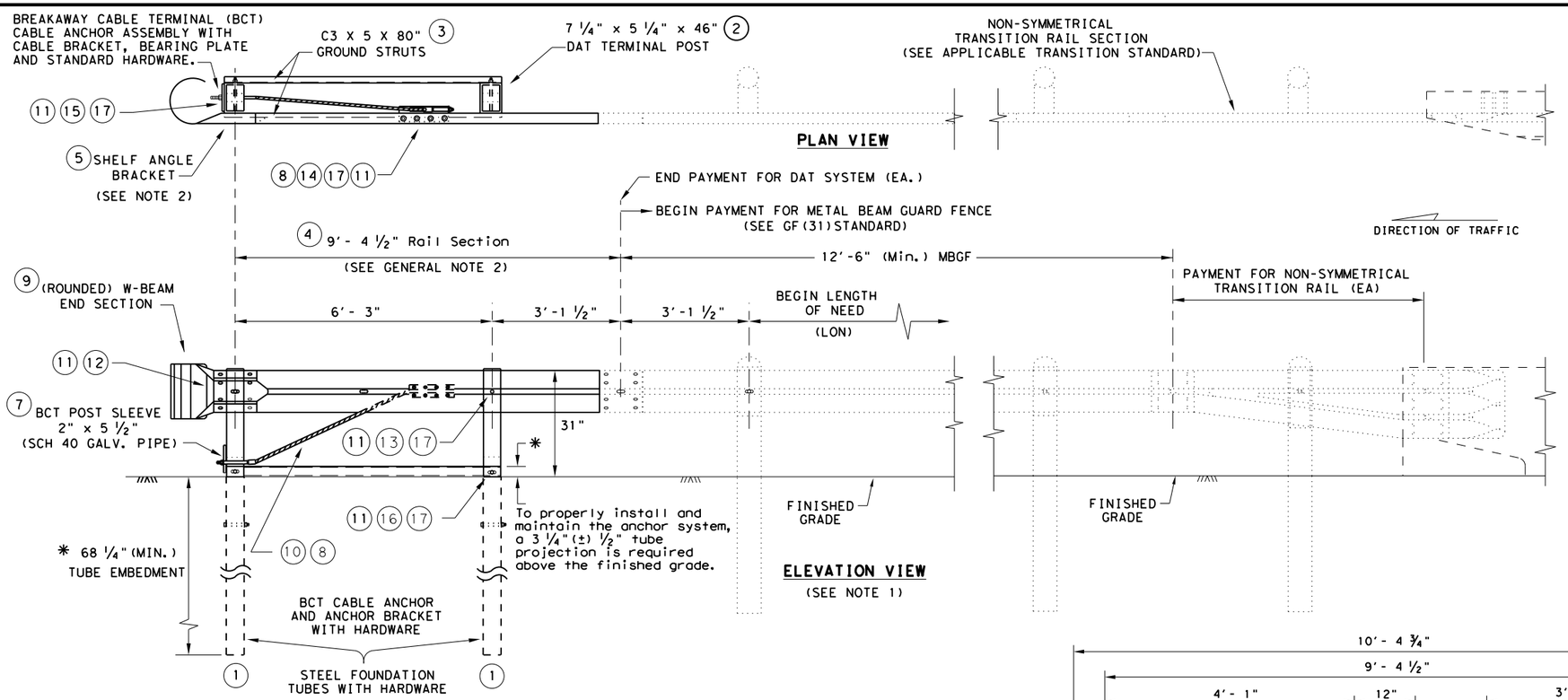
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

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	0922	33	185, ETC.	CR 352, ETC.	
	DIST	COUNTY		SHEET NO.	
	LRD	WEBB		65	

DATE: 3/28/2024
FILE: ...\Standards\gf31trtl1219.dgn

DATE:
FILE:



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

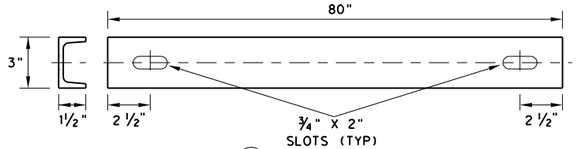
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 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

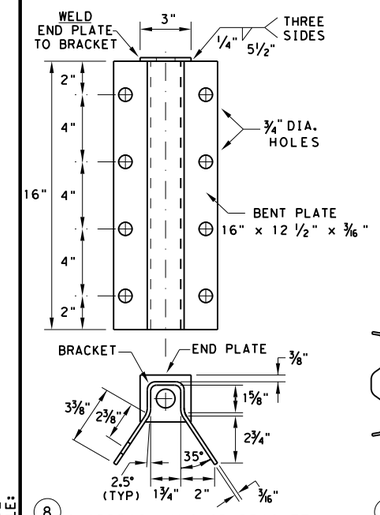
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

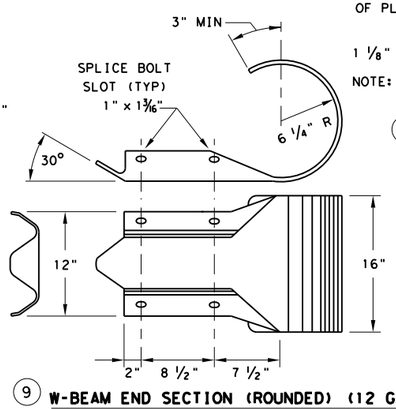
(4) **TERMINAL RAIL ELEMENT FOR DAT**



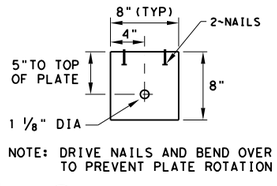
(3) **CHANNEL STRUT**
C3 X 5 X 80", GRADE A36



(8) **GUARDRAIL ANCHOR BRACKET**

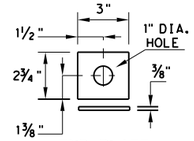


(9) **W-BEAM END SECTION (ROUNDED) (12 GA.)**

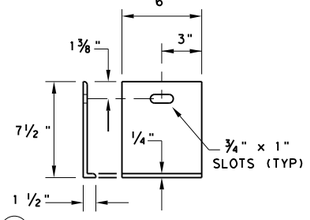


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

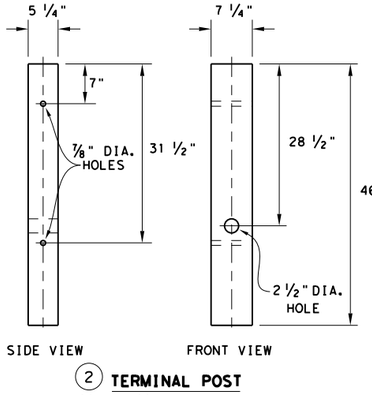
(6) **BEARING PLATE**
8"x 8"x 5/8" R



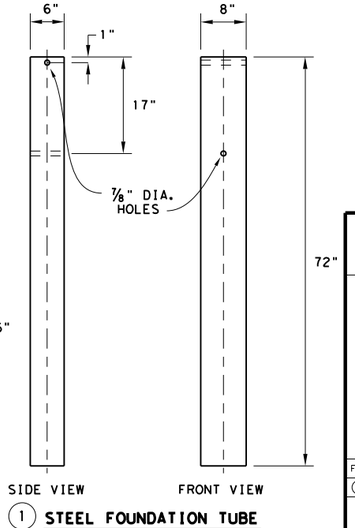
END PLATE



(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

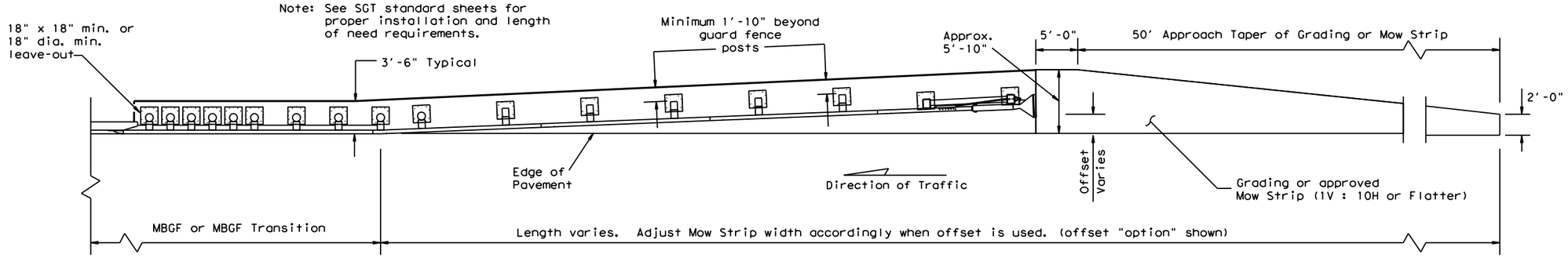
Texas Department of Transportation — Design Division Standard

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

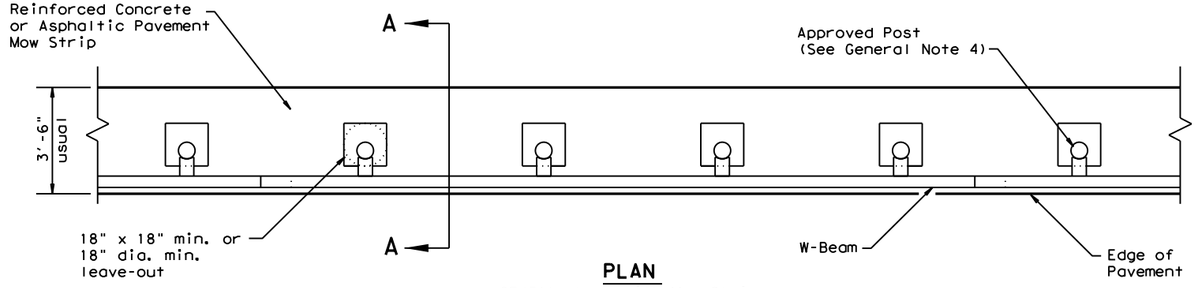
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		66

DATE: 3/28/2024
FILE: ...\Standards\gf31ms19.dgn

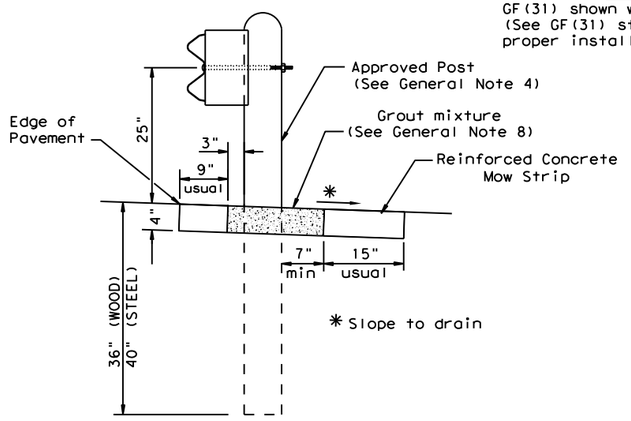


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



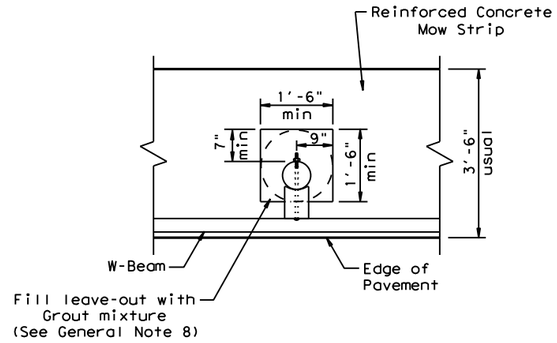
PLAN

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



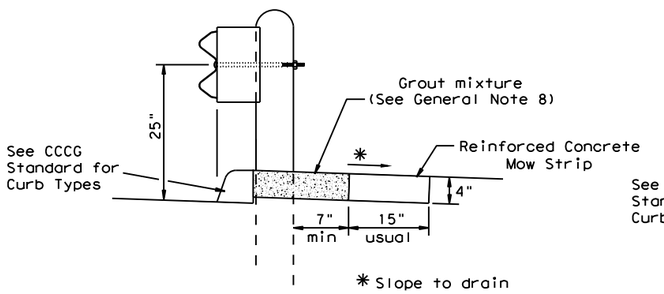
SECTION A-A

Typical



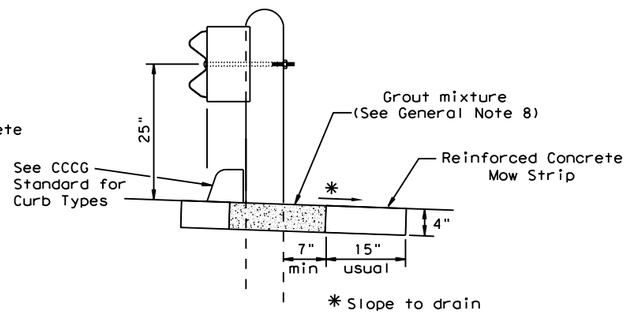
MOW STRIP DETAIL

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



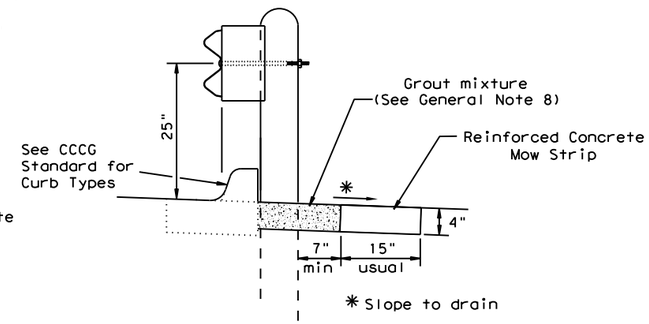
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

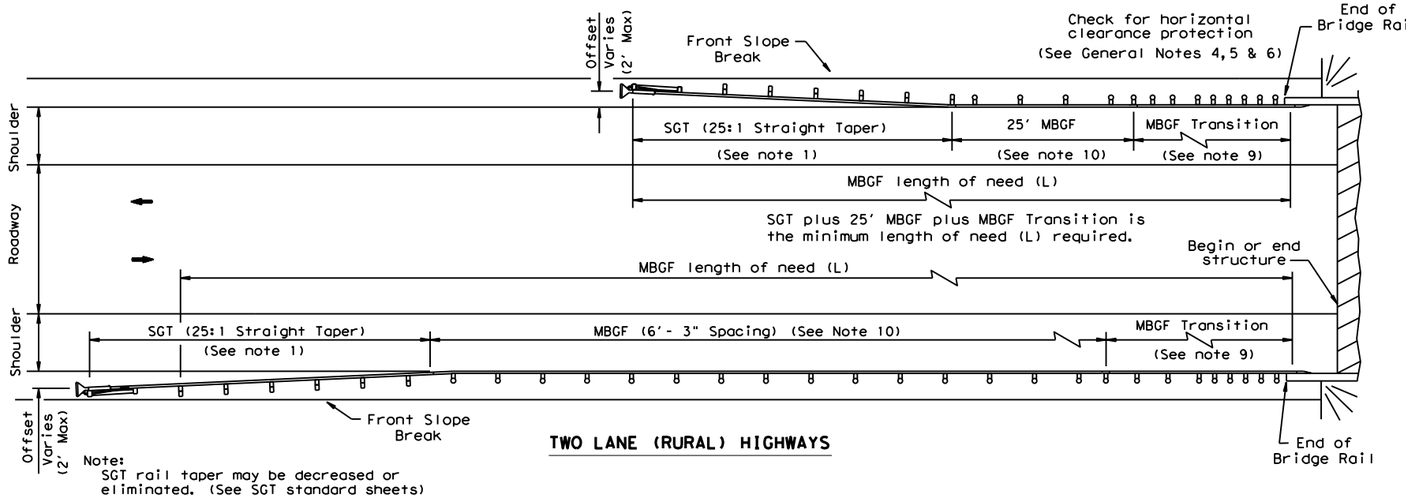
Texas Department of Transportation

Design Division Standard

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

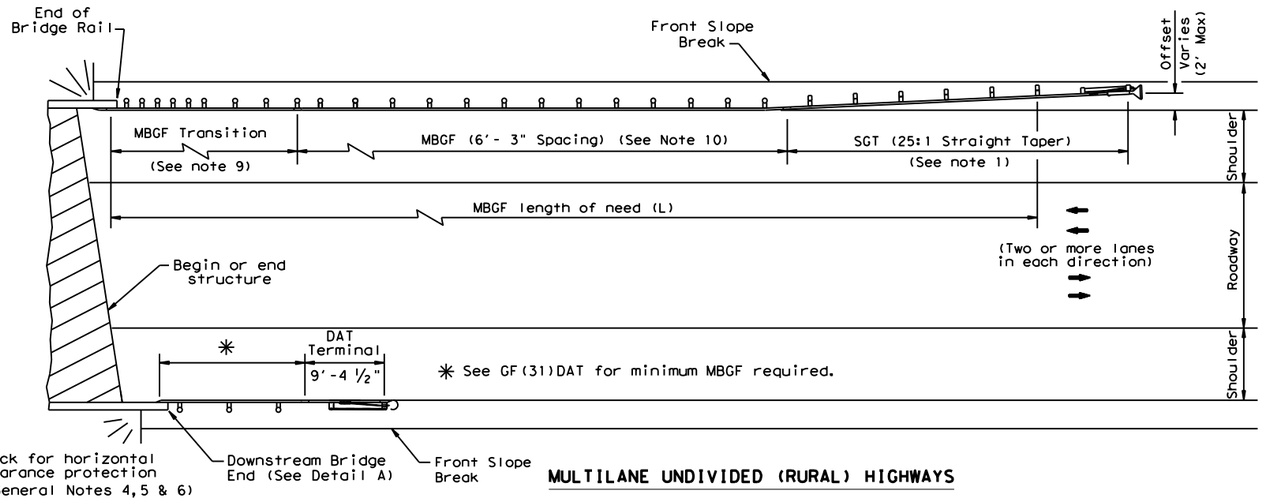
GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		67

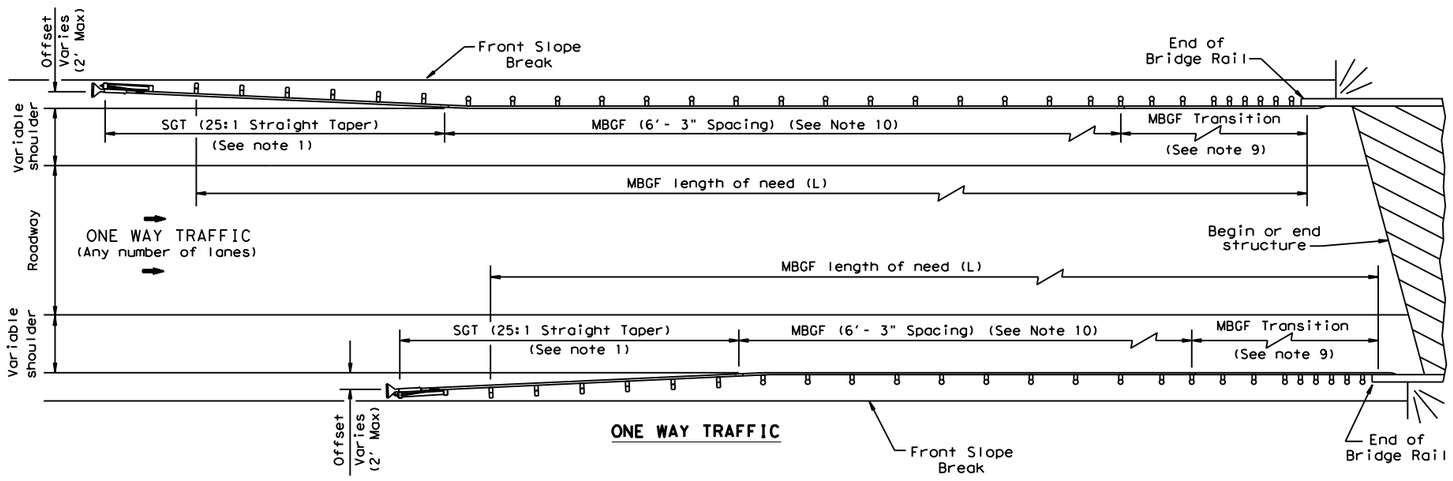


TWO LANE (RURAL) HIGHWAYS

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



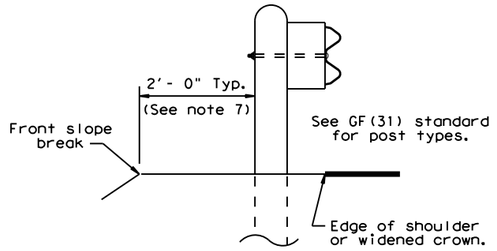
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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. <u>For restrictive bridge widths:</u> 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

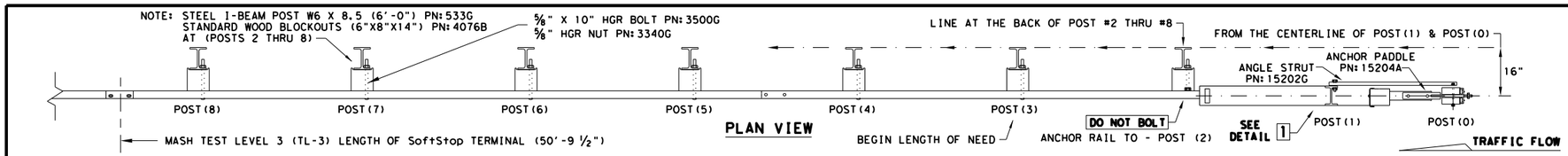
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

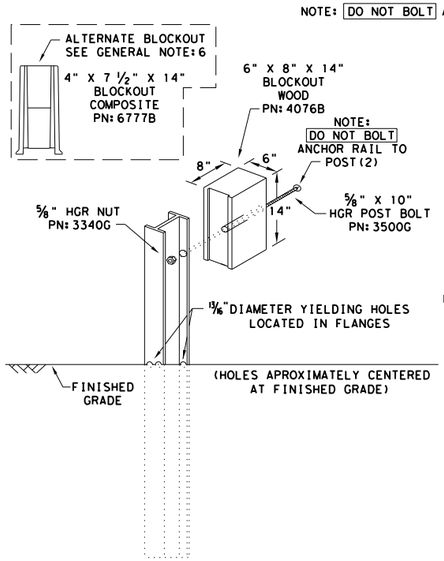
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	LRD	WEBB		68

DATE: 3/28/2024
FILE: ...\3. Roadway\Standards\bed14.dgn

DATE: 3/28/2024
FILE: ...Standards\sgt10s3116.dgn

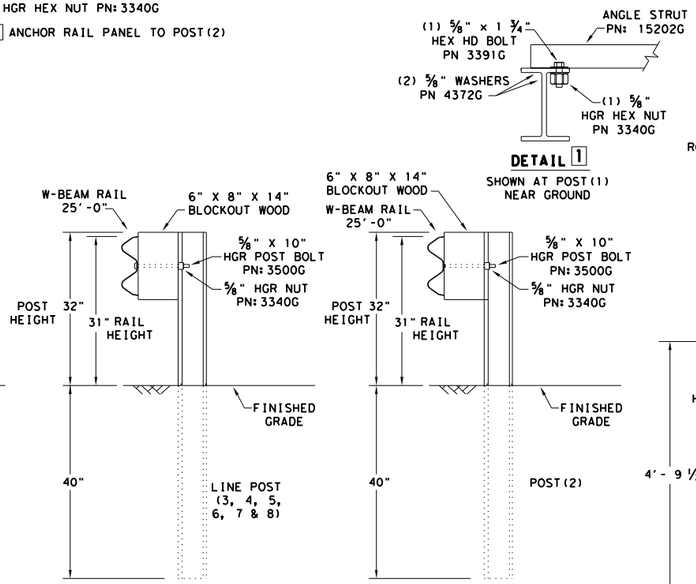




ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



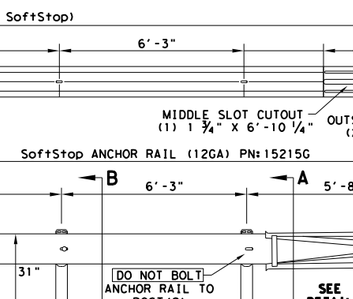
SECTION VIEW B-B

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

SECTION VIEW A-A

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

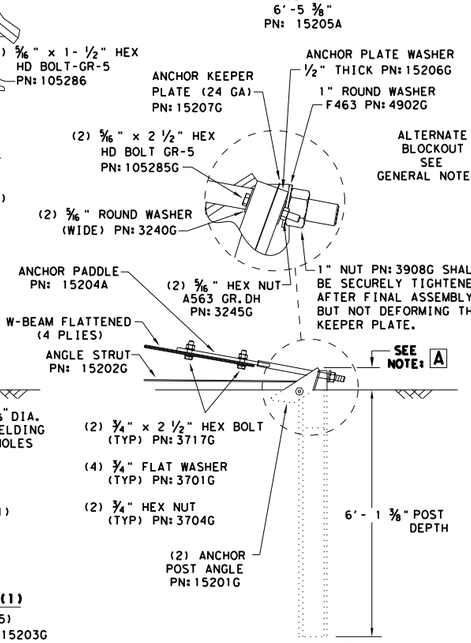
NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)



FRONT VIEW POST(1)

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

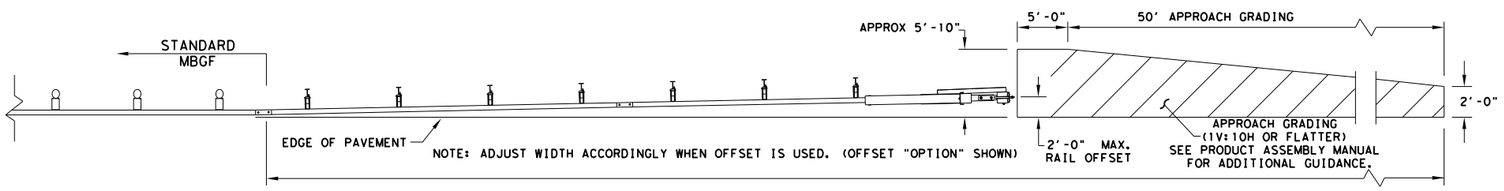
NOTE: NO BLOCKOUT INSTALLED AT POST(1)



DETAIL 3 AT POST(0)

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

TRAFFIC FLOW



APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0922	33	185, ETC.	CR 352, ETC.	
	DIST	COUNTY		SHEET NO.	
	LRD	WEBB		69	

(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).

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.

PLAN VIEW

MBGF
RAIL 2

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

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 5/16"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

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

DETAIL (D)

FINISHED
GRADE

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)

SOIL
ANCHOR POST
ITEM (1)

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

ELEVATION VIEW

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

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING
NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

GENERAL NOTES

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

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

* 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

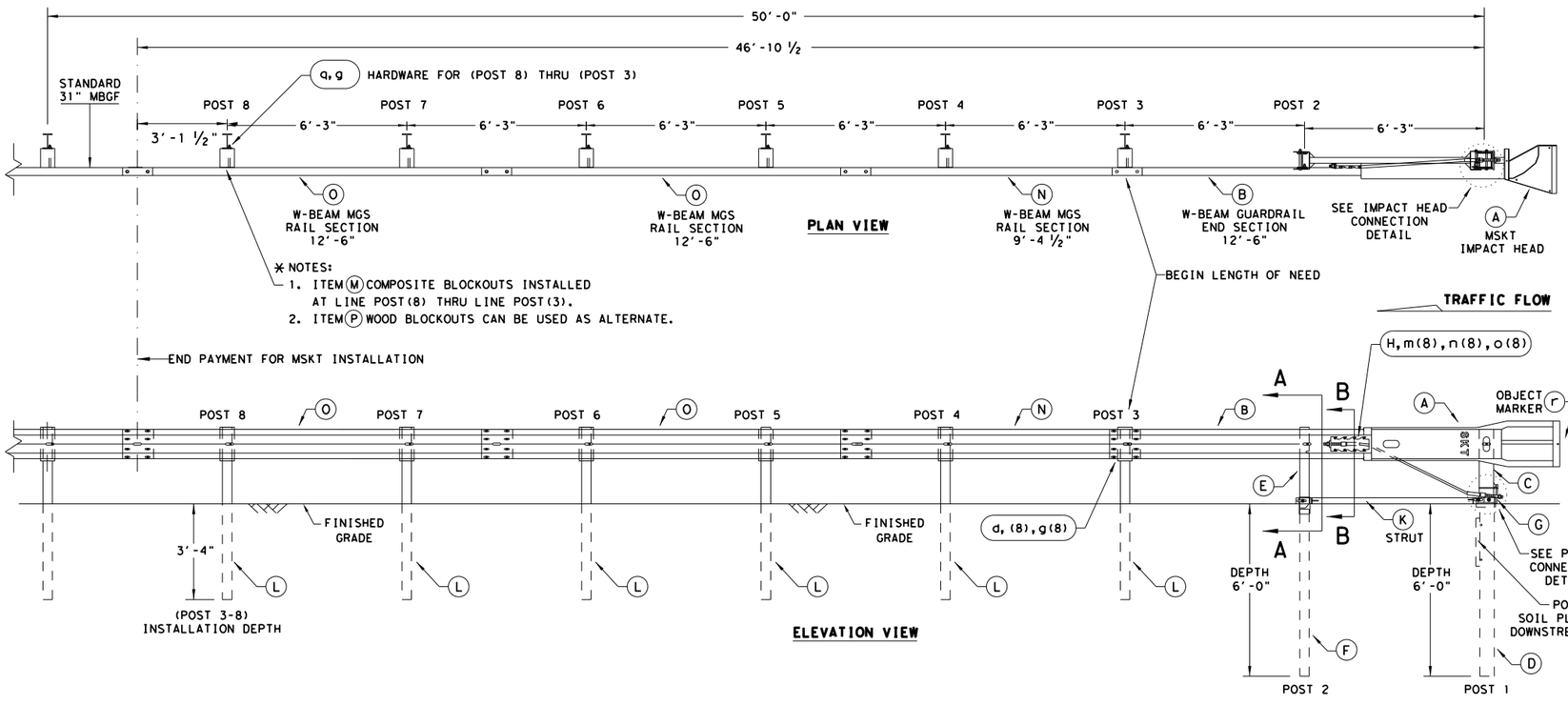
Design Division Standard

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

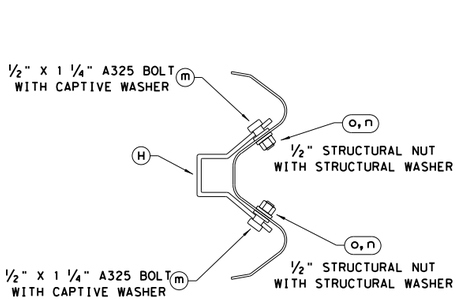
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL	
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0922	33	185, ETC.	CR 352, ETC.	
	DIST	COUNTY		SHEET NO.	
	LRD	WEBB		70	

DATE: 3/28/2024
FILE: ...Standardslsgt11s3118.dgn

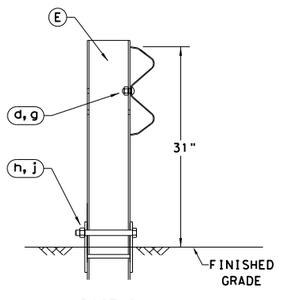
DATE:
FILE:



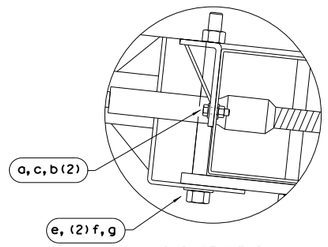
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



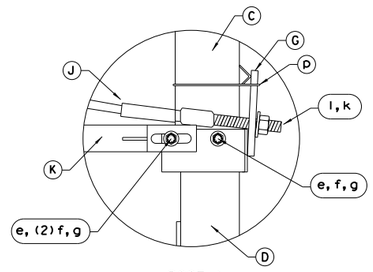
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



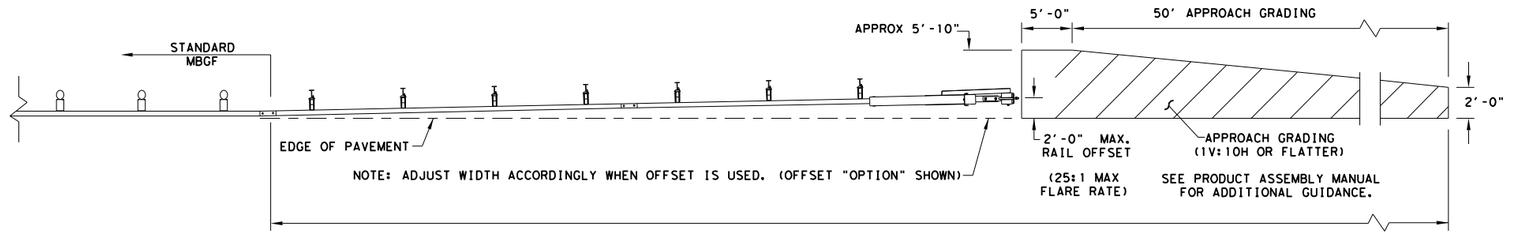
IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

SEE NOTES: *

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

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

GENERAL NOTES

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

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

Texas Department of Transportation

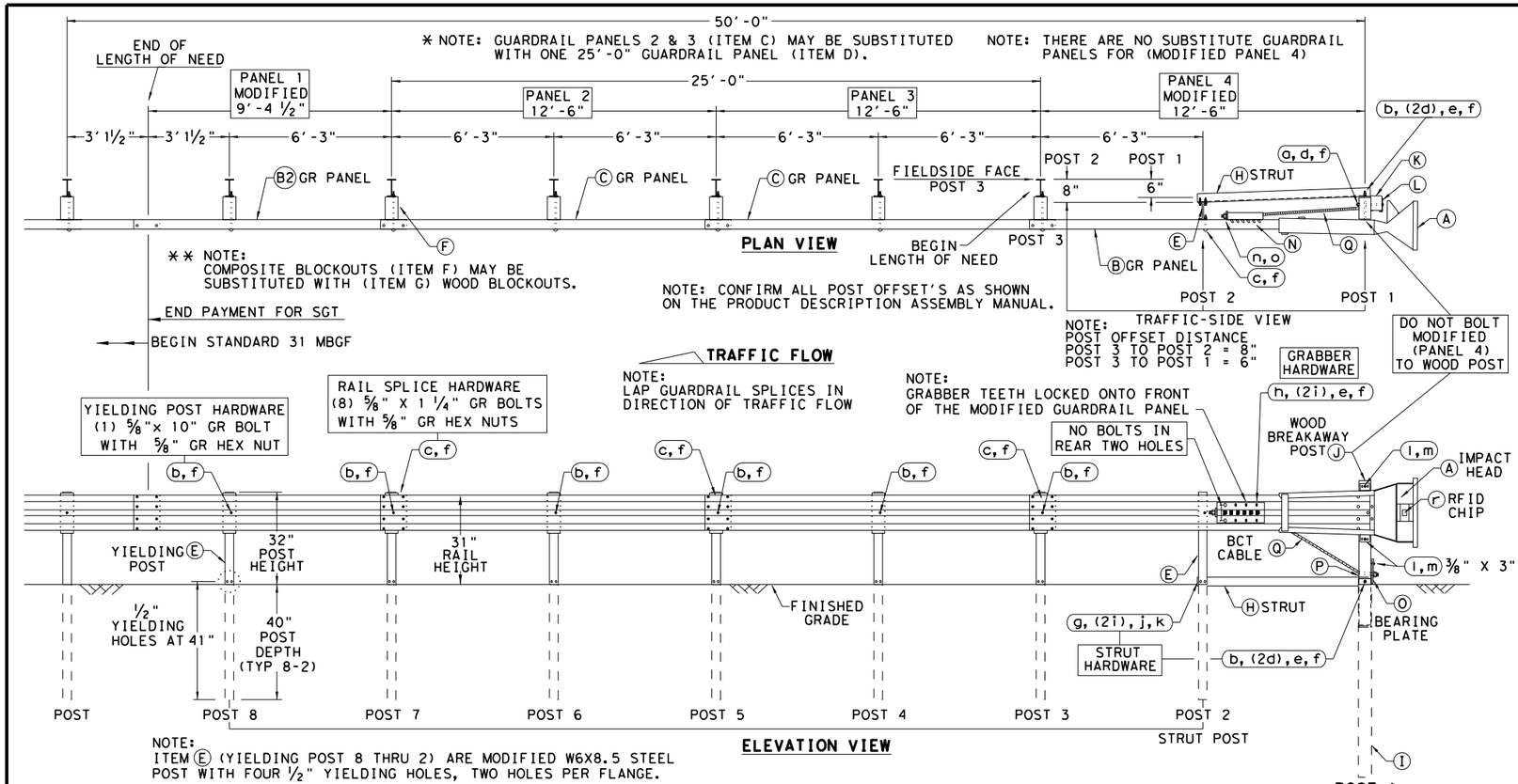
Design Division Standard

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	0922	33	185, ETC.	CR 352, ETC.	
	DIST	COUNTY		SHEET NO.	
	LRD	WEBB		71	

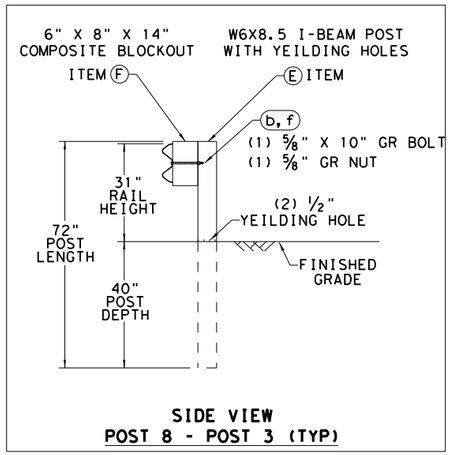


GENERAL NOTES

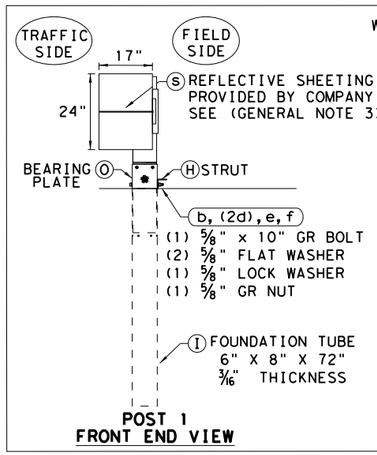
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

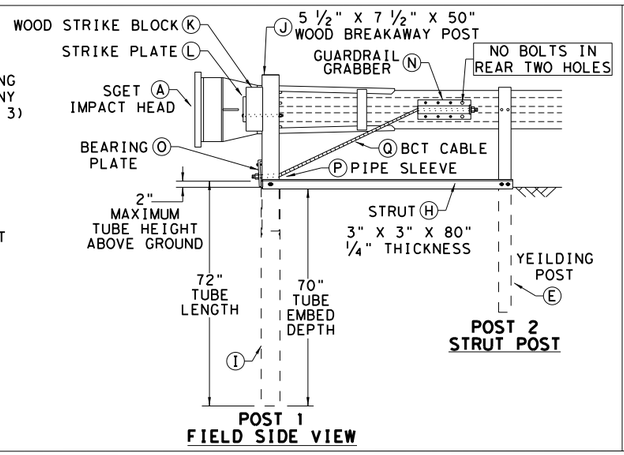
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



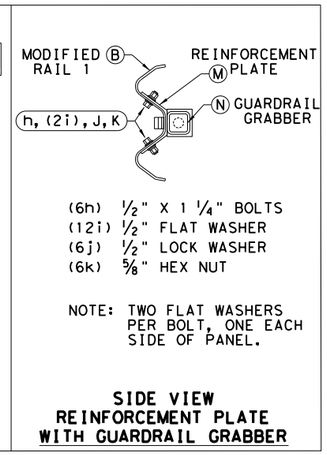
SIDE VIEW
POST 8 - POST 3 (TYP)



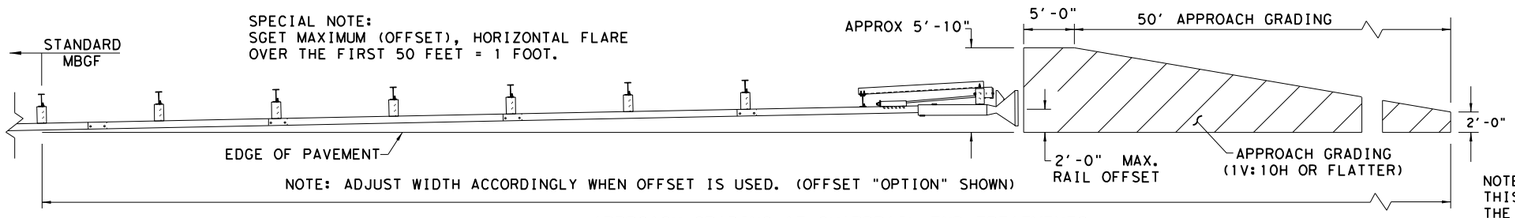
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



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	0922	33	185, ETC.	CR 352, ETC.		
	DIST	COUNTY		SHEET NO.		
	LRD	WEBB		72		

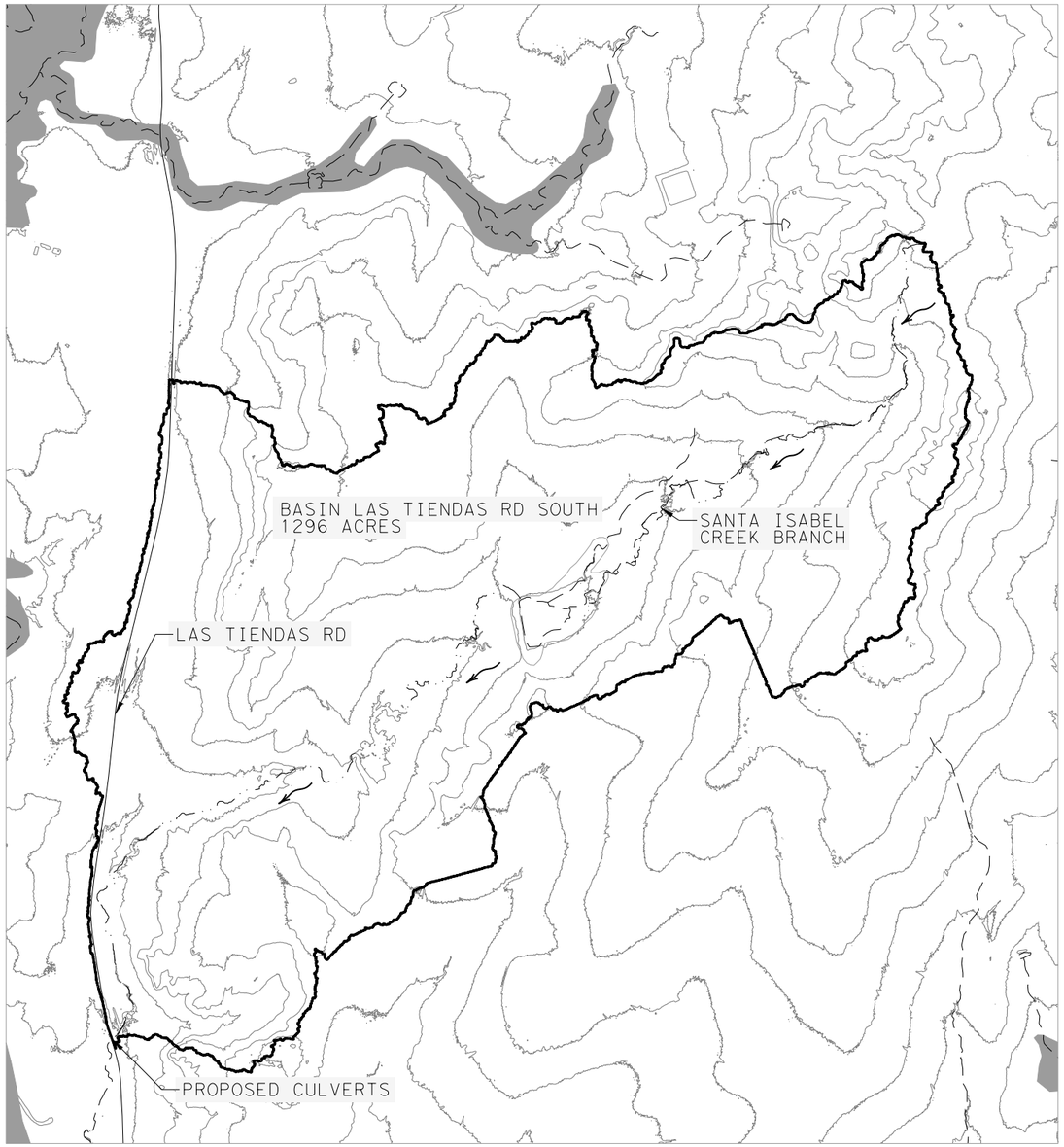
DATE: 3/28/2024
FILE: ...\Standards\sgt153120.dgn

OMIT

OMIT

100% SUBMITTAL

DSN: LBS	CK: WRY	DSN: GAW	CK: WRY



LEGEND

- BASIN BOUNDARY
- STREAM
- 10 FT ELEVATION CONTOUR
- FEMA FLOOD ZONE A
- FLOW DIRECTION
- TIME OF CONCENTRATION FLOWPATH
- STREET

N

0 500 FT 1000 FT

NOTES:
1. FLOWS ESTIMATED USING THE HEC-HMS PROGRAM VERSION 4.9 AND PRECIPITATION ESTIMATED USING EBDLKUP-2019 AND ATLAS 14 PRECIPITATION DEPTHS.
2. FEMA FIRM 48479C0775C WAS USED FOR FLOOD ZONE. EFFECTIVE DATE 04/02/2008.
3. THERE IS NOT SUFFICIENT SMALL RESERVOIR STORAGE CAPACITY IN THE WATERSHED TO AFFECT THE RUNOFF CALCULATIONS.

DRAINAGE AREA ID	DRAINAGE AREA (MI2)	DRAINAGE AREA (ACRES)	COMPUTATION METHOD	CN (AMC-I)	LAG TIME (MIN)	PEAK FLOW Q (CFS)						
						2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
LAS TIENDAS RD SOUTH	2.02	1,296	NRCS CN	53	87	60	247	440	825	1195	1607	2831

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER
4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)

DRAINAGE AREA MAP

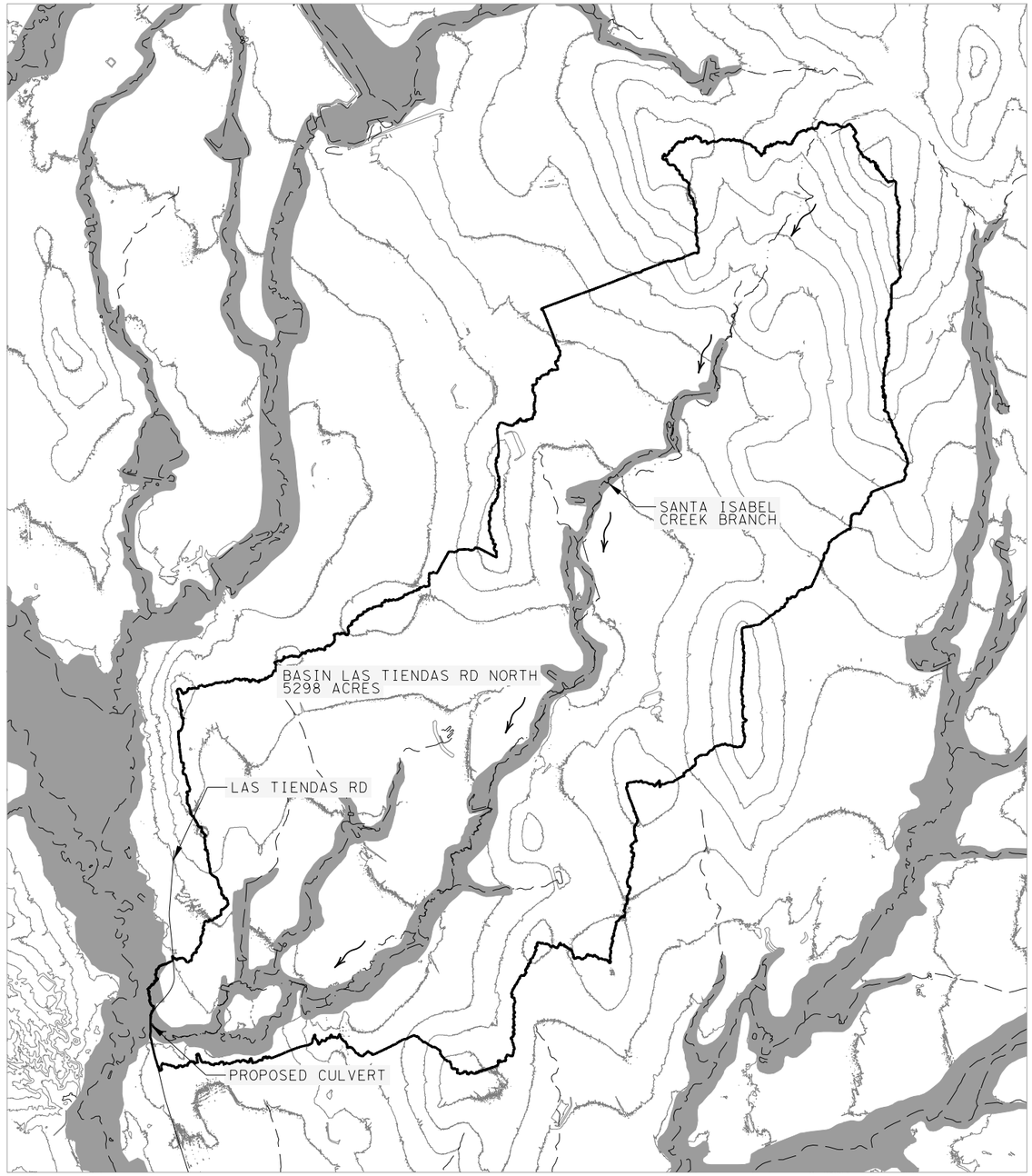
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		75

DATE: 4/9/2024 2:05:41 PM
FILE: ...\DAM_Las Tiendas South.dgn

100% SUBMITTAL

DW: LBS	CK: WRY	DW: GAW	CK: WRY



LEGEND

- BASIN BOUNDARY
- STREAM
- 10 FT ELEVATION CONTOUR
- FEMA FLOOD ZONE A
- FLOW DIRECTION
- TIME OF CONCENTRATION FLOWPATH
- STREET

0 2500 FT 5000 FT

N

NOTES:
1. FLOWS ESTIMATED USING THE HEC-HMS PROGRAM VERSION 4.9 AND PRECIPITATION ESTIMATED USING EBDLKUP-2019 AND PRECIPITATION BASED ON ATLAS 14 RAINFALL DATA.
2. FEMA FIRM 48479C0525C WAS USED FOR FLOOD ZONE. EFFECTIVE DATE 04/02/2008.

DRAINAGE AREA ID	DRAINAGE AREA (MI2)	DRAINAGE AREA (ACRES)	COMPUTATION METHOD	CN (AMC-I)	LAG TIME (MIN)	PEAK FLOW Q (CFS)						
						2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
LAS TIENDAS RD NORTH	8.28	5,298	NRCS CN	50	256	80	368	668	1286	1896	2591	4721

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER
4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

LAS TIENDAS RD
AT
SANTA ISABEL CK BRANCH
(NORTH)

DRAINAGE AREA MAP

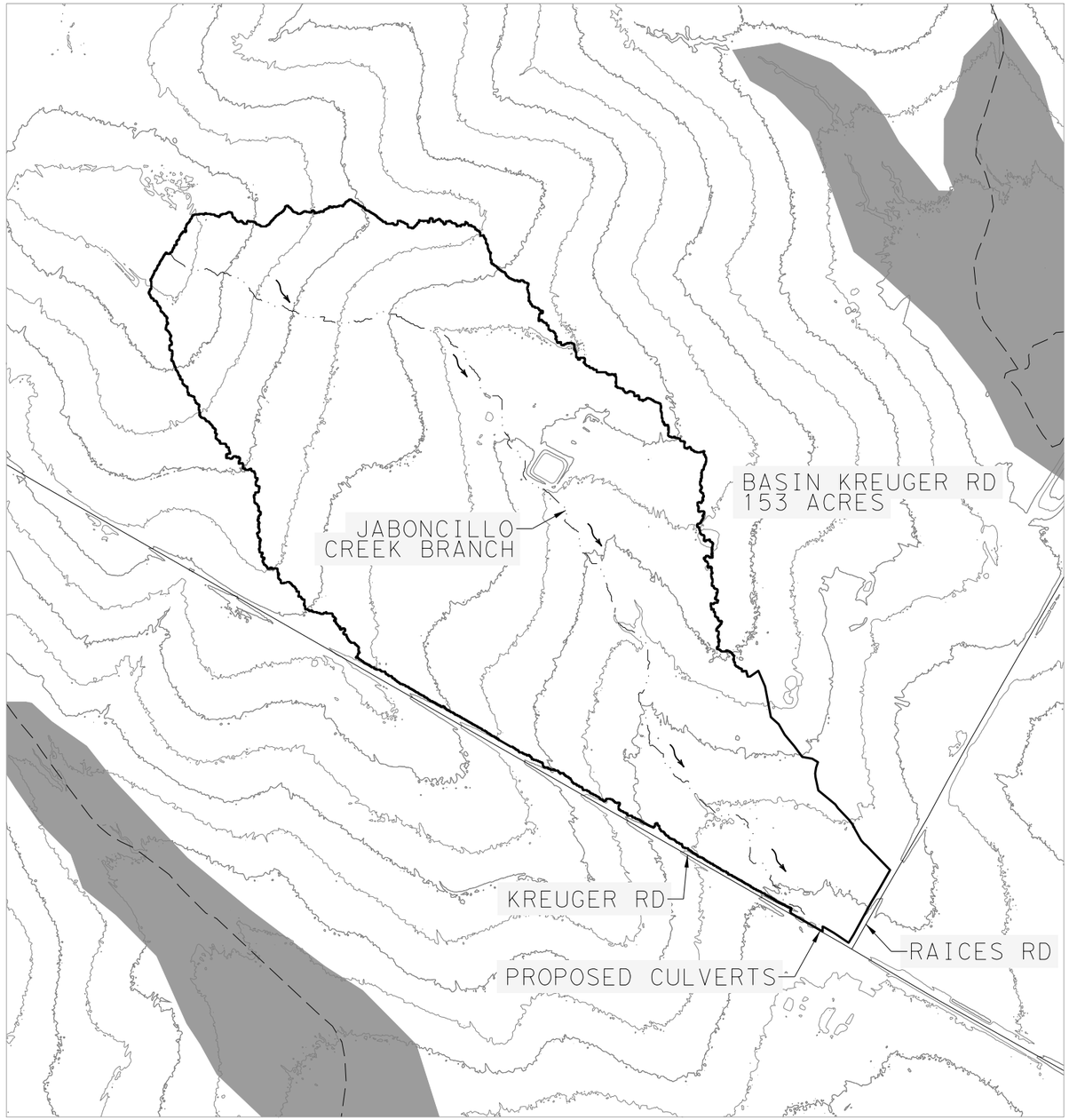
SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		76

DATE: 4/9/2024 2:06:13 PM
FILE: ...\DAM Las Tiendas North.dgn

100% SUBMITTAL

DW: LBS	CK: WRY	DW: GAW	CK: WRY



LEGEND

- BASIN BOUNDARY
- STREAM
- 10 FT ELEVATION CONTOUR
- FEMA FLOOD ZONE A
- FLOW DIRECTION
- TIME OF CONCENTRATION FLOWPATH
- STREET

N

0 500 FT 1000 FT

NOTES:
1. FLOWS ESTIMATED USING THE HEC-HMS PROGRAM VERSION 4.9 AND PRECIPITATION ESTIMATED USING EBDLKUP-2019 AND PRECIPITATION BASED ON ATLAS 14 RAINFALL DATA.
2. FEMA FIRM 48479C0325C WAS USED FOR FLOOD ZONE. EFFECTIVE DATE 04/02/2008.
3. THE ROAD NAME CHANGES FROM KREUGER ROAD TO ALAMO ROAD IN THIS AREA.

DRAINAGE AREA ID	DRAINAGE AREA (MI2)	DRAINAGE AREA (ACRES)	COMPUTATION METHOD	RUNOFF COEFF. (C)	2-YR		5-YR		10-YR		25-YR		50-YR		100-YR		500-YR	
					INTENSITY (IN/HR)	PEAK FLOW	INTENSITY (IN/HR)	PEAK FLOW	INTENSITY (IN/HR)	PEAK FLOW	INTENSITY (IN/HR)	PEAK FLOW	INTENSITY (IN/HR)	PEAK FLOW	INTENSITY (IN/HR)	PEAK FLOW	INTENSITY (IN/HR)	PEAK FLOW
KREUGER RD	0.24	153	RATIONAL	0.29	1.36	60	1.92	85	2.37	105	2.98	132	3.47	154	4	178	5.48	243

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER
4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

KREUGER RD AT JABONCILLO CREEK BRANCH

DRAINAGE AREA MAP

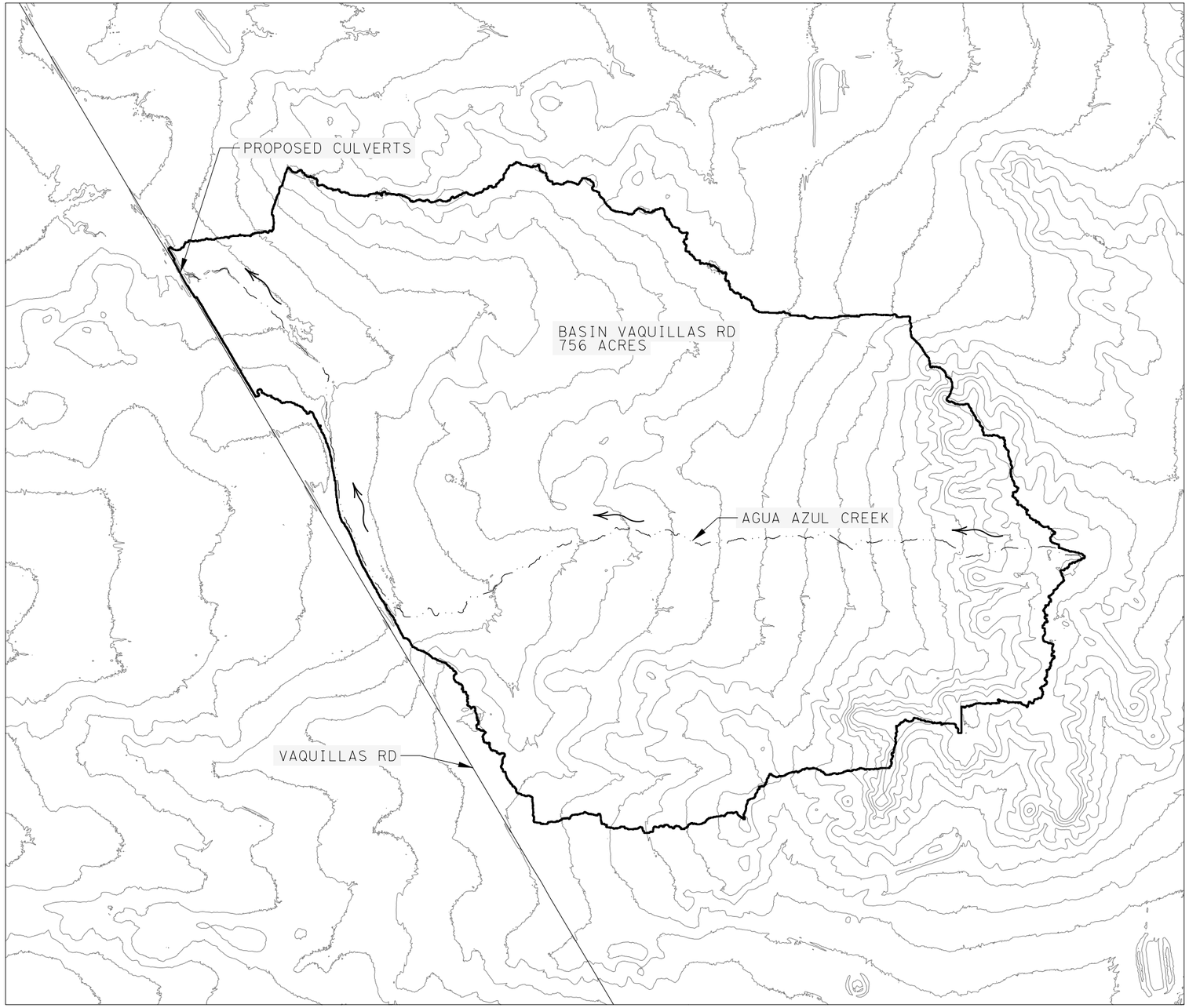
SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		77

DATE: 4/9/2024 2:06:33 PM
FILE: ...\5. Drainage\DAM Kreuger Rd.dgn

100% SUBMITTAL

DSN: LBS	CK: WRY	DSN: GAW	CK: WRY



LEGEND

- BASIN BOUNDARY
- STREAM
- 10 FT ELEVATION CONTOUR
- FLOW DIRECTION
- TIME OF CONCENTRATION FLOWPATH
- STREET

N

0 500 FT 1000 FT

NOTES:
1. FLOWS ESTIMATED USING THE HEC-HMS PROGRAM VERSION 4.9 AND PRECIPITATION ESTIMATED USING EBDLKUP-2019 AND ATLAS 14 PRECIPITATION DEPTHS.

DRAINAGE AREA ID	DRAINAGE AREA (MI2)	DRAINAGE AREA (ACRES)	COMPUTATION METHOD	CN (AMC-I)	LAG TIME (MIN)	PEAK FLOW Q (CFS)						
						2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
VAQUILLAS RD	1.18	756	NRCS CN	54	73	45	176	311	573	822	1097	1907

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER
4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

DRAINAGE AREA MAP

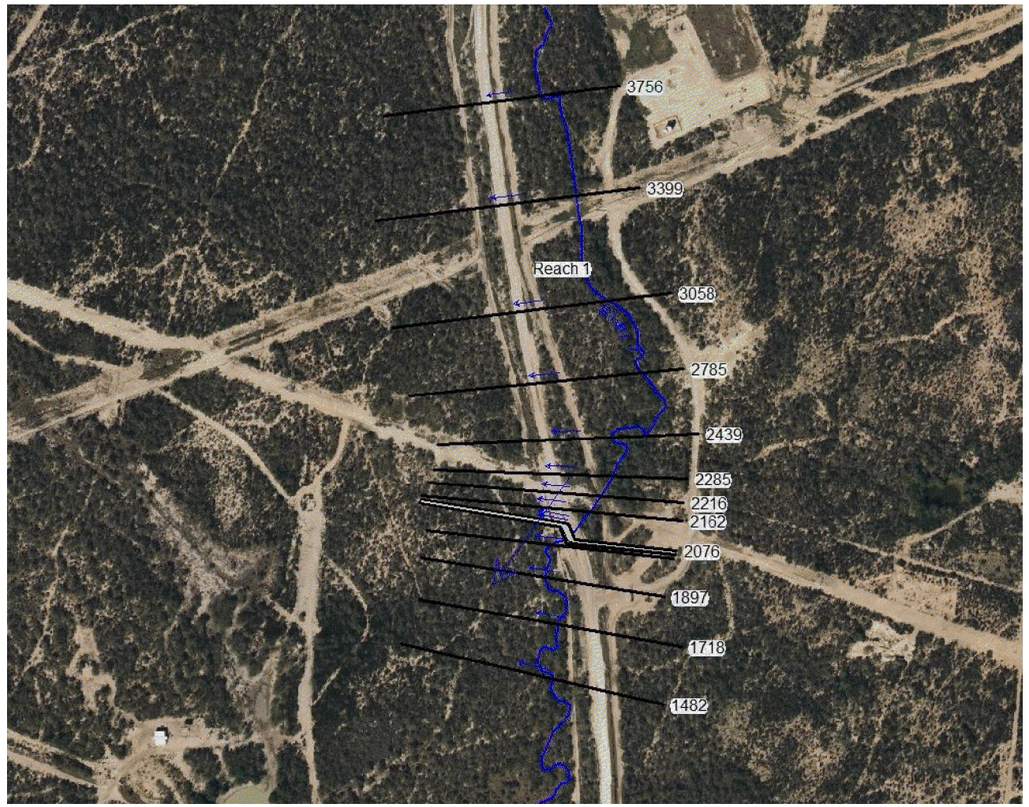
SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		78

DATE: 4/9/2024 2:06:54 PM
FILE: ...\DAM Vaquillas Rd.dgn

100% SUBMITTAL

DW: LBS | CK: WRY | DW: GAW | CK: WRY



NOTES:
1. HEC-RAS VERSION 6.3 WAS USED FOR THE EXISTING BRIDGE AND PROPOSED CULVERT ANALYSIS.
2. DRAINAGE AREA WAS DELINEATED AND PEAK FLOWS WERE CALCULATED USING 2018 SOUTH TEXAS LIDAR DATA.
3. THE PROPOSED 5-7X3 BOX CULVERTS PROVIDE A 20% AEP LEVEL OF SERVICE BASED ON WSEL; HOWEVER, THE ROADWAY CROSSING OVERALL PROVIDES A 50% AEP EVENT DUE TO OVERTOPPING OF THE ROADWAY AT THE SAG JUST SOUTH OF THE CULVERTS.
4. COORDINATION WITH THE WEBB COUNTY FLOODPLAIN ADMINISTRATOR, JORGE CALDERON, OCCURRED ON 02/07/2024.

20% AEP HYDRAULIC DATA

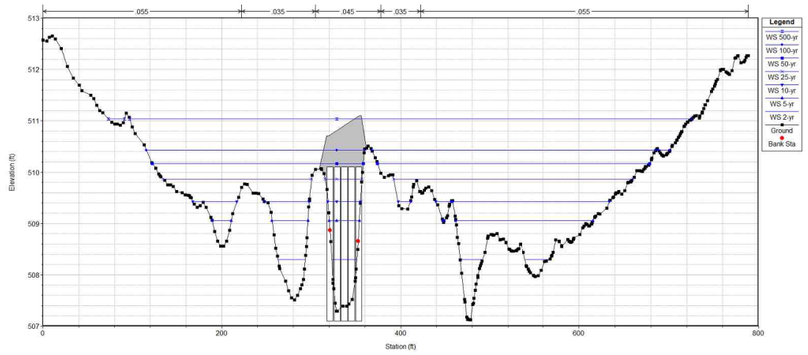
River Sta	Existing			Proposed		
	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)
3756	247	514.49	2.7	247	514.49	2.71
3399	247	513.29	2.9	247	513.29	2.88
3058	247	511.79	2.6	247	511.80	2.53
2785	247	510.90	1.8	247	510.89	1.83
2439	247	509.77	2.4	247	509.79	2.36
2285	247	509.48	1.6	247	509.50	1.61
2216	247	509.34	2.0	247	509.36	1.92
2162	247	509.15	2.5	247	509.17	2.58
2076	247	508.99	1.6	247	509.00	1.69
2061		Bridge			Culvert	
2049	247	508.94	2.0	247	508.97	2.28
2006	247	508.83	2.1	247	508.85	2.21
1897	247	508.52	2.3	247	508.52	2.40
1718	247	507.63	3.7	247	507.62	3.65
1482	247	506.79	2.5	247	506.79	2.54

1% AEP HYDRAULIC DATA

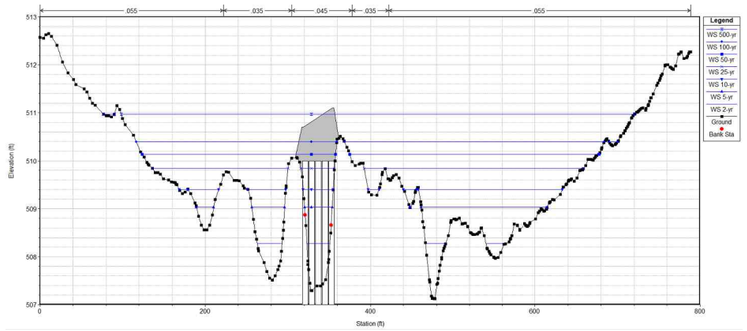
River Sta	Existing			Proposed		
	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)
3756	1607	515.99	4.5	1607	515.99	4.5
3399	1607	514.53	4.5	1607	514.53	4.5
3058	1607	512.92	4.0	1607	512.92	4.0
2785	1607	512.08	2.8	1607	512.08	2.8
2439	1607	511.14	3.3	1607	511.16	3.2
2285	1607	510.84	2.6	1607	510.88	2.6
2216	1607	510.67	3.2	1607	510.73	3.1
2162	1607	510.56	3.1	1607	510.61	3.2
2076	1607	510.35	3.3	1607	510.39	3.5
2061		Bridge			Culvert	
2049	1607	510.31	3.6	1607	510.35	3.8
2006	1607	510.12	4.1	1607	510.13	4.3
1897	1607	509.73	3.5	1607	509.74	3.5
1718	1607	509.15	4.2	1607	509.15	4.2
1482	1607	508.40	4.0	1607	508.40	4.0

1% AEP CULVERT DATA

Plan: Proposed	Reach: River 1	RS: 2061	Profile: 100yr
Q Culv Group (cfs)	185.25	Culv Full Len (ft)	30
# Barrels	5	Culv Vel US (ft/s)	1.76
Q Barrel (cfs)	37.05	Culv Vel DS (ft/s)	1.76
E.G. US. (ft)	510.48	Culv Inv El Up (ft)	507.1
W.S. US. (ft)	510.39	Culv Inv El Dn (ft)	507
E.G. DS (ft)	510.45	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	510.35	Culv Exit Loss (ft)	0
Delta EG (ft)	0.03	Culv Entr Loss (ft)	0.02
Delta WS (ft)	0.04	Q Weir (cfs)	1421.75
E.G. IC (ft)	510.43	Weir Sta Lft (ft)	114.4
E.G. OC (ft)	510.48	Weir Sta Rgt (ft)	702.6
Culvert Control	Outlet	Weir Submerg	0.95
Culv WS Inlet (ft)	510.1	Weir Max Depth (ft)	3.35
Culv WS Outlet (ft)	510	Weir Avg Depth (ft)	1.31
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	705.54
Culv Crt Depth (ft)	0.95	Min El Weir Flow (ft)	507.13



HEC-RAS PROPOSED UPSTREAM PROFILE



HEC-RAS PROPOSED DOWNSTREAM PROFILE

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)

HYDRAULIC DATA SHEET

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		79

DATE: 4/9/2024 2:07:13 PM
FILE: ...\Hydraulic Data Las Tiendas S.dgn

100% SUBMITTAL

DW: LBS | CK: WRY | DW: GAW | CK: WRY

NOTES:
1. HEC-RAS VERSION 6.3 WAS USED FOR THE EXISTING AND PROPOSED BRIDGE ANALYSIS.
2. DRAINAGE AREA WAS DELINEATED AND PEAK FLOWS WERE CALCULATED USING 2018 SOUTH TEXAS LIDAR DATA.
3. THE PROPOSED BRIDGE PROVIDES A 20% AEP LEVEL OF SERVICE BASED ON WSEL.
4. COORDINATION WITH THE WEBB COUNTY FLOODPLAIN ADMINISTRATOR, JORGE CALDERON, OCCURRED ON 02/07/2024.
5. THE FLOOD ZONE A FLOODPLAIN (NOT SHOWN) DOES NOT RESEMBLE THE ACTUAL LIDAR FLOWPATH.

20% AEP HYDRAULIC DATA

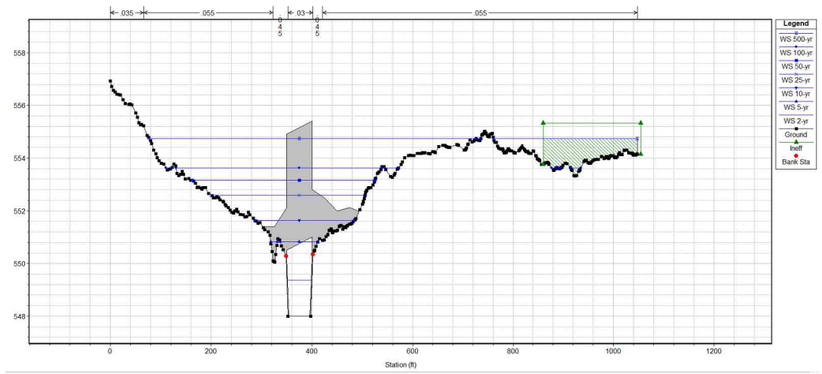
River Sta	Existing			Proposed		
	Q Total	W.S. Elev	Vel Chnl	Q Total	W.S. Elev	Vel Chnl
	(cfs)	(ft)	(ft/s)	(cfs)	(ft)	(ft/s)
3000	368	554.34	2.8	368	554.34	2.8
2613	368	553.72	2.7	368	553.72	2.7
2088	368	552.66	3.5	368	552.68	3.5
1476	368	552.11	1.7	368	551.79	2.1
1289	368	551.97	1.9	368	551.51	2.5
1167	368	551.87	2.1	368	551.06	4.0
1138	Bridge			Bridge		
1115	368	550.66	4.9	368	550.66	4.9
1031	368	550.60	1.9	368	550.60	1.9
926	368	550.45	2.0	368	550.45	2.0
644	368	549.91	3.4	368	549.91	3.4
396	368	549.21	3.8	368	549.21	3.8

1% AEP HYDRAULIC DATA

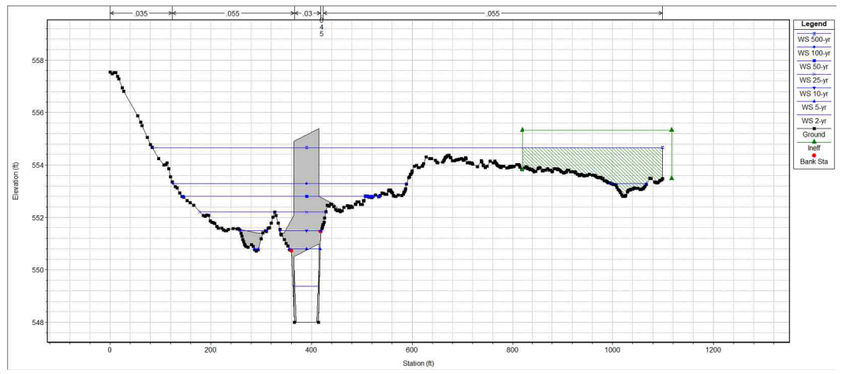
River Sta	Existing			Proposed		
	Q Total	W.S. Elev	Vel Chnl	Q Total	W.S. Elev	Vel Chnl
	(cfs)	(ft)	(ft/s)	(cfs)	(ft)	(ft/s)
3000	2591	556.86	5.6	2591	556.86	5.6
2613	2591	555.81	5.4	2591	555.81	5.4
2088	2591	554.88	4.5	2591	554.90	4.4
1476	2591	554.38	3.0	2591	554.42	3.0
1289	2591	553.99	4.8	2591	554.05	4.7
1167	2591	553.68	5.0	2591	553.78	4.8
1138	Bridge			Bridge		
1115	2591	553.45	6.2	2591	553.45	6.2
1031	2591	553.36	3.5	2591	553.36	3.5
926	2591	553.25	2.9	2591	553.25	2.9
644	2591	552.82	5.3	2591	552.82	5.3
396	2591	552.18	5.9	2591	552.18	5.9

1% AEP BRIDGE DATA

Plan: Proposed R2 60 RC	River 1	Reach 1 RS: 1138	Profile: 100-yr	
E.G. US. (ft)	553.97	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	553.78	E.G. Elev (ft)	553.98	553.8
Q Total (cfs)	2591	W.S. Elev (ft)	553.78	553.45
Q Bridge (cfs)	615.11	Crit W.S. (ft)	553.43	553.27
Q Weir (cfs)	1975.9	Max Chl Dpth (ft)	5.78	5.65
Weir Sta Lft (ft)	94.24	Vel Total (ft/s)	4.07	4.18
Weir Sta Rgt (ft)	860.54	Flow Area (sq ft)	636.06	620.41
Weir Submerg	0.68	Froude # Chl	0.34	0.37
Weir Max Depth (ft)	2.57	Specif Force (cu ft)	1324.69	1286.88
Min El Weir Flow (ft)	551.41	Hydr Depth (ft)	1.53	1.52
Min El Prs (ft)	551.13	W.P. Total (ft)	514.61	507.28
Delta EG (ft)	0.22	Conv. Total (cfs)		
Delta WS (ft)	0.34	Top Width (ft)	481.03	518.25
BR Open Area (sq ft)	131.13	Frctn Loss (ft)		
BR Open Vel (ft/s)	4.69	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		



HEC-RAS PROPOSED UPSTREAM PROFILE



HEC-RAS PROPOSED DOWNSTREAM PROFILE

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)

HYDRAULIC DATA SHEET

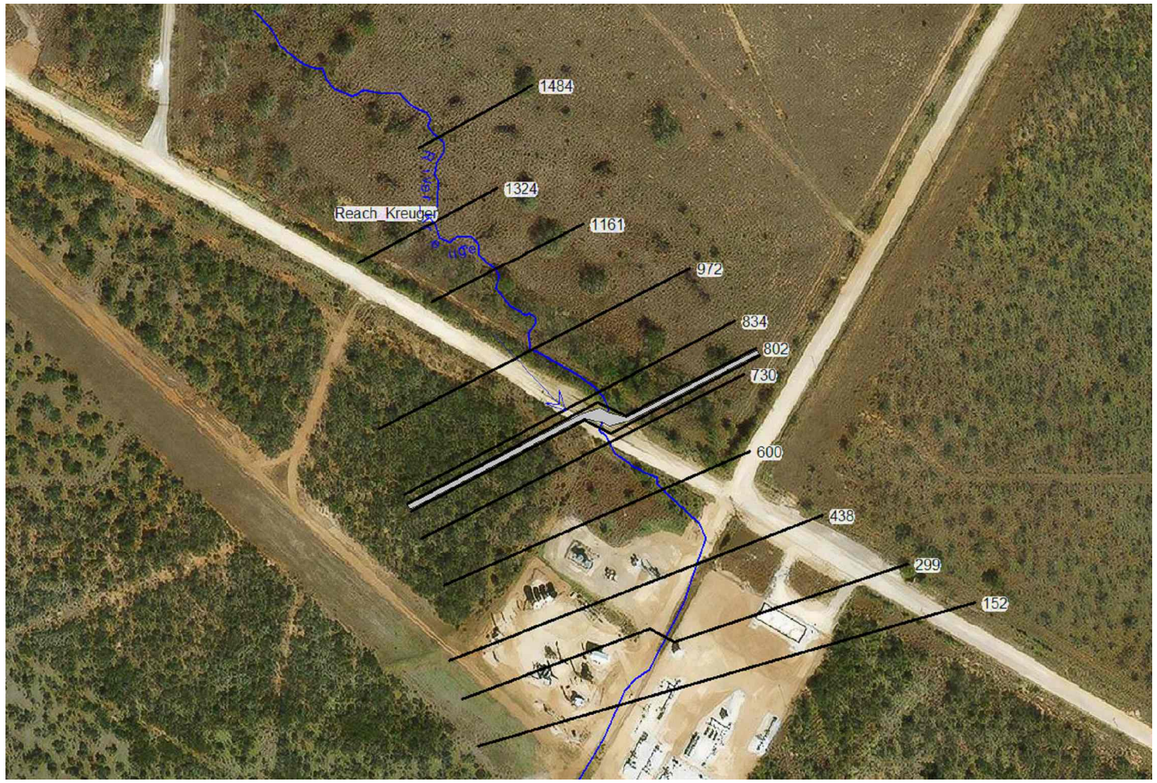
SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		80

DATE: 4/9/2024 2:07:31 PM
FILE: ...\Hydraulic Data Las Tiendas N.dgn

100% SUBMITTAL

DW: LBS | CK: WRY | DW: GAW | CK: WRY



NOTES:
1. HEC-RAS VERSION 6.3 WAS USED FOR THE EXISTING BRIDGE AND PROPOSED CULVERT ANALYSIS.
2. DRAINAGE AREA WAS DELINEATED AND PEAK FLOWS WERE CALCULATED USING 2018 SOUTH TEXAS LIDAR DATA.
3. THE PROPOSED 3-7X3 BOX CULVERTS HAVE A 20% AEP LEVEL OF SERVICE BASED ON WSEL.
4. COORDINATION WITH THE WEBB COUNTY FLOOD PLAIN ADMINISTRATOR, JORGE CALDERON, OCCURRED ON 02/07/2024.
5. THE FLOOD ZONE A FLOODPLAIN (NOT SHOWN) DOES NOT RESEMBLE THE ACTUAL LIDAR FLOWPATH.

20% AEP HYDRAULIC DATA

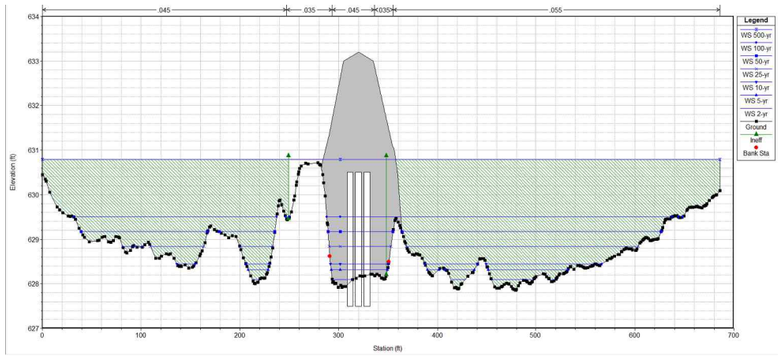
River Sta	Existing			Proposed		
	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)
1484	85	633.58	1.7	85	633.58	1.7
1324	85	632.30	1.6	85	632.30	1.6
1161	85	631.29	1.0	85	631.29	1.0
972	85	629.72	3.2	85	629.72	3.2
834	85	629.45	0.5	85	629.08	0.8
802	85	629.41	1.2	85	628.93	1.9
784		Bridge			Culvert	
763	85	628.69	2.5	85	628.69	2.5
730	85	628.49	2.5	85	628.49	2.5
600	85	627.39	3.5	85	627.39	3.5
438	85	625.56	2.1	85	625.56	2.1
299	85	624.59	2.5	85	624.59	2.5
152	85	623.85	1.9	85	623.85	1.9

1% AEP HYDRAULIC DATA

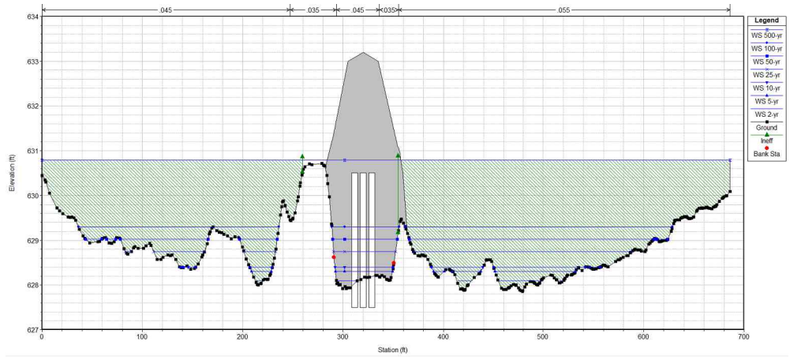
River Sta	Existing			Proposed		
	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)
1484	178	633.69	2.5	178	633.75	2.1
1324	178	632.58	1.7	178	632.50	2.0
1161	178	631.38	2.0	178	631.57	1.6
972	178	630.15	2.4	178	629.90	4.2
834	178	630.12	0.6	178	629.84	0.8
802	178	630.07	1.6	178	629.76	1.9
784		Bridge			Culvert	
763	178	629.19	2.7	178	629.19	2.7
730	178	628.98	3.3	178	628.98	3.3
600	178	627.72	4.6	178	627.72	4.6
438	178	625.77	2.9	178	625.77	2.9
299	178	624.74	2.9	178	624.74	2.9
152	178	624.01	2.3	178	624.01	2.3

1% AEP CULVERT DATA

Plan: Proposed	Reach: Reach 1	RS: 784	Culv Group	Profile: 100yr
Q Culv Group (cfs)	178	Culv Full Len(ft)		
# Barrels	3	Culv Vel US (ft/s)		4.72
Q Barrel (cfs)	59.33	Culv Vel DS (ft/s)		5
E.G. US. (ft)	629.82	Culv Inv El Up (ft)		627.5
W.S. US. (ft)	629.76	Culv Inv El Dn (ft)		627.5
E.G. DS (ft)	629.31	Culv Frctn Ls (ft)		0.06
W.S. DS (ft)	629.19	Culv Exit Loss (ft)		0.28
Delta EG (ft)	0.51	Culv Entr Loss (ft)		0.17
Delta WS (ft)	0.57	Q Weir (cfs)		
E.G. IC (ft)	629.59	Weir Sta Lft (ft)		
E.G. OC (ft)	629.82	Weir Sta Rgt (ft)		
Culvert Control	Outlet	Weir Submerg		
Culvert WS Inlet (f)	629.3	Weir Max Depth (ft)		
Culvert WS Outlet (ft)	629.19	Weir Avg Depth (ft)		
Culvert Nml Depth (ft)		Weir Flow Area (sq ft)		
Culv Crt Depth (ft)	1.31	Min El Weir Flow (ft)		630.54



HEC-RAS PROPOSED UPSTREAM PROFILE



HEC-RAS PROPOSED DOWNSTREAM PROFILE

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

KREUGER RD AT JABONCILLO CREEK BRANCH

HYDRAULIC DATA SHEET

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		81

DATE: 4/9/2024 2:07:47 PM
FILE: ...\Hydraulic Data Kreuger Rd

100% SUBMITTAL

DW: LBS | CK: WRY | DW: GAW | CK: WRY

NOTES:
1. HEC-RAS VERSION 6.3 WAS USED FOR THE EXISTING BRIDGE AND PROPOSED CULVERT ANALYSIS.
2. DRAINAGE AREA WAS DELINEATED AND PEAK FLOWS WERE CALCULATED USING 2019 SOUTH TEXAS LIDAR DATA
3. THE PROPOSED 10-5x2 BOX CULVERTS PROVIDE A 20% AEP LEVEL OF SERVICE BASED ON WSEL.
4. COORDINATION WITH THE WEBB COUNTY FLOODPLAIN ADMINISTRATOR, JORGE CALDERON, OCCURRED ON 02/07/2024.

20% AEP HYDRAULIC DATA

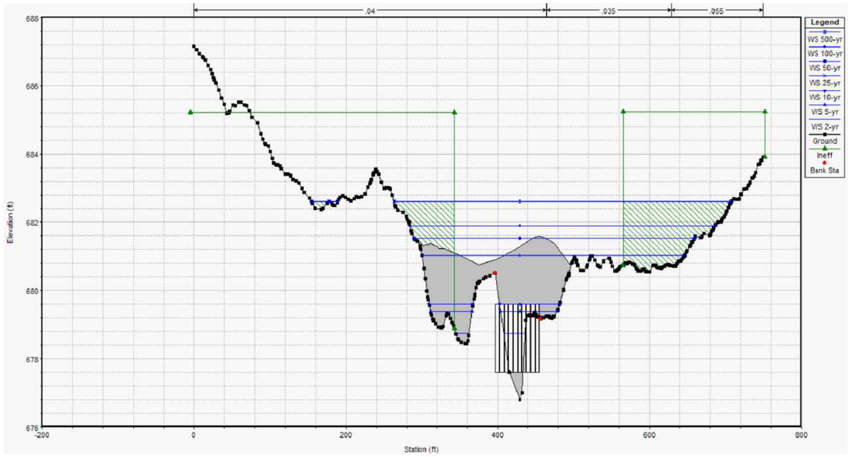
River Sta	Existing			Proposed		
	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)
3041	176	686.92	2.6	176	686.92	2.6
2781	176	684.99	2.6	176	684.99	2.7
2466	176	683.73	2.5	176	683.73	2.5
2005	176	681.93	2.3	176	681.91	2.3
1858	176	680.32	4.8	176	680.33	4.7
1805	176	679.79	2.5	176	679.51	3.7
	Bridge			Culvert		
1757	176	679.38	2.1	176	679.38	2.1
1713	176	679.10	3.2	176	679.10	3.2
1560	176	677.79	3.9	176	677.79	3.9
1393	176	675.89	5.2	176	675.89	5.2

1% AEP HYDRAULIC DATA

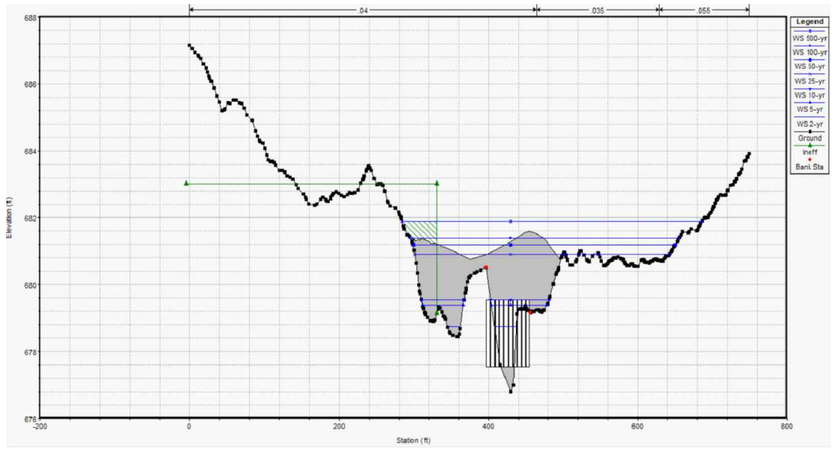
River Sta	Existing			Proposed		
	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)
3041	1097	689.18	3.6	1097	689.18	3.6
2781	1097	687.80	5.1	1097	687.80	5.1
2466	1097	686.12	5.8	1097	686.12	5.8
2005	1097	683.39	4.1	1097	683.39	4.1
1858	1097	681.92	7.1	1097	681.92	7.1
1805	1097	681.94	3.0	1097	681.89	3.0
	Bridge			Culvert		
1757	1097	681.22	3.1	1097	681.22	3.1
1713	1097	680.49	6.6	1097	680.49	6.6
1560	1097	679.26	6.2	1097	679.26	6.2
1393	1097	677.61	8.3	1097	677.61	8.3

1% AEP CULVERT DATA

Plan: Proposed	Reach: River 1	RS: 1780	Culv Group	Profile: 100yr
Q Culv Group (cfs)	525.75	Culv Full Len(ft)		30
# Barrels	10	Culv Vel US (ft/s)		5.26
Q Barrel (cfs)	52.58	Culv Vel DS (ft/s)		5.26
E.G. US. (ft)	681.99	Culv Inv El Up (ft)		677.61
W.S. US. (ft)	681.89	Culv Inv El Dn (ft)		677.55
E.G. DS (ft)	681.31	Culv Frctn Ls (ft)		0.13
W.S. DS (ft)	681.22	Culv Exit Loss (ft)		0.33
Delta EG (ft)	0.68	Culv Entr Loss (ft)		0.21
Delta WS (ft)	0.67	Q Weir (cfs)		571.25
E.G. IC (ft)	681.59	Weir Sta Lft (ft)		343
E.G. OC (ft)	681.99	Weir Sta Rgt (ft)		565.36
Culvert Control	Outlet	Weir Submerg		0.28
Culvert WS Inlet (f)	679.61	Weir Max Depth (ft)		1.42
Culvert WS Outlet (ft)	679.55	Weir Avg Depth (ft)		0.97
Culvert Nml Depth (ft)		Weir Flow Area (sq ft)		216.14
Culv Crt Depth (ft)	1.51	Min El Weir Flow (ft)		680.58



HEC-RAS PROPOSED UPSTREAM PROFILE



HEC-RAS PROPOSED DOWNSTREAM PROFILE

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

HYDRAULIC DATA SHEET

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		82

DATE: 4/9/2024 2:08:02 PM
FILE: ...\Hydraulic Data Vaquillas Rd

100% SUBMITTAL

DW: LBS | CK: WRY | DW: GAW | CK: WRY

Las Tiendas North SRICOS Scour Analysis

General Scour Parameters	
Hydraulic Design Flood	<10 year
Scour Design Flood	Maximum of 2-year, 5-year, Incipient Pressure Flow Event, 10-year, 25-year
Scour Check Flood	50-year
Model Name	Las_Tiendas_North_LBS
Plan Used	Proposed
Cross Section ID	**Corresponding HEC-RAS Cross Section Number**
Cross Section 4	1289
Cross Section 3	1167
Cross Section BU	1138 BR U
Cross Section BD	1138 BR D
Cross Section 2	1115
Cross Section 1	1031
Conveyance Zone	**Erosion Category**
Main Channel	3 Medium Erodibility

Contraction Scour - SRICOS			
Input Parameter	**Units**	**Main Channel**	
		2-yr	**5-yr**
Width of flow at Cross Section 4	**ft**	38.9	180.15
Width of flow through Cross Section BU less pier widths	**ft**	45.18	47.50
Length of contracted channel section in direction of flow	**ft**	35	
Abutment transition angle	**Degrees**	25	
Manning's roughness coefficient for channel bed	**N/A**	0.03	
Average velocity in Cross Section 4	**ft/s**	1.11	2.54
Hydraulic radius measured in Cross Section BU	**ft**	1.47	1.78
Average depth of flow in Cross Section 4	**ft**	1.88	1.14
Average velocity in Cross Section BU	**ft/s**	1.19	2.84

SRICOS Equivalent Time Calculations for Contraction Scour			
Input Parameter	**Units**	**Main Channel**	
		2-yr	**5-yr**
Design life of structure	**Years**	75	
Representative velocity in contracted section	**ft/s**	1.19	2.84
Initial contraction scour rate - expected value	**in/day**	0	10.99
Initial pier scour rate - expected value	**in/day**	0	0

SRICOS Scour Results			
Scour Type	**Units**	**Main Channel**	
		2-yr	**5-yr**
Contraction Scour	**ft**	0.5	1.0
Pier Scour	**ft**	0	0
Total Scour	**ft**	0.5	1.0

Las Tiendas North Pressure Scour Analysis

Contraction Scour - Pressure					
Input Parameter	**Units**	**Main Channel**			
		Incipient	**10-yr**	**25-yr**	**50-yr**
Cross Section 4 Channel Discharge	**cfs**	540	668	1286	1896
Cross Section 4 Flow Depth	**ft**	4.94	5.41	6.06	6.62
Cross Section 4 WSEL	**ft**	551.88	552.35	553.00	553.56
Bridge Railing Elevation	**ft**	555.84			
Slope of Energy Grade Line of Main Channel - Cross Section 3	**ft/ft**	0.010301	0.011222	0.009334	0.006407
Fall Velocity based on the D50	**ft/s**	0.07872			
Flow in Cross Section BU	**cfs**	540	668	1286	1896
Number of Piers	**Piers**	0			
Width of flow transporting bed material in Cross Section 4	**ft**	200.64	289.2	347.42	408.39
Width of flow transporting bed material in Cross Section BU	**ft**	152.47	201.5	315.47	380.63
Low chord minus Cross Section BU avg channel bottom elevation	**ft**	3.04			
Distance from water surface to low chord	**ft**	0.36	0.65	1.71	2.28
Height of bridge from low chord to top of railing	**ft**	3.23			

Pressure Scour Results					
Scour Type	**Units**	**Main Channel**			
		Incipient	**10-yr**	**25-yr**	**50-yr**
Contraction Scour	**ft**	4.0	5.0	4.5	5.0
Pier Scour	**ft**	0	0	0	0
Total Scour	**ft**	4.0	5.0	4.5	5.0

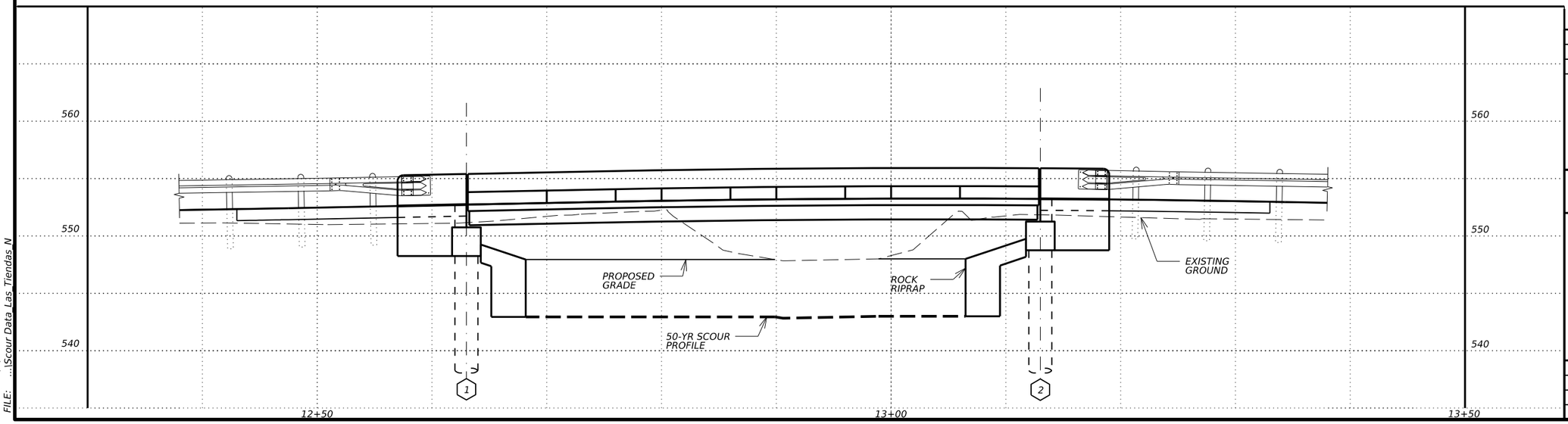
NOTES:

1. SCOUR CALCULATIONS WERE PERFORMED USING THE TXDOT SCOUR ANALYSIS SPREADSHEETS FOR BOTH THE SRICOS AND PRESSURE FLOW SCOUR METHODS. THE VERSION USED WAS LAST REVISED BY TXDOT IN JANUARY 2024.
2. THE SCOUR DEPTH WAS CALCULATED USING THE SRICOS METHOD FOR FLOOD EVENTS THAT WERE NOT MODELED AS OVERTOPPING THE BRIDGE. THE SOIL WAS CATEGORIZED AS COHESIVE BASED ON GEOTECHNICAL DATA WHICH INDICATES THAT AT THE DEPTH OF THE CHANNEL BOTTOM, THE SOIL IS CLASSIFIED AS EITHER CLAY OR DENSE CLAYEY GRAVEL DEPENDING UPON SAMPLING LOCATION. A D_{50} OF 0.2 mm WAS ASSUMED FOR CLAY, AND A D_{50} OF 4.75 mm WAS ASSUMED FOR GRAVEL. THE CALCULATED SCOUR DEPTHS WERE IDENTICAL USING EITHER D_{50}.
3. THE SCOUR DEPTH WAS CALCULATED USING THE PRESSURE METHOD FOR FLOOD EVENTS THAT WERE MODELED AS OVERTOPPING THE BRIDGE.
4. THE SELECTED SCOUR DESIGN FLOOD WAS THE 10-YR EVENT, AS IT YIELDED THE MAXIMUM CALCULATED SCOUR DEPTH OUT OF THE 2-YR, 5-YR, 10-YR, 25-YR, AND THE INCIPIENT OVERTOPPING EVENTS. THE SELECTED SCOUR CHECK FLOOD WAS THE 50-YR EVENT. THESE SELECTIONS WERE BASED ON GUIDELINES FROM THE TXDOT SCOUR ANALYSIS GUIDE (SEPTEMBER 2023).
5. FRACTURED SANDSTONE IS APPROXIMATED TO BE 5 TO 7 FT BELOW THE THALWEG OF THE CHANNEL.
6. RIPRAP CALCULATIONS WERE PERFORMED USING EQUATION 14.1 FROM THE FHWA HYDRAULIC ENGINEERING CIRCULAR NO. 23, VOL. 2.

Las Tiendas North Riprap Sizing Analysis

Riprap Design Data							
Input Parameter	**Units**	**Abutments**					
		2-yr	**5-yr**	**Incipient**	**10-yr**	**25-yr**	**50-yr**
Froude Number	**N/A**	0.17	0.29	0.39	0.46	0.45	0.38
Setback Ratio	**N/A**	<5 for both abutments					
Flow through Bridge Opening	**cfs**	80.4	368	530.27	660.03	753.69	698.23
Flow Area of Bridge Opening	**ft^2**	67.48	129.38	131.13	131.13	131.13	131.13
Characteristic Average Velocity	**ft/s**	1.19	2.84	4.04	5.03	5.75	5.32
Water Surface Elevation at XS BU	**ft**	549.61	551.02	551.4	551.69	552.75	553.32
Main Channel Bottom Elevation at XS BU	**ft**	548	548	548	548	548	548
Depth of Flow in Contracted Opening	**ft**	1.61	3.02	3.13	3.69	4.75	5.32
Specific Gravity of Riprap	**N/A**	2.5	2.5	2.5	2.5	2.5	2.5

Results							
Calculated D50	**ft**	0.03	0.15	0.3	0.47	0.61	0.52
Calculated D50	**in**	0.36	1.8	3.6	5.64	7.32	6.24
Recommended Stone Riprap Size (TXDOT Item 432)	**in**	12					
Recommended D50 (TXDOT Item 432)	**in**	7.31-9.92					
Recommended Riprap Thickness	**in**	18					



STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER
4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

LAS TIENDAS RD
AT
SANTA ISABEL CK BRANCH
(NORTH)

SCOUR DATA

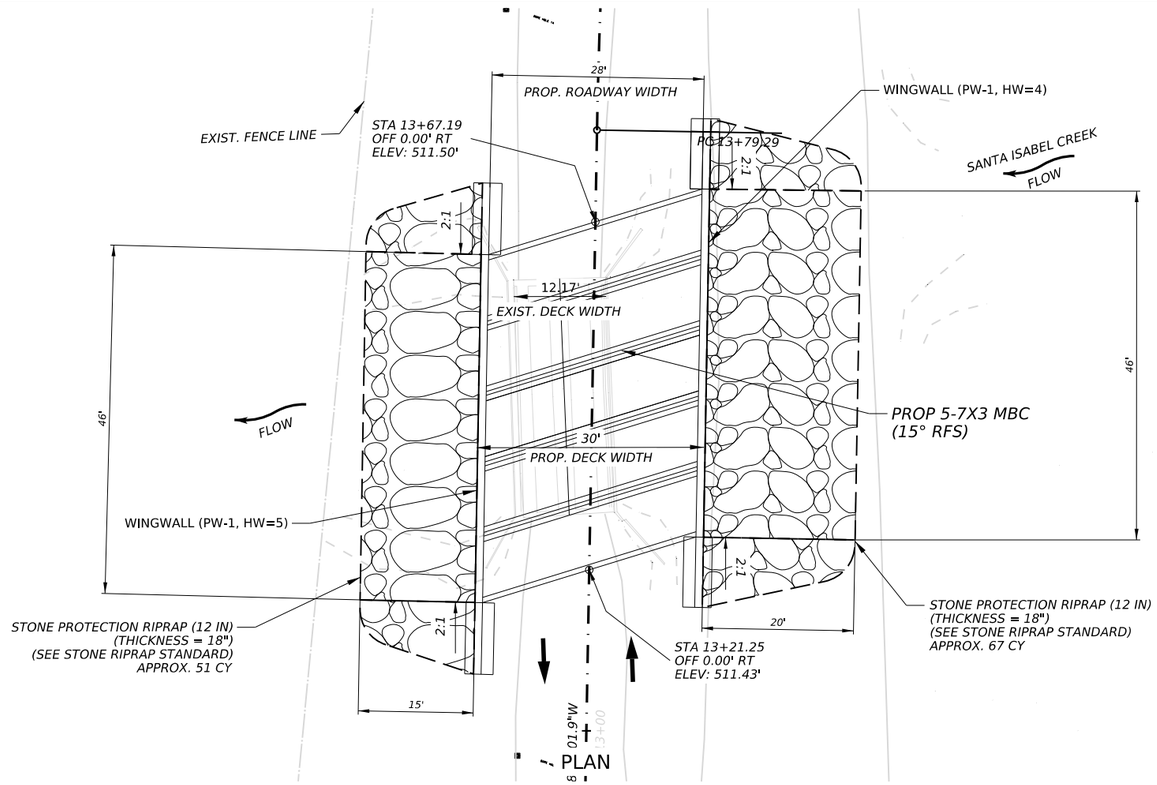
SHEET 1 OF 1

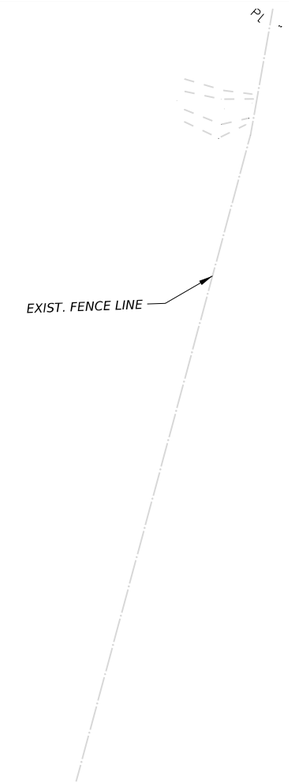
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		83

DATE: 4/9/2024 2:08:22 PM
FILE: ...\Scour Data_Las Tiendas N

100% SUBMITTAL

DW:	CK:
LBS	WRY
GAW	WRY





CULVERT LEGEND

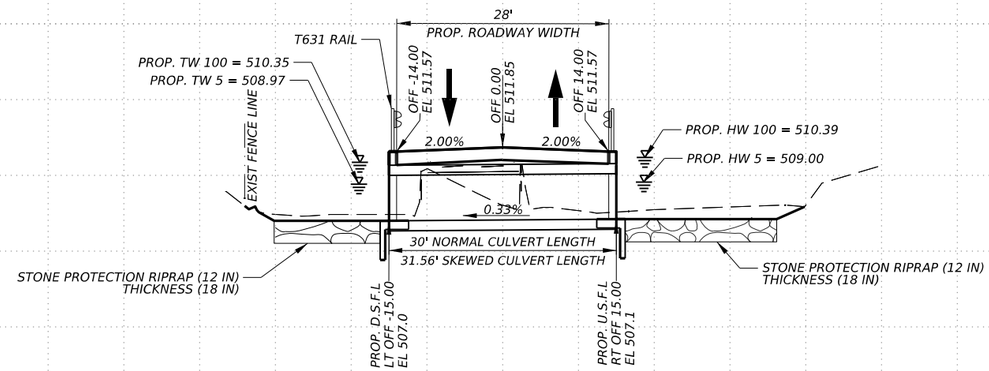
DIRECTION OF TRAFFIC

DIRECTION OF DITCH FLOW

0 10 20

HORIZONTAL SCALE IN FEET

QUANTITIES		
BID ITEM	DESCRIPTION	QUANTITY
432 6031	RIPRAP (STONE PROTECTION) (12 IN)	118 CY
462 6014	CONC BOX CULVERT (7x3)	158 LF
466 6179	WINGWALL (PW-1) (HW=4)	1 EA
467 6180	WINGWALL (PW-1) (HW=5)	1 EA



CSJ 0922-33-185
CULVERT 1: STA 13+45.43
REMOVE EXIST BRIDGE
PROPOSED 5 - 7' x 3' MBC W/ 2-PARALLEL WINGWALLS
SCP-7, SCP-MB & PW-2 (15° RFS)

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

LAS TIENDAS RD AT SANTA ISABEL CK (SOUTH) BRANCH

CULVERT LAYOUT

22-240-0-AA03-52-103

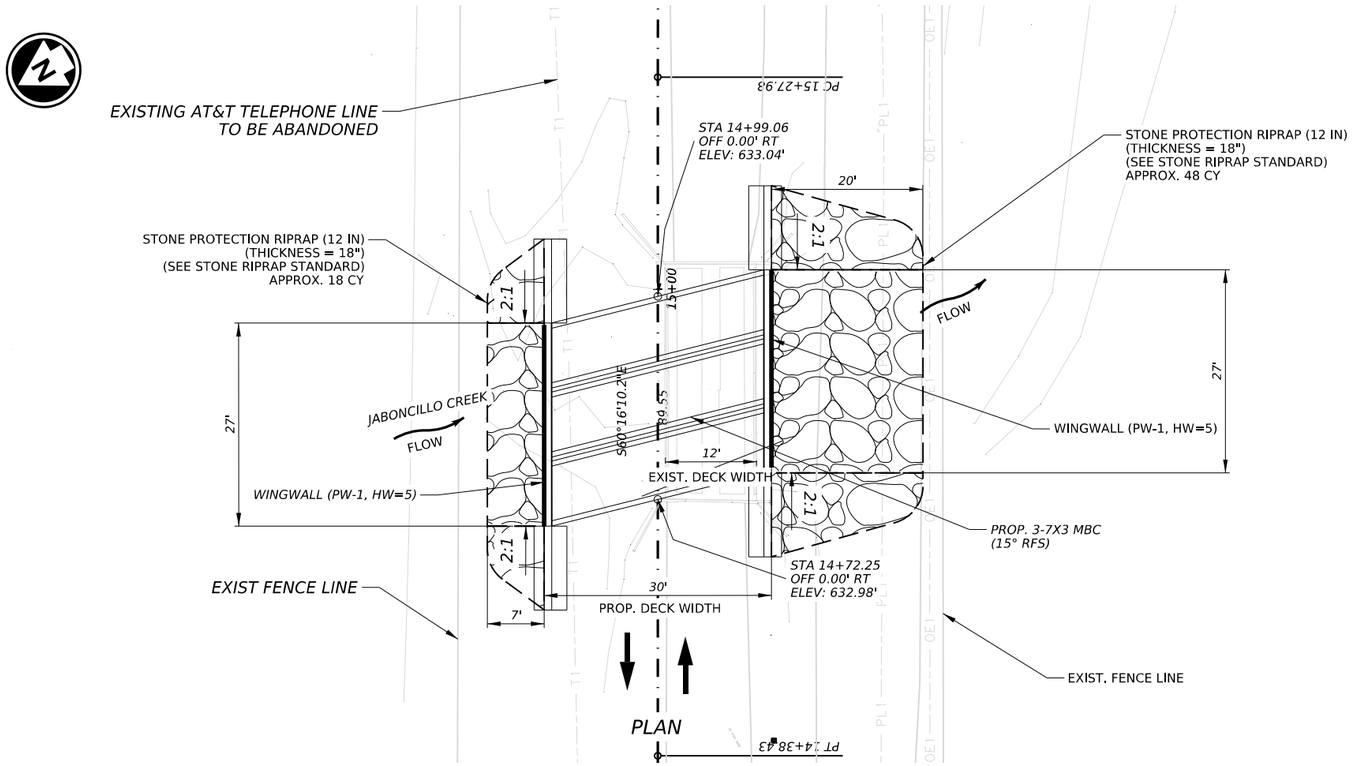
SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		84

DATE: 4/9/2024 2:08:46 PM
FILE: ...\5_Drainage\P&P Las Tiendas S

100% SUBMITTAL

DW: LBS	CK: WRY	DW: GAW	CK: WRY



PLAN

CULVERT LEGEND

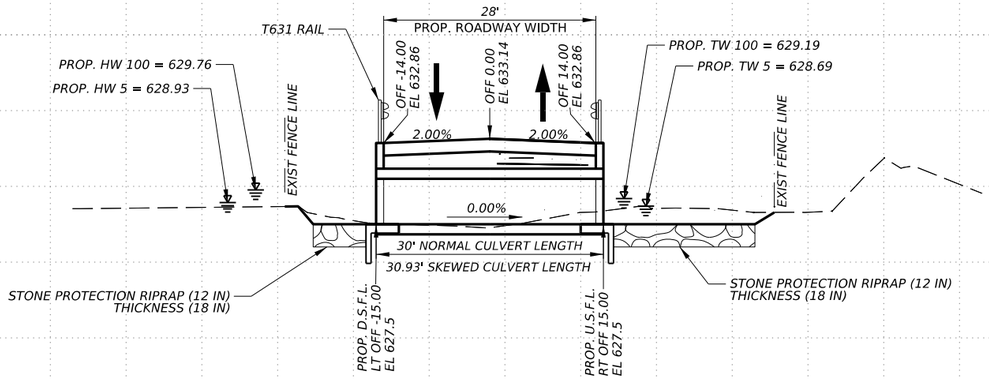
DIRECTION OF TRAFFIC

DIRECTION OF DITCH FLOW

0 10 20

HORIZONTAL SCALE IN FEET

QUANTITIES		
BID ITEM	DESCRIPTION	QUANTITY
432 6031	RIPRAP (STONE PROTECTION) (12 IN)	66 CY
462 6014	CONC BOX CULVERT (7x3)	93 LF
466 6180	WINGWALL (PW-1) (HW=5)	2 EA



ELEVATION

CSJ 0922-33-187
CULVERT 2: STA 14+85.65
REMOVE EXIST BRIDGE
PROPOSED 3 - 7' x 3' MBC W/ 2-PARALLEL WINGWALLS
SCP-7, SCP-MD, & PW-2 (15° RFS)

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

KREUGER RD
AT
JABONCILLO CREEK
BRANCH
CULVERT LAYOUT
22-240-0-AA10-25-101

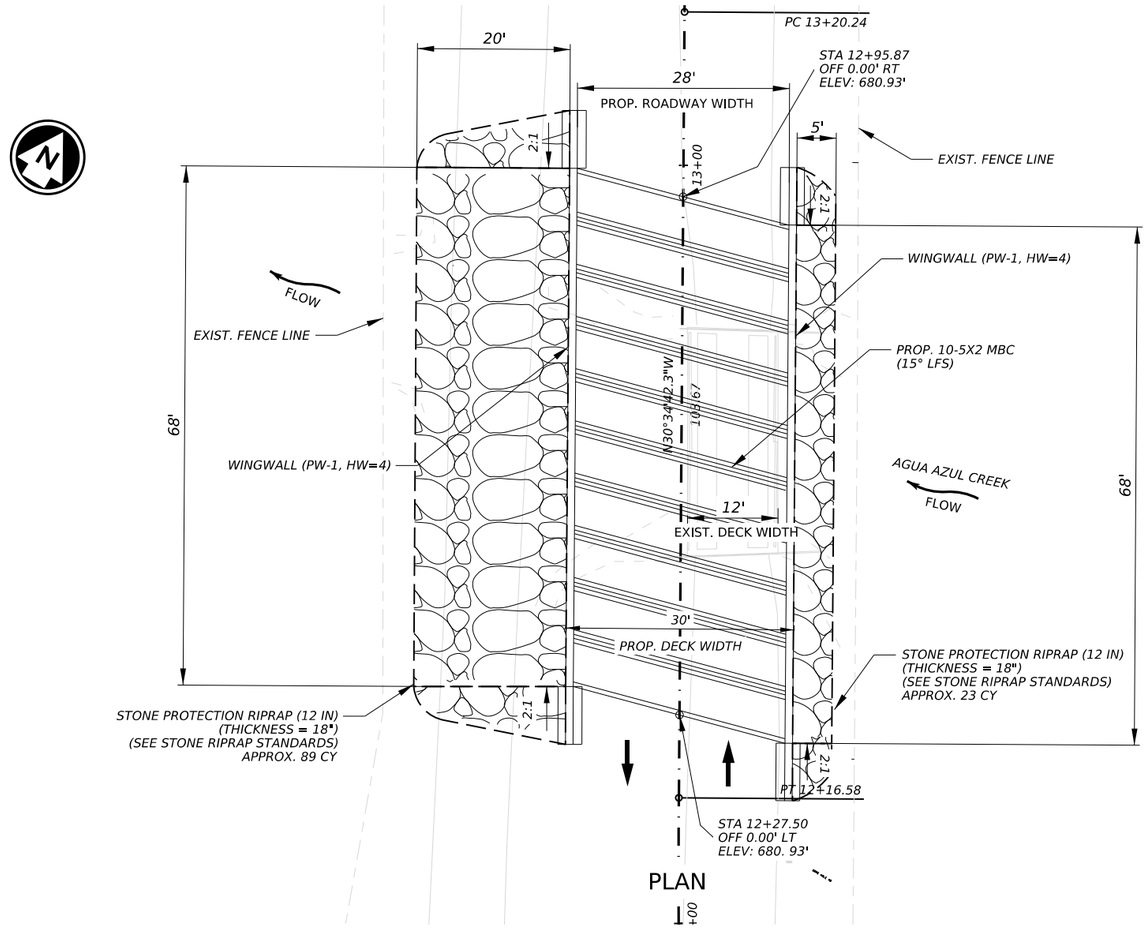
SHEET 2 OF 3

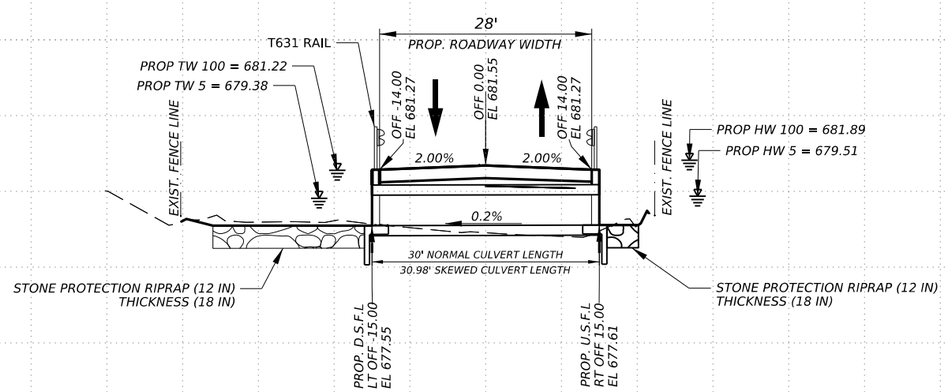
CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		85

DATE: 4/9/2024 2:09:03 PM
FILE: ...\5_Drainage\P&P Kreuger Rd

100% SUBMITTAL

DW: LBS	CK: WRY	DW: GAW	CK: WRY





CSJ 0922-33-197
CULVERT 3: STA 12+61.68
REMOVE EXIST BRIDGE
PROPOSED 10 - 5' x 2' MBC W/ 2-PARALLEL WINGWALL
SCP-5, SCP-MD & PW-2 (15° LFS)

DATE: 4/9/2024 2:09:18 PM
FILE: ...\5 Drainage\P&P Vaquillas Rd

CULVERT LEGEND

DIRECTION OF TRAFFIC

DIRECTION OF DITCH FLOW

0 10 20
HORIZONTAL SCALE IN FEET

QUANTITIES		
BID ITEM	DESCRIPTION	QUANTITY
432 6031	RIPRAP (STONE PROTECTION) (12 IN)	112 CY
462 6006	CONC BOX CULVERT (5x2)	310 LF
466 6179	WINGWALL (PW-1) (HW=4)	2 EA

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis

Texas Department of Transportation

VAQUILLAS RD AT AGUA AZUL CREEK

CULVERT LAYOUT

22-240-0-AA10-05-101

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		86

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
KREUGER (BOTH)	3- 7x3	1.97	SCP-7	PW-1	15	2:1	8	8	1.69	5.354	N/A	N/A	11.086	26.40	N/A	0	3.4	18.8	238
VAQUILLAS (RT)	10- 5x2	1.28	SCP-5	PW-1	15	2:1	8	6	1.00	3.667	N/A	N/A	7.592	66.775	N/A	0	2.5	8.8	56
VAQUILLAS (LT)	10- 5x2	1.28	SCP-5	PW-1	15	2:1	8	6	1.02	3.688	N/A	N/A	7.635	66.775	N/A	0	2.5	8.8	56
LAS TIENDAS S (RT)	5- 7x3	1.32	SCP-7	PW-1	15	2:1	8	8	0.813	4.479	N/A	N/A	9.274	44.344	N/A	0	1.3	8.4	83
LAS TIENDAS S (LT)	5- 7x3	1.32	SCP-7	PW-1	15	2:1	8	8	0.896	4.563	N/A	N/A	9.447	44.344	N/A	0	1.5	9.3	86

DATE:
FILE:

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
· Side slope at culvert for flared or straight wingwalls.
· Channel slope for parallel wingwalls.
· Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

STATE OF TEXAS
WESLEY YOUNG
72271
REGISTERED
PROFESSIONAL ENGINEER

4-9-2024

Texas Department of Transportation

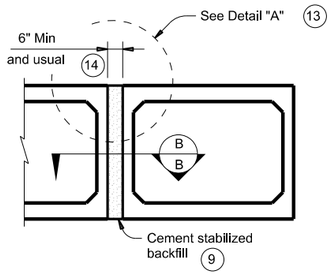
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

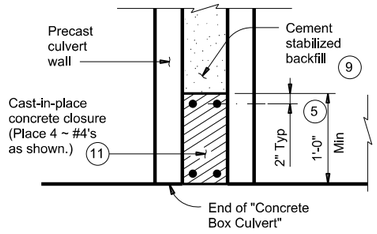
BCS

FILE: CD-BCS-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		87

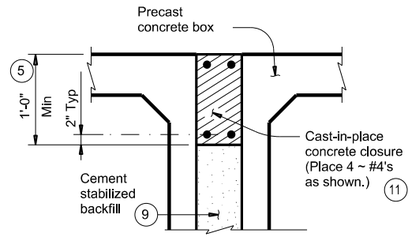
DATE:
FILE:



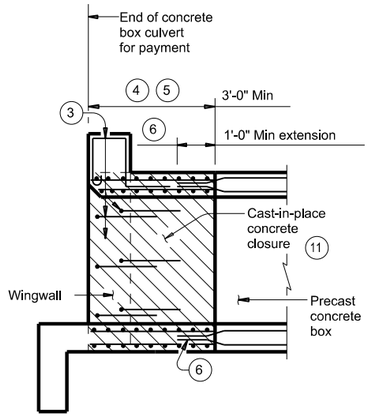
MULTIPLE UNIT PLACEMENT



SECTION B-B

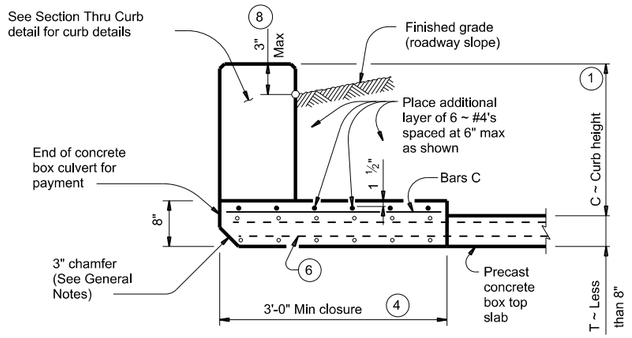


DETAIL "A" (13)

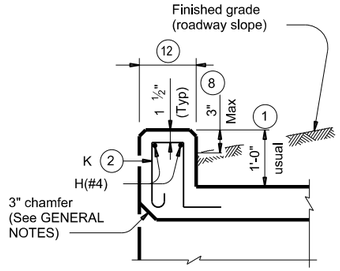


WINGWALL CONNECTION

(Also applies to safety end treatment.)

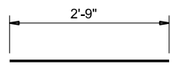


SECTION THRU TOP SLABS LESS THAN 8"

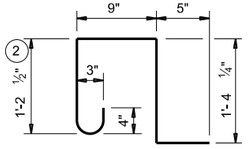


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



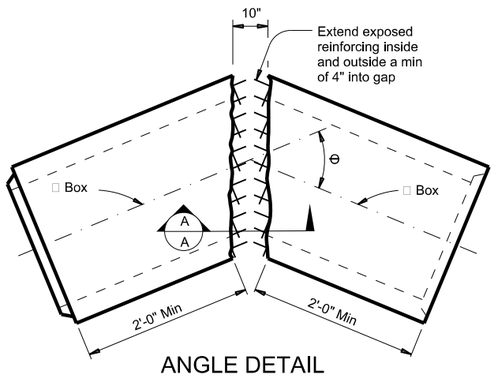
BARS C (#4)
(Spa = 1'-0" Max)



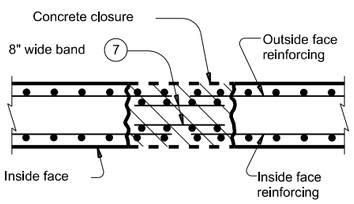
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

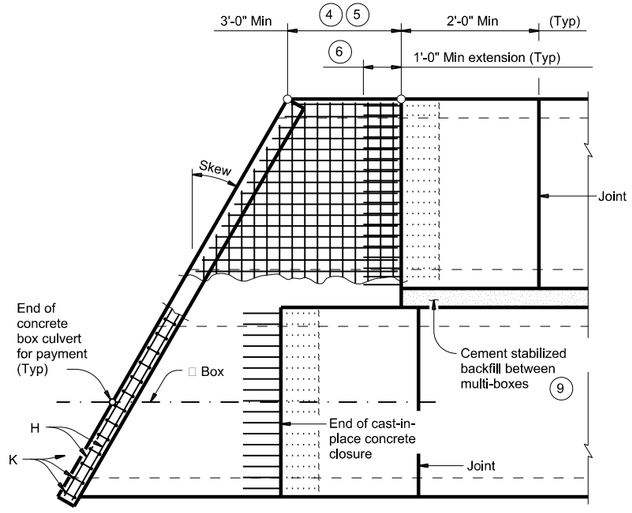
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." No payment will be made for any additional material in the gap between adjacent boxes.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: CD-SCP-MD-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		88

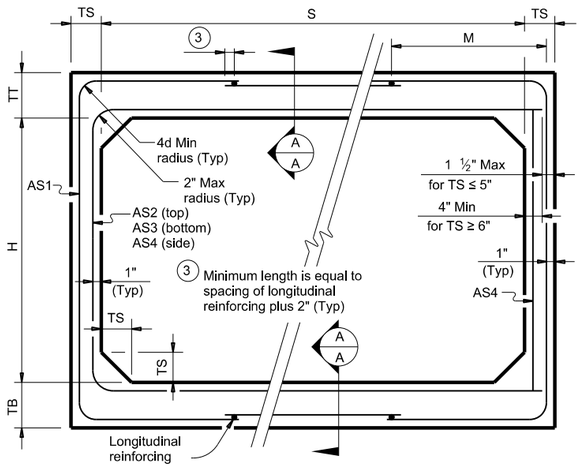
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	-	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	-	-	-	5.1
5	2	6	6	6	3 - 5	44	0.16	0.14	0.14	0.14	-	-	-	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	-	-	-	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	-	-	-	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	-	-	-	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	-	-	-	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	-	-	-	5.1
5	3	8	7	6	< 2	-	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	-	-	-	5.7
5	3	6	6	6	3 - 5	36	0.14	0.17	0.16	0.14	-	-	-	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	-	-	-	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	-	-	-	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	-	-	-	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	-	-	-	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	-	-	-	5.7
5	4	8	7	6	< 2	-	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	-	-	-	6.3
5	4	6	6	6	3 - 5	45	0.14	0.19	0.18	0.14	-	-	-	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	-	-	-	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	-	-	-	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	-	-	-	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	-	-	-	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	-	-	-	6.3
5	5	8	7	6	< 2	-	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	-	-	-	6.9
5	5	6	6	6	3 - 5	45	0.14	0.21	0.20	0.14	-	-	-	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	-	-	-	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	-	-	-	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	-	-	-	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	-	-	-	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	-	-	-	6.9

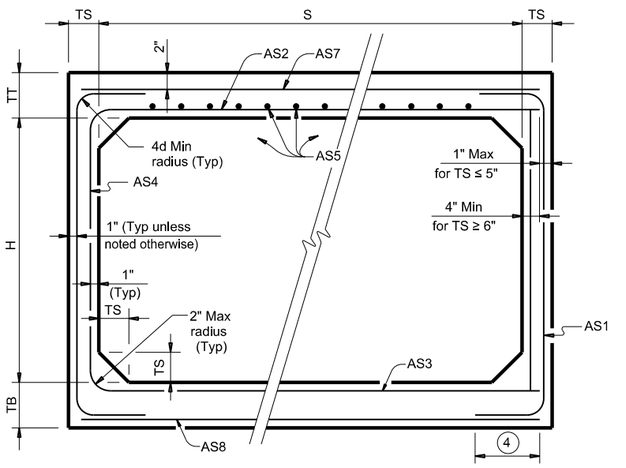
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

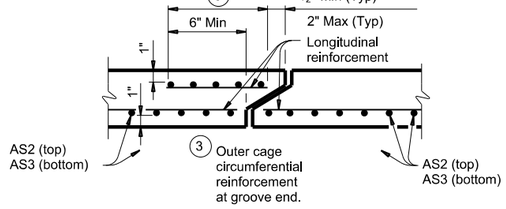
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

SCP-5

FILE: CD-SCP05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		89

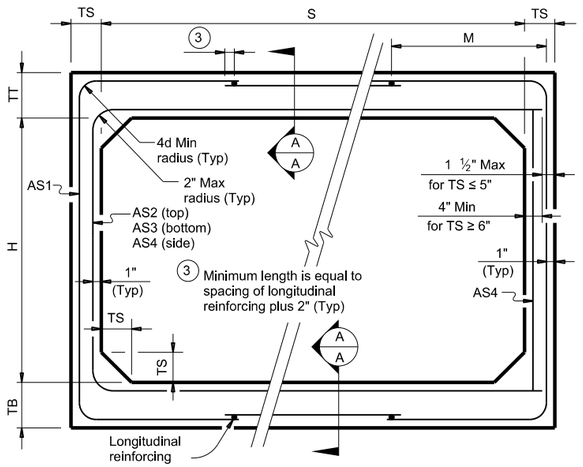
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
7	3	8	8	8	< 2	-	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	-	-	-	9.6
7	3	8	8	8	3 - 5	43	0.19	0.19	0.19	0.19	-	-	-	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	-	-	-	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	-	-	-	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	-	-	-	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	-	-	-	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	-	-	-	9.6
7	4	8	8	8	< 2	-	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	-	-	-	10.4
7	4	8	8	8	3 - 5	43	0.19	0.22	0.19	0.19	-	-	-	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	-	-	-	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	-	-	-	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	-	-	-	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	-	-	-	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	-	-	-	10.4
7	5	8	8	8	< 2	-	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	-	-	-	11.2
7	5	8	8	8	3 - 5	43	0.19	0.24	0.21	0.19	-	-	-	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	-	-	-	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	-	-	-	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	-	-	-	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	-	-	-	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	-	-	-	11.2
7	6	8	8	8	< 2	-	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	-	-	-	12.0
7	6	8	8	8	3 - 5	47	0.19	0.25	0.23	0.19	-	-	-	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	-	-	-	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	-	-	-	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	-	-	-	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	-	-	-	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	-	-	-	12.0
7	7	8	8	8	< 2	-	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	-	-	-	12.8
7	7	8	8	8	3 - 5	59	0.19	0.27	0.25	0.19	-	-	-	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	-	-	-	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	-	-	-	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	-	-	-	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	-	-	-	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	-	-	-	12.8

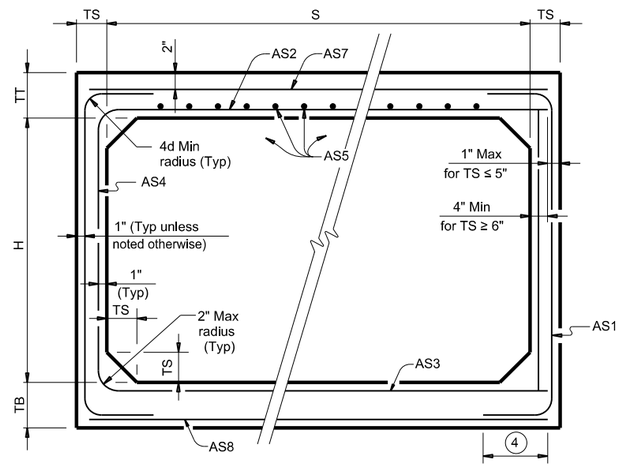
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

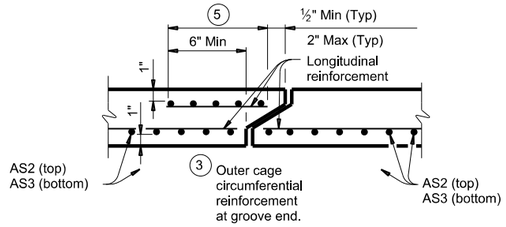
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

7'-0" SPAN

SCP-7

FILE: CD-SCP07-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		90

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:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

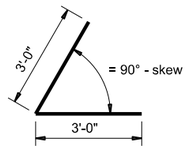
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1		Bars J2					
					Size	Spa	Size	Spa	Reinf Lb/Ft	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

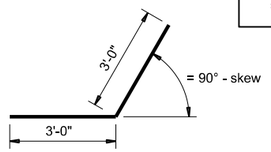
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

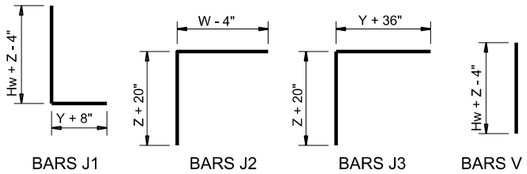
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

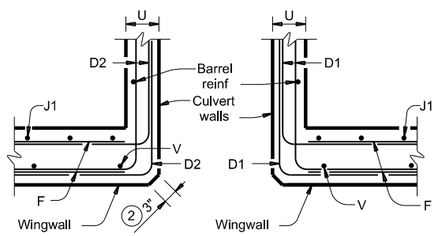
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw 4' ≥
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw 4' <

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

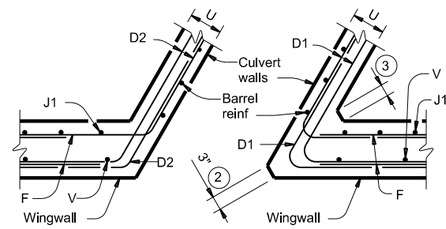
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw 4' ≥
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw 4' <

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

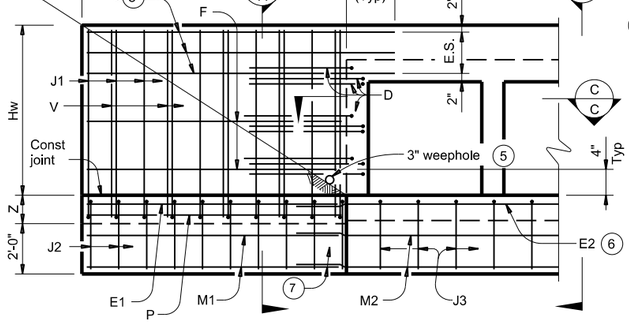
See applicable box culvert standard sheet for S, H, T, and U values.



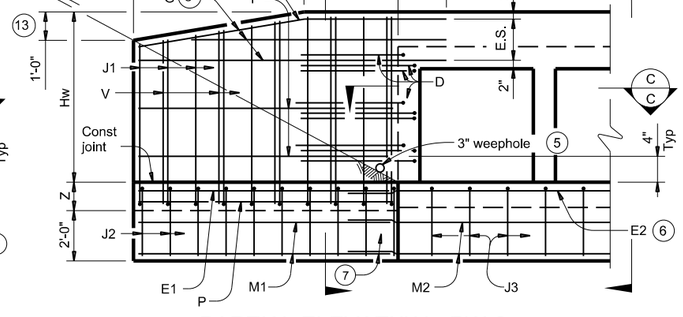
SECTION C-C - PW-1



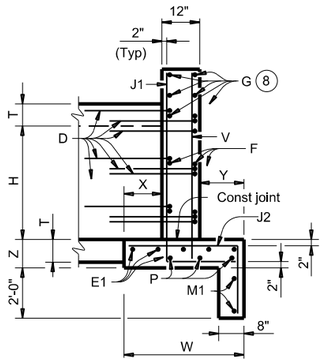
SECTION C-C - PW-2



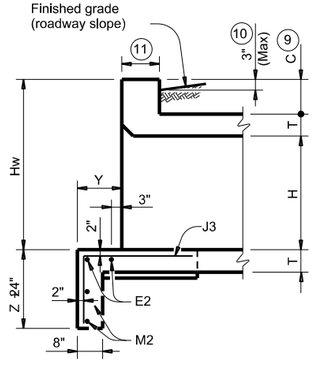
PARTIAL ELEVATION - PW-1



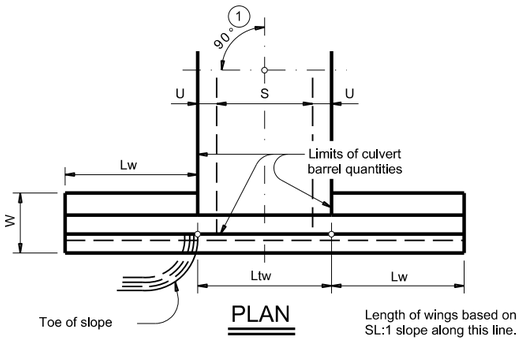
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)



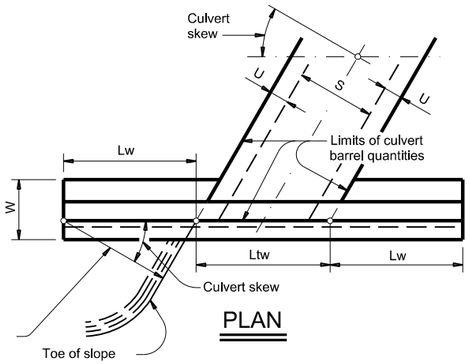
SECTION B-B
(Showing wing reinforcement.)



PLAN

Length of wings based on SL:1 slope along this line.

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

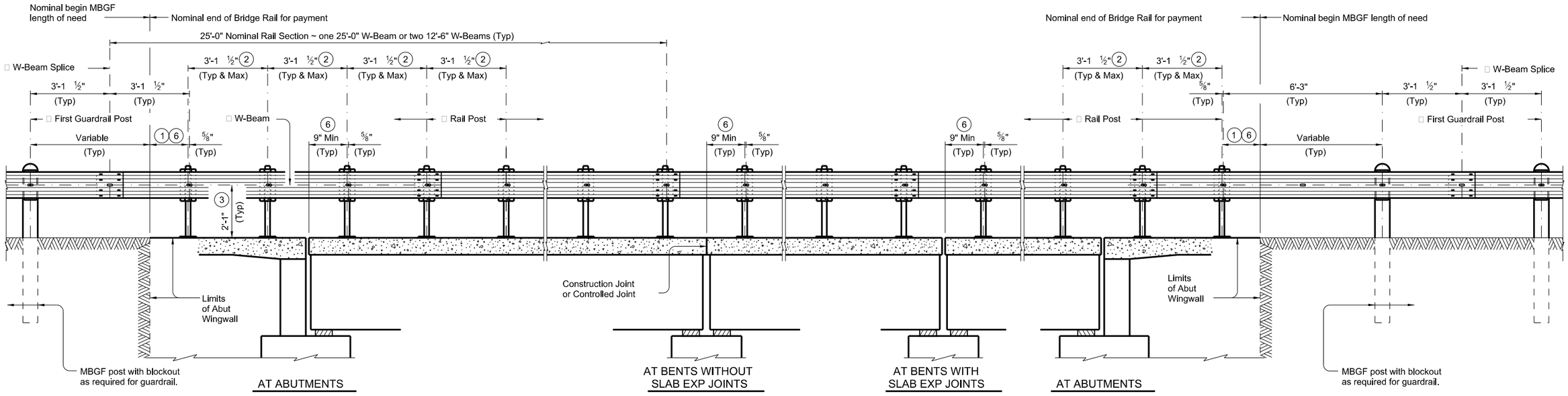
Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

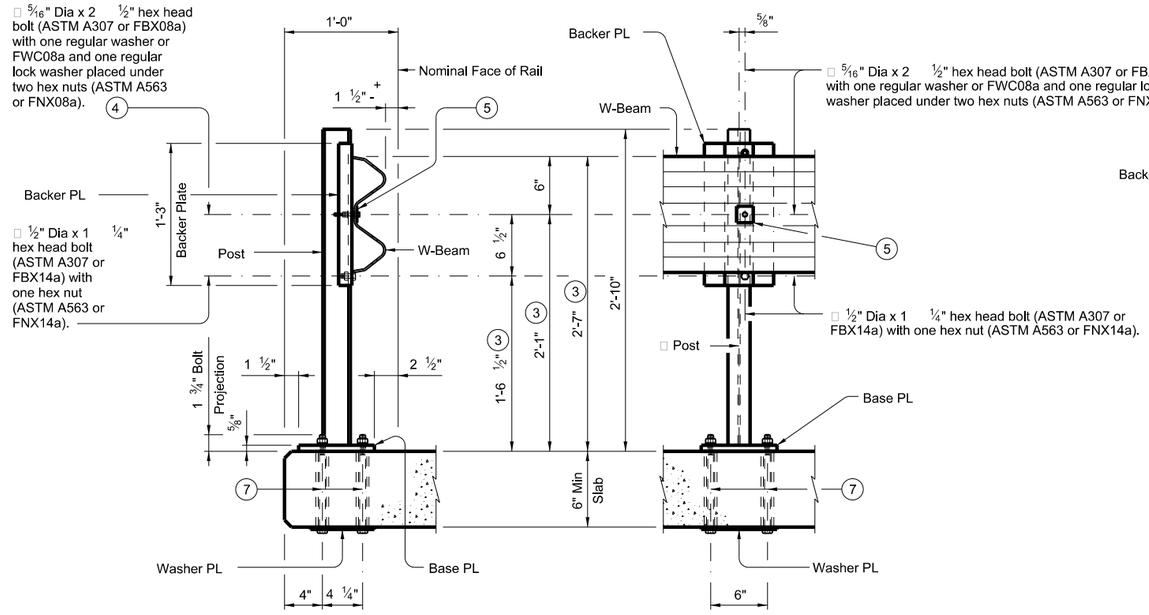
FILE: CD-PW-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		91

DATE:
FILE:



ROADWAY ELEVATION OF RAIL

Showing without overlay.

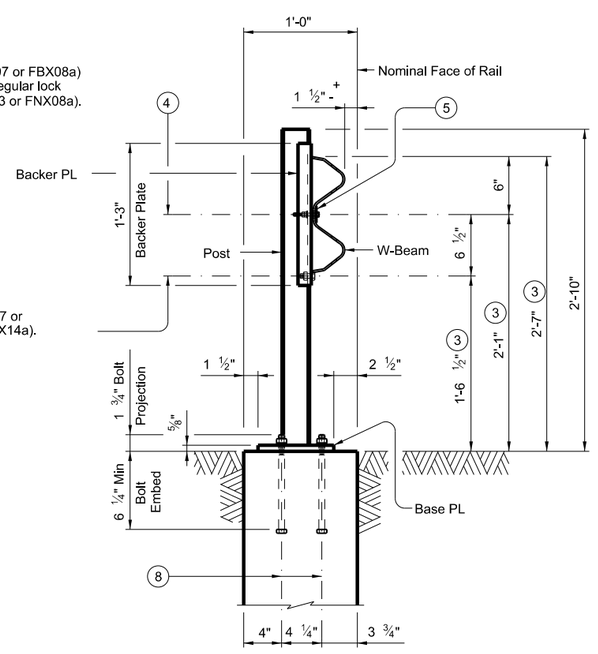


RAIL SECTION

TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

1. 9" Min, 5'-9" Max
2. Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.
3. Increase 2" for structures with overlay.
4. Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.
5. PL ⅛ x 1 ¾ x 1 ¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).
6. The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.
7. ⅞" Dia formed holes for ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".
8. ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

Texas Department of Transportation

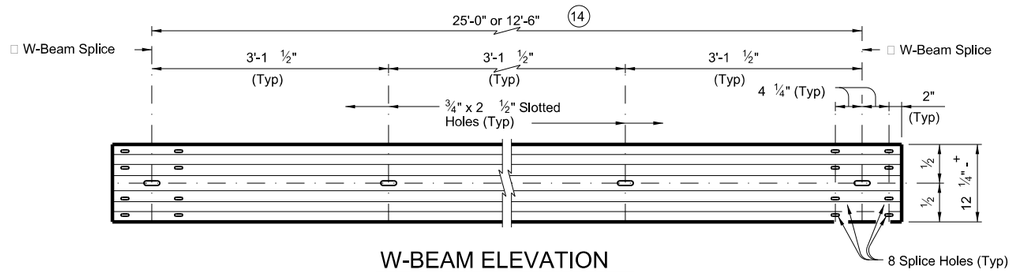
Bridge Division Standard

TRAFFIC RAIL

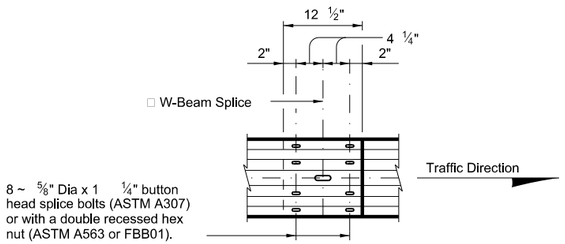
TYPE T631

FILE: RL-T631-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
07/2020: Allowing 9'-4½" or 6'-3" W-Beam sections. 03/2023: MBGF Notes.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		92

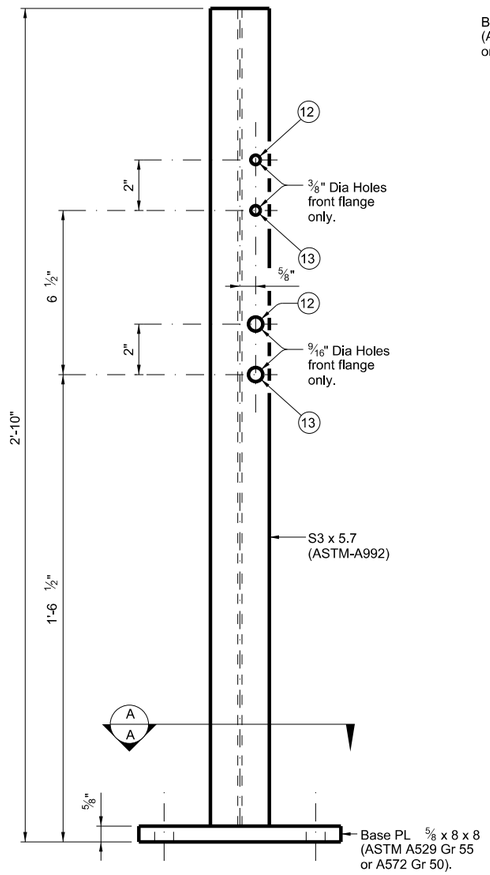
DATE:
FILE:



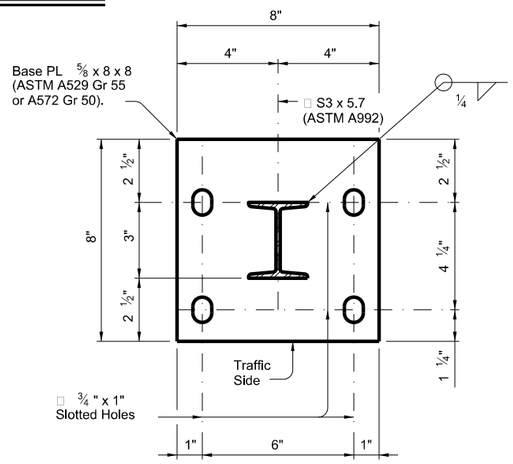
W-BEAM ELEVATION



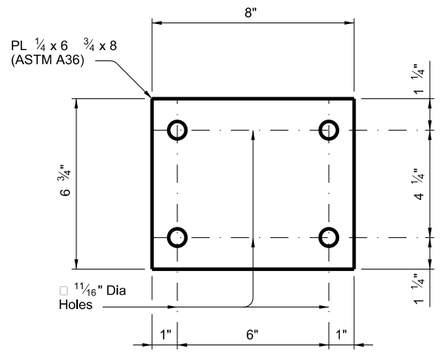
W-BEAM SPLICE ELEVATION



POST ELEVATION

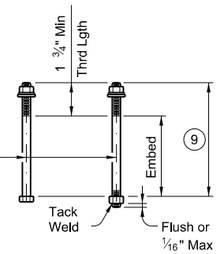


SECTION A-A



WASHER PLATE DETAIL

⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



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

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

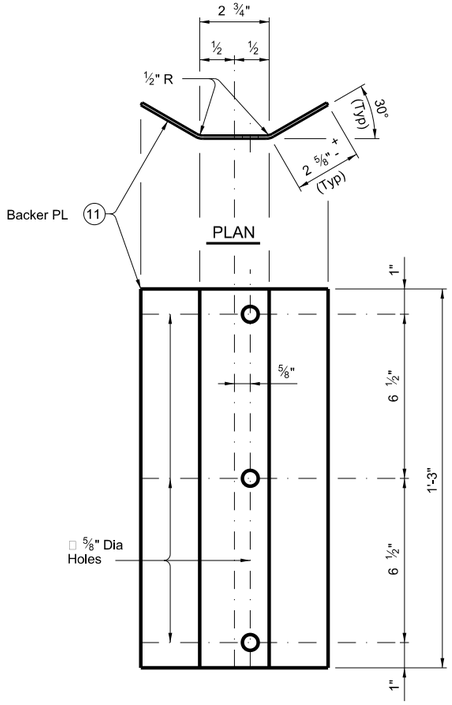
(10) See "Material Notes" for anchor bolt information.

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

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment installed tangent to the primary roadway.

CONSTRUCTION NOTES:

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

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

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

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

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

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

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

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0" or 12'-6" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length. W-Beam must have slotted holes at 3'-1 ½".

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

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

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

Average weight of railing with no overlay: 20 plf total.

Texas Department of Transportation

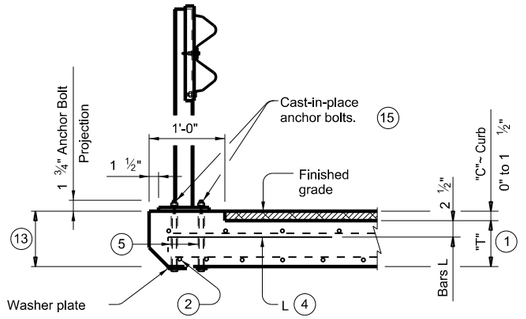
Bridge Division Standard

TRAFFIC RAIL

TYPE T631

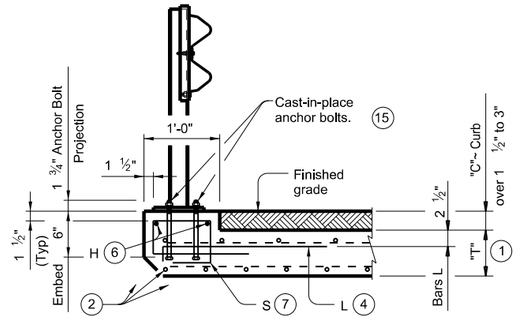
FILE: RL-T631-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
07/2020: Allowing 9'-4½" or 6'-3" W-Beam sections. 03/2023: MBGF Notes.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		93

DATE:
FILE:



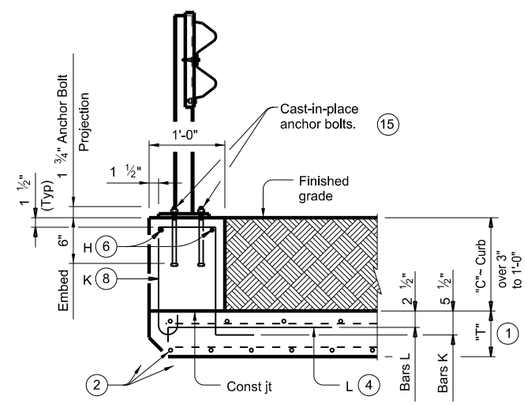
SECTION - TYPE 1 (3)

Used for curbs 1 ½" and Less
(Showing "C"= 1 ½")



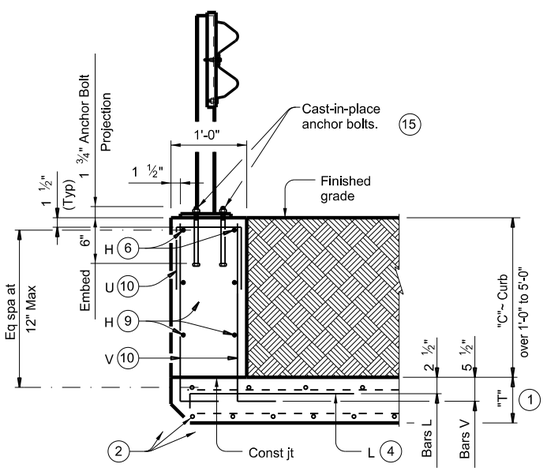
SECTION - TYPE 2

Used for curbs over 1 ½" to 3"
(Showing "C"= 3")



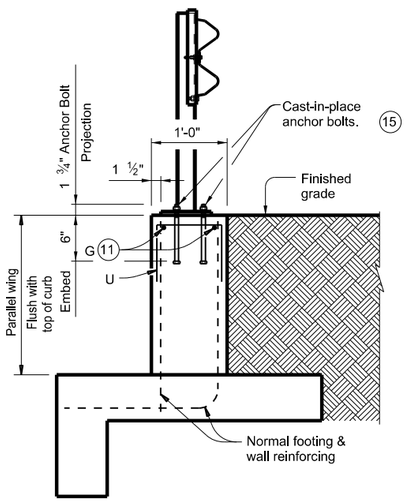
SECTION - TYPE 3

Used for curbs over 3" to 1'-0"
(Showing "C"= 1'-0")



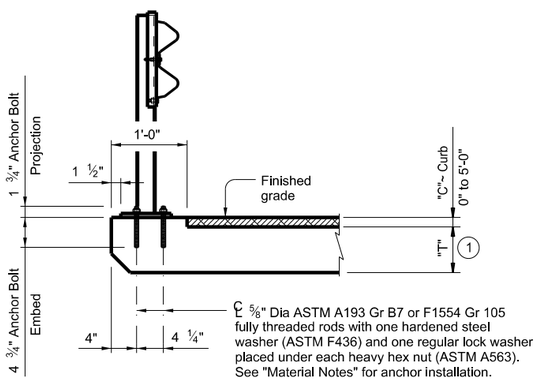
SECTION - TYPE 4

Used for curbs over 1'-0" to 5'-0"
(Showing "C"= 2'-0")



TYPICAL SECTION THRU PARALLEL WINGWALL (15)

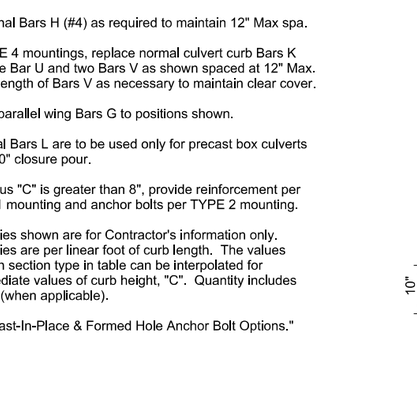
Use with all curb heights shown



OPTIONAL ADHESIVE ANCHORAGE

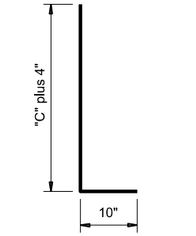
Optional adhesive anchor may replace cast-in-place anchor bolts for Type 1 thru Type 4 and on Typical Section Thru Parallel Wingwalls. Reinforcement for optional adhesive anchorage matches details shown for Type 1 thru Type 4 and on Typical Section Thru Parallel Wingwalls.

1. "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.
2. Adjust normal culvert slab bars as necessary to clear obstructions.
3. Omit normal culvert curb Bars K and H.
4. Place Bars L as shown. Tilt hook as necessary to maintain cover.
5. 4 formed holes for anchor bolts at each rail post. See rail standard for information not shown.
6. Place normal culvert curb Bars H (#4) as shown. Adjust as necessary to clear obstructions.
7. Omit normal culvert curb Bars K. Place Bars S as shown. Tilt Bars S as necessary to maintain cover.
8. Place normal culvert curb Bars K spaced at 12" Max as shown. Tilt Bars K as necessary to maintain cover. Refer to box culvert details sheets for Bars K details.
9. Additional Bars H (#4) as required to maintain 12" Max spa.
10. At TYPE 4 mountings, replace normal culvert curb Bars K with one Bar U and two Bars V as shown spaced at 12" Max. Adjust length of Bars V as necessary to maintain clear cover.
11. Adjust parallel wing Bars G to positions shown.
12. Optional Bars L are to be used only for precast box culverts with 3'-0" closure pour.
13. If "T" plus "C" is greater than 8", provide reinforcement per TYPE 1 mounting and anchor bolts per TYPE 2 mounting.
14. Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The values for each section type in table can be interpolated for intermediate values of curb height, "C". Quantity includes Bars K (when applicable).
15. See "Cast-In-Place & Formed Hole Anchor Bolt Options."

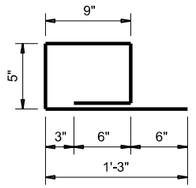


CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS

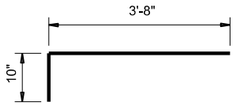
Applies to T631LS and T631 traffic rails.



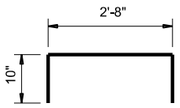
BARS V (#5) (10)
Spaced at 12" Max



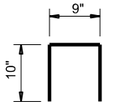
BARS S (#4) (7)
Spaced at 12" Max



BARS L (#5) (4) (12)
Spaced at 12" Max



OPTIONAL BARS L (#5) (4) (12)
Spaced at 12" Max



BARS U (#4) (10)
Spaced at 12" Max

TABLE OF ESTIMATED CURB QUANTITIES (14)

Curb Height "C"	Section Type	Conc (CY/LF)	Reinf Steel (Lb/LF)
1 ½"	1	0.005	4.7
3"	2	0.009	8.4
6"	3	0.019	8.9
1'-0"	3	0.037	8.9
1'-6"	4	0.056	14.3
2'-0"	4	0.074	15.4
2'-6"	4	0.093	17.7
3'-0"	4	0.111	18.8
3'-6"	4	0.130	21.2
4'-0"	4	0.148	22.2
4'-6"	4	0.167	24.6
5'-0"	4	0.185	25.6

CONSTRUCTION NOTES:

For vehicle safety, finished grade must be flush with top of curb.

Adjust reinforcing as necessary to provide 1 ¼" cover.

At the Contractor's option, anchor bolts may be an adhesive anchor system.

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

MATERIAL NOTES:

Provide concrete for curb of the same Class and strength as the box culvert top slab.

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Galvanize all reinforcing steel if required elsewhere.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchor system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive.

Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

See T631LS or T631 rail standard for approved speed restrictions, notes and details not shown.

The curb is considered as part of the box culvert for payment.

These details are for use with curbs that are 5'-0" tall and less only. Curb heights that are less than or greater than those shown will require special design.

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

The use of the T631LS rail is restricted to speeds of 45 mph or less.

Texas Department of Transportation

Bridge Division Standard

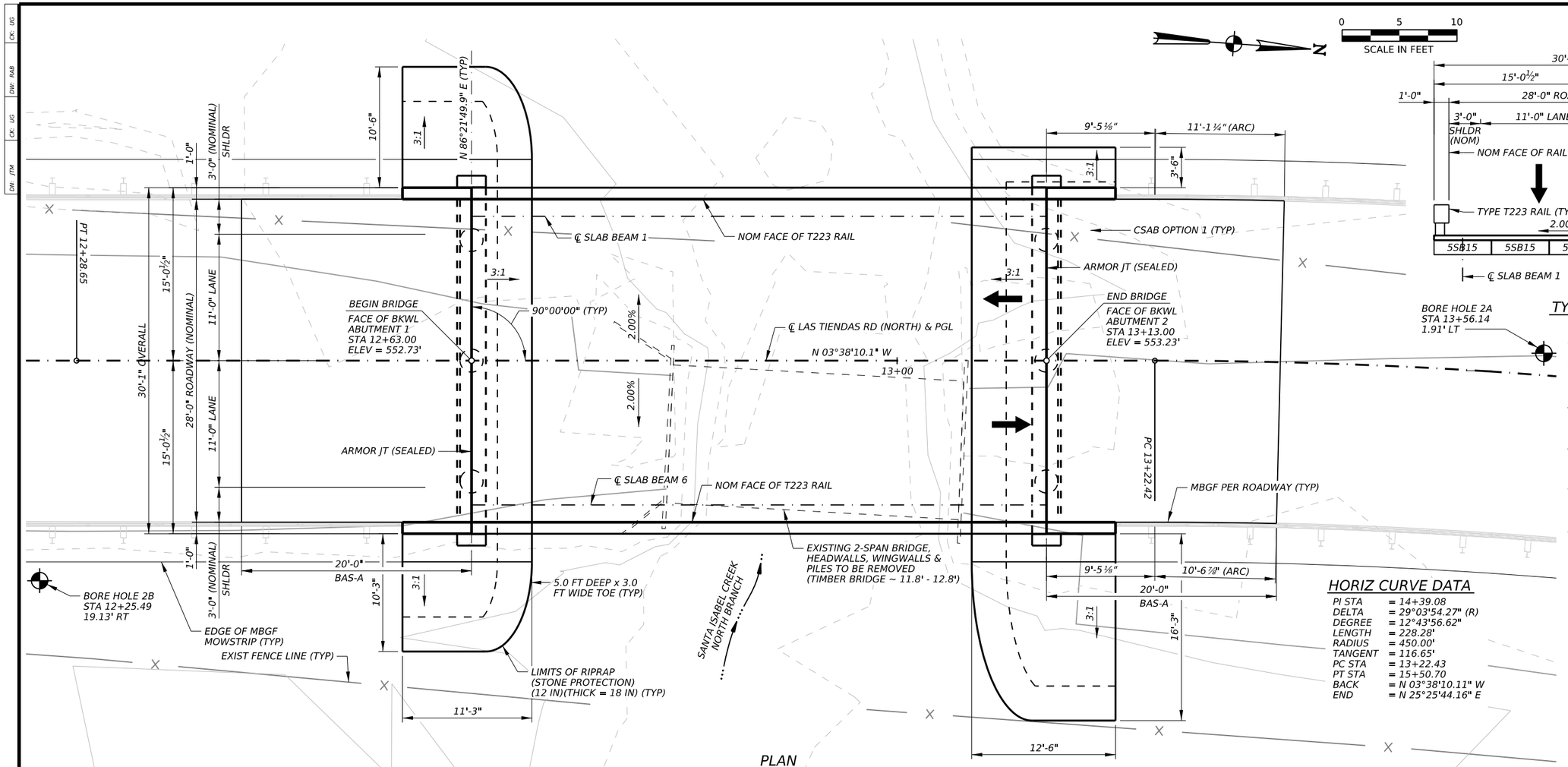
BOX CULVERT MOUNTING DETAILS FOR TYPE T631LS & T631 RAILS (CURBS 5' TALL AND LESS ONLY)

T631-CM

FILE: CD-T631-CM-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		94

100% SUBMITTAL

DW	CK	DW	CK	DW	CK
JTM	UG	RAB	UG		



PLAN

TYPICAL SECTION
(NTS)

GENERAL NOTES:

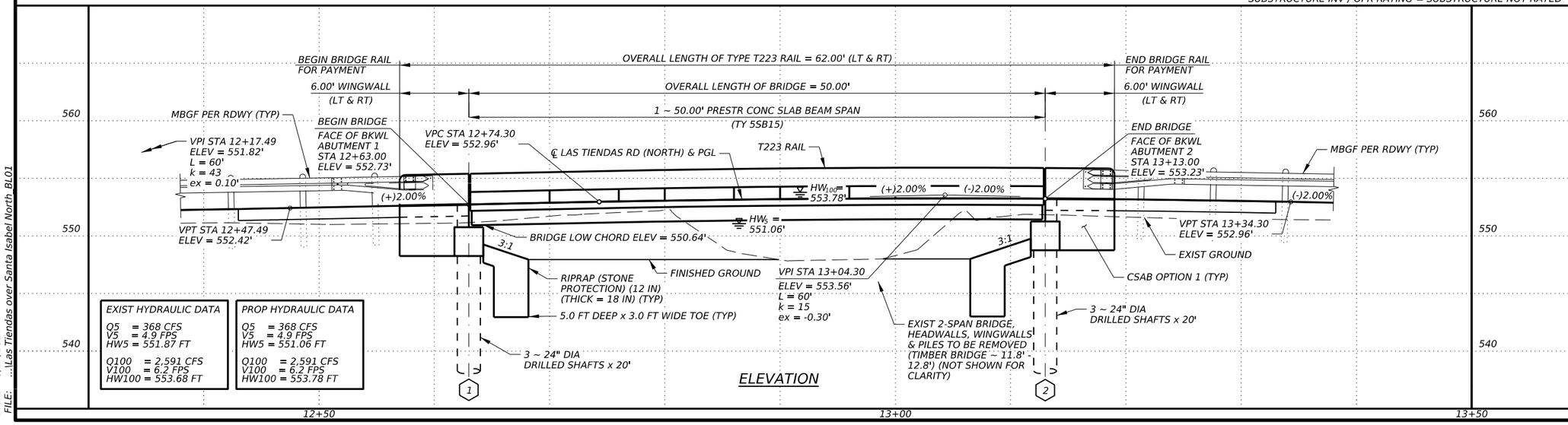
1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023).
2. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR VERTICAL GRADE AND CROSS-SLOPE.
3. CONTRACTOR TO VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY CONFLICTS.
4. EXISTING BRIDGE CLOSED DURING CONSTRUCTION. SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAILS.
5. SEE "TEST HOLE DATA" SHEET FOR TEST HOLE INFORMATION.
6. RIPRAP LAYOUT IS APPROXIMATE AND MAY NEED TO BE ADJUSTED IN THE FIELD.
7. SEE CSAB OPTION 1 STANDARD FOR CEMENT STABILIZED BACKFILL BEHIND ABUTMENTS.

HORIZ CURVE DATA

PI STA	= 14+39.08
DELTA	= 29°03'54.27" (R)
DEGREE	= 12°43'56.62"
LENGTH	= 228.28'
RADIUS	= 450.00'
TANGENT	= 116.65'
PC STA	= 13+22.43
PT STA	= 15+50.70
BACK	= N 03°38'10.11" W
END	= N 25°25'44.16" E

FUNCTIONAL CLASS: MINOR COLLECTOR
DESIGN SPEED: MOIEC
ADT: 122 (2018); 183 (2042)
EXIST NBI: 22-240-0-AA03-52-005
PROP NBI: 22-240-0-AA03-52-105

HL93 LOADING: SUPERSTRUCTURE INV/OPR RATING = 1.01 / 1.72
SUBSTRUCTURE INV / OPR RATING = SUBSTRUCTURE NOT RATED



EXIST HYDRAULIC DATA	PROP HYDRAULIC DATA
Q5 = 368 CFS	Q5 = 368 CFS
V5 = 4.9 FPS	V5 = 4.9 FPS
HW5 = 551.87 FT	HW5 = 551.06 FT
Q100 = 2,591 CFS	Q100 = 2,591 CFS
V100 = 6.2 FPS	V100 = 6.2 FPS
HW100 = 553.68 FT	HW100 = 553.78 FT

ELEVATION

STATE OF TEXAS
URIEL GARCIA
144964
LICENSED
PROFESSIONAL ENGINEER
03/27/2024

REV. NO	DATE	REVISION	BY

P.E. Structural Consultants, a Hardesty & Hanover, LLC Company
H&H PESC
8436 Spicewood Springs Road
Austin, Texas 78759
(512) 255-5205
www.HardestyHanover.com
TBPELS Firm No. F-3379

Texas Department of Transportation

BRIDGE LAYOUT - LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH) NBI: 22-240-0-AA03-52-105

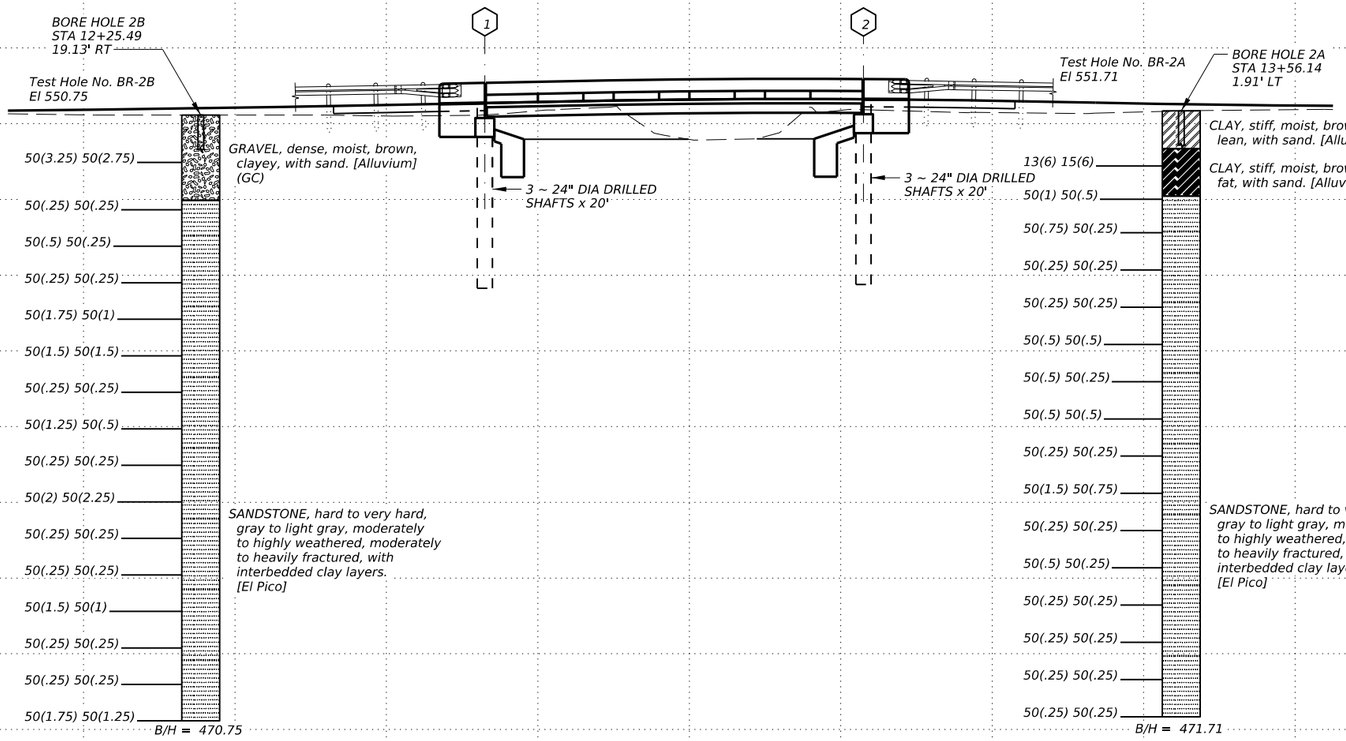
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185,ETC.	CR352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		95

DATE: 3/27/2024 1:42:06 PM
FILE: ...\Las Tiendas over Santa Isabel North BL01

100% SUBMITTAL

DN: JTM CK: UG DW: RAB CK: UG



ELEVATION

0 10 20
SCALE IN FEET

STATE OF TEXAS
URIEL GARCIA
144964
LICENSED
PROFESSIONAL ENGINEER
03/27/2024

REV. NO	DATE	REVISION	BY

P.E. Structural Consultants, *a Hardesty & Hanover, LLC Company*

H&H PESC

8436 Spicewood Springs Road
Austin, Texas 78759
(512) 454-5200
www.HardestyHanover.com
TBPELS Firm No. F-3379

Texas Department of Transportation

TEST HOLE DATA - LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185,ETC.	CR352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		96

DATE: 3/27/2024 1:42:22 PM
FILE: ...\Las Tiendas over Santa Isabel North_BR01

100% SUBMITTAL

DW: ITM | CK: UG | DW: RAB | CK: UG

SUMMARY OF ESTIMATED BRIDGE QUANTITIES

BID ITEM	400 6005	416 6002	420 6013	422 6007	422 6015	425 6012	432 6031	450 6006	454 6004	496 6009
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (12 IN)	RAIL (TY T223)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	CY	LF	CY	SF	CY	LF	CY	LF	LF	EA
2 ~ ABUTMENTS	27	120	20.6		45		120			
1 ~ 50.00' PRESTR CONC SLAB BEAM SPAN				1,504		297.00		124.0	57	1
TOTALS	27	120	20.6	1,504	45	297.00	120	124.0	57	1

TOP OF CAP ELEVATIONS

		Left End of Cap	Center of Cap	Right End of Cap
		FT	FT	FT
ABUT 1	FWD	550.466	550.767	550.466
ABUT 2	BK	550.957	551.258	550.957

NOTE: SEE ABUTMENT STANDARDS FOR LOCATIONS OF CAP ELEVATIONS.

STATE OF TEXAS
URIEL GARCIA
144964
LICENSED
PROFESSIONAL ENGINEER
03/27/2024

REV. NO	DATE	REVISION	BY

P.E. Structural Consultants, *a Hardesty & Hanover, LLC Company*

H&H | PESC

8436 Spicewood Springs Road
Austin, Texas 78759
(512) 250-6200
www.HardestyHanover.com
TBPELS Firm No. F-3379

Texas Department of Transportation

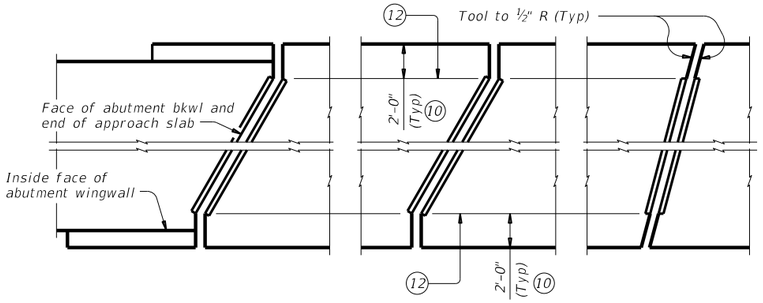
ESTIMATED QUANTITIES AND CAP ELEVATIONS - LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185,ETC.	CR352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		97

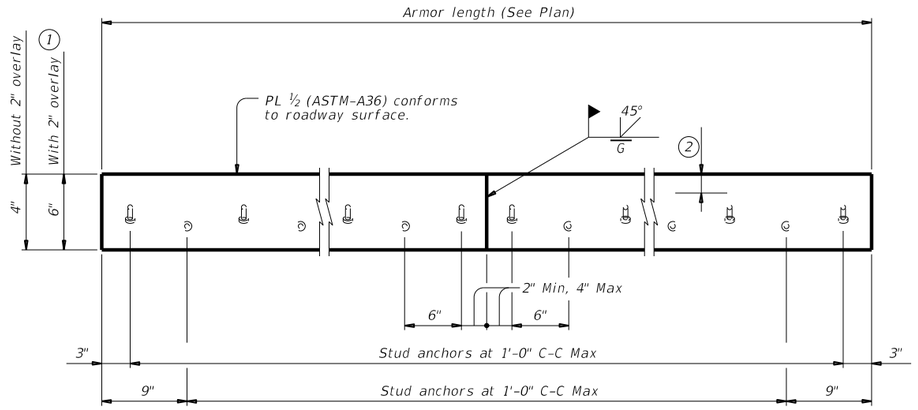
DATE: 3/27/2024 1:42:37 PM
FILE: ...Las Tiendas over Santa Isable North_EQ01

DATE:
FILE:



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.

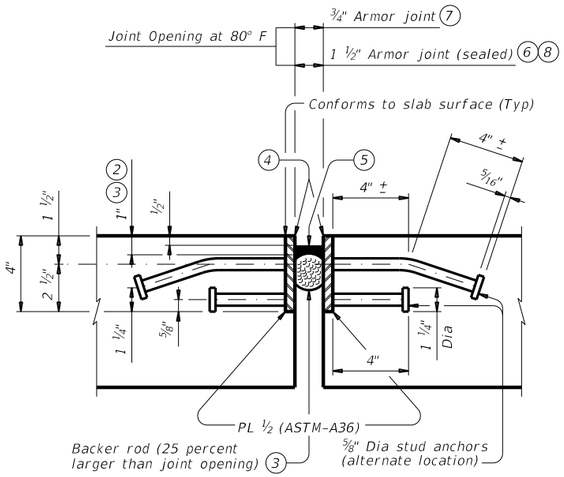
(9) Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.

(10) Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

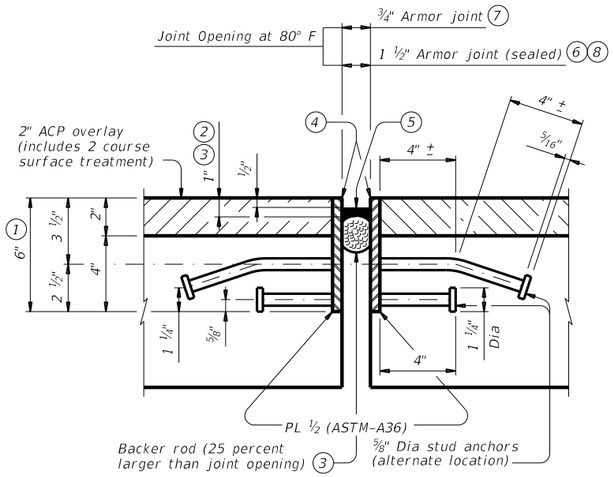
(11) See "Plans of Armor Plates".

(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.



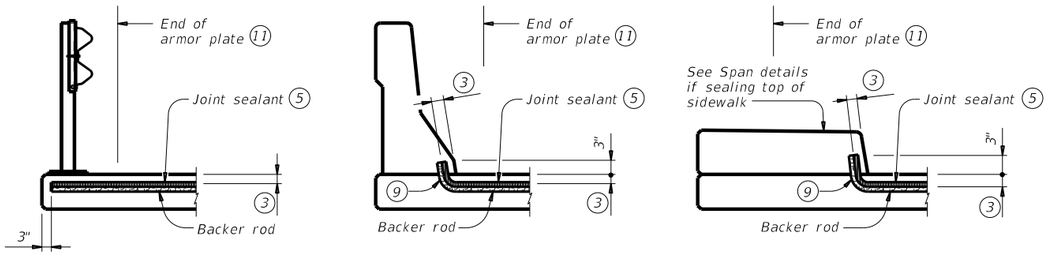
SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



SHOWN WITH 2" OVERLAY AT JOINT LOCATION (1)

ARMOR JOINT SECTIONS

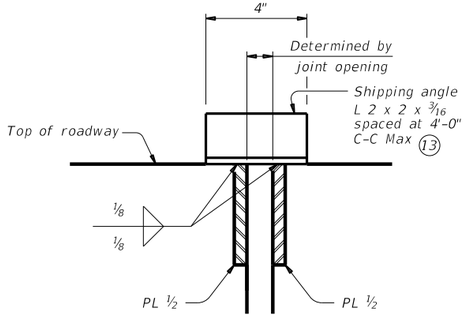
Showing Armor Joint (Sealed)



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.



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.

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 ⅝" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.

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

Texas Department of Transportation

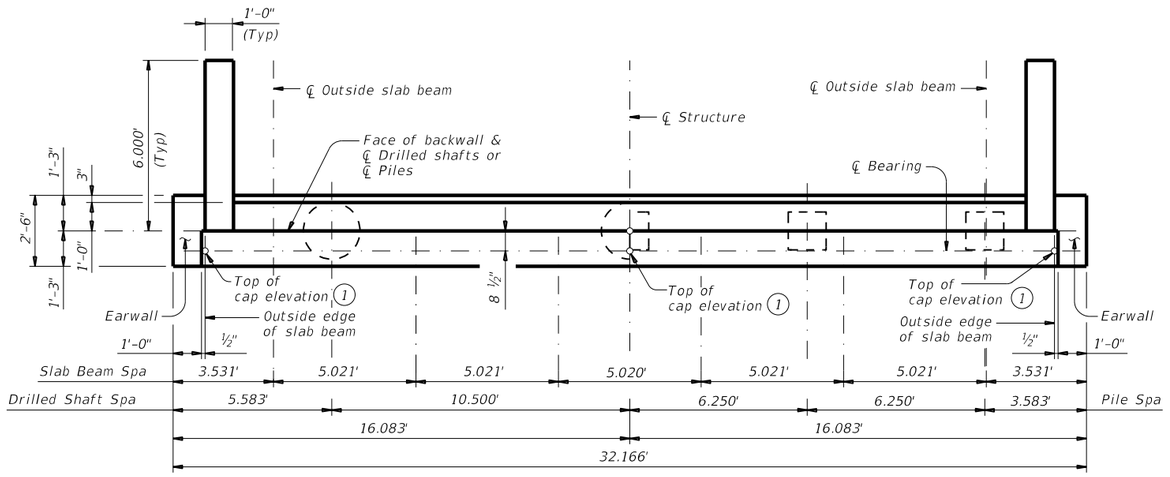
Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: MS-AJ-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		98

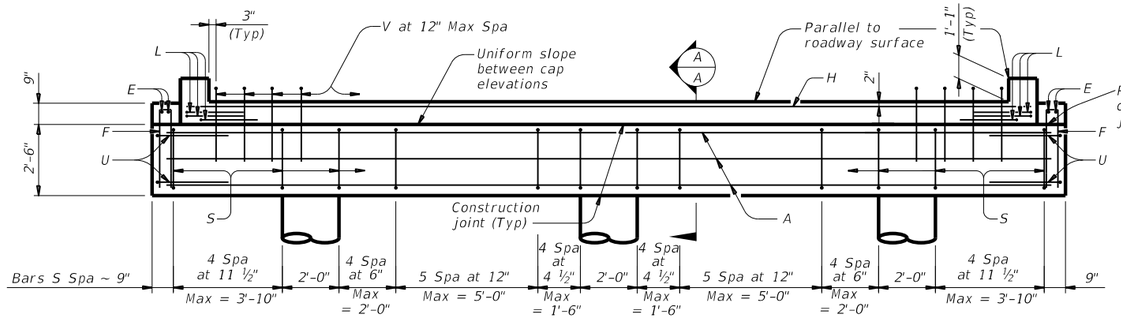
DATE:
FILE:



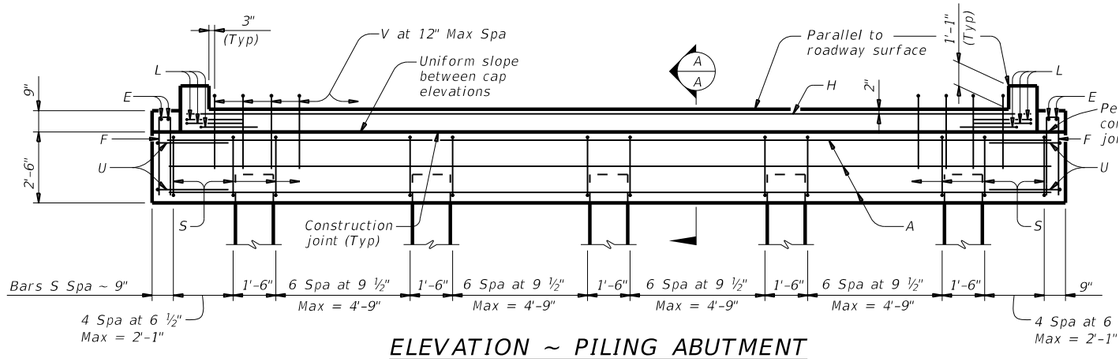
SHOWING DRILLED SHAFTS

PLAN

SHOWING PILES

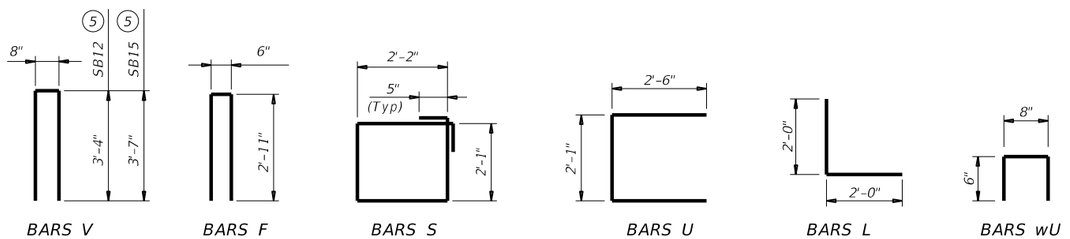


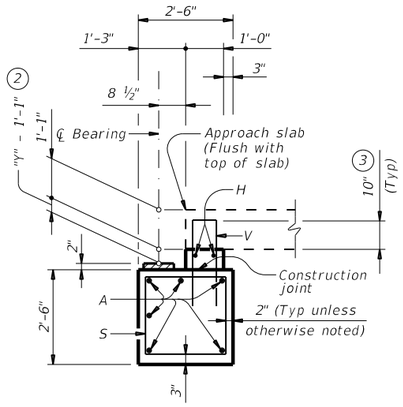
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

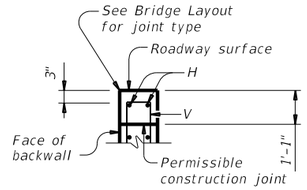
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





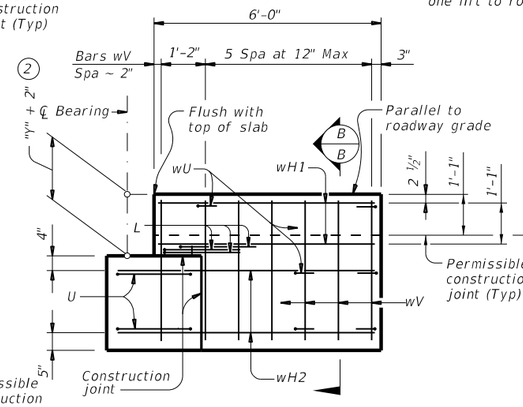
SECTION A-A (4)

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



BACKWALL DETAIL (4)

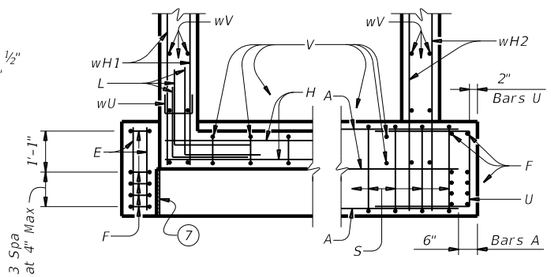
(Without Approach Slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	42	44	25	27
30	46	50	28	30
35	51	55	31	33
40	55	60	33	36
45		64		39
50		69		42

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	31'-2"	31'-2"	994	994
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	29'-9"	29'-9"	62	62
L	6	#6	4'-0"	4'-0"	36	36
S	38	#4	9'-4"	9'-4"	237	237
U	4	#6	7'-1"	7'-1"	43	43
V	29	#5	7'-4"	7'-10"	222	237
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,920	1,942
Cl "C" Conc (Abut)				CY	9.9	10.3

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

(2) See Span Details for "Y".

(3) Increase as required to maintain 3" from finished grade.

(4) See Bridge Layout to determine if approach slab is present.

(5) See Bridge Layout for beam type used in the superstructure.

(6) Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.1 CY Class "C" concrete and 62 Lb reinforcing steel for 2 additional Bars H.

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

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

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

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SPSB-28 only.

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

MATERIAL NOTES:

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

HL93 LOADING

Texas Department of Transportation

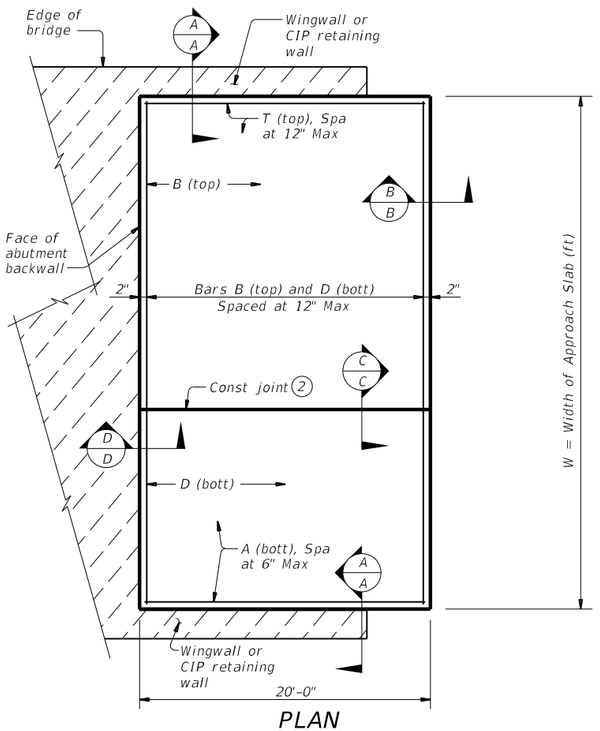
Bridge Division Standard

ABUTMENTS PRESTR CONC SLAB BEAM 28' ROADWAY

APSB-28

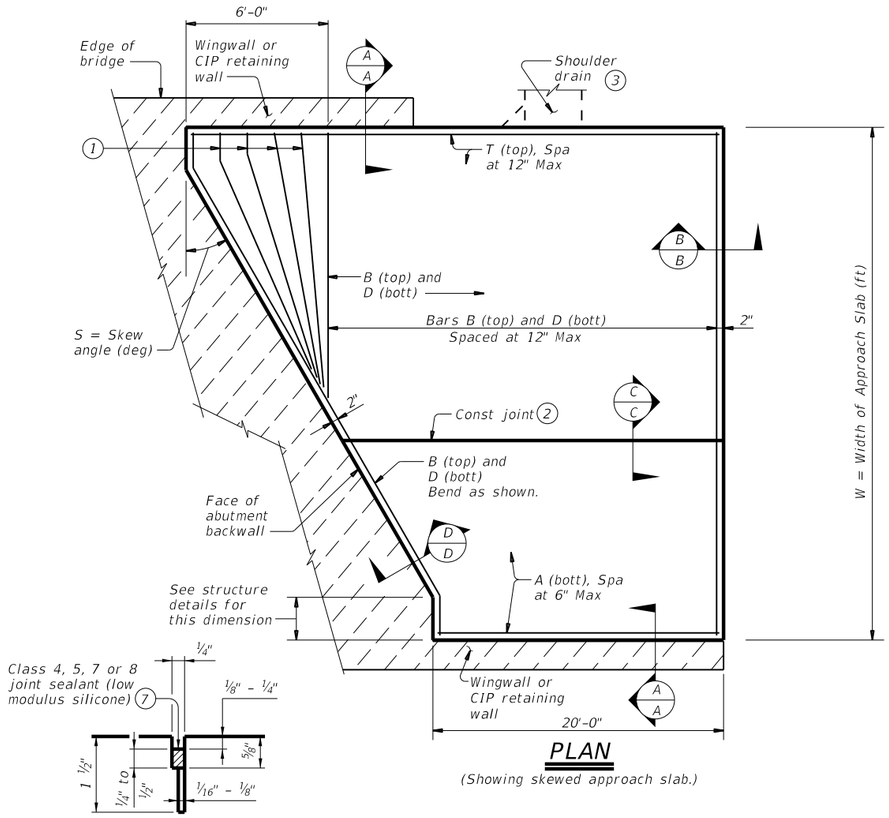
FILE: PSB-APSB2800-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		99

DATE:
FILE:



PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

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

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

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."

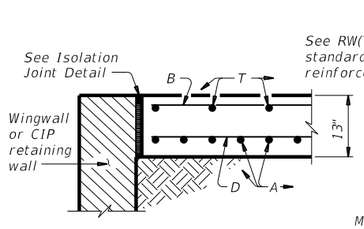
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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.

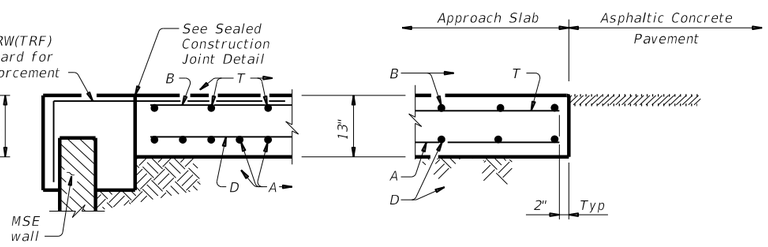
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

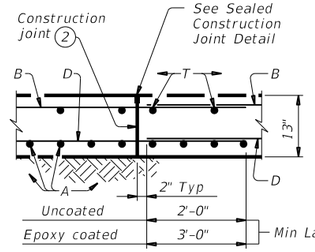
Cover dimensions are clear dimensions, unless noted otherwise.



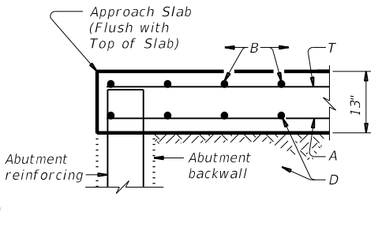
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL



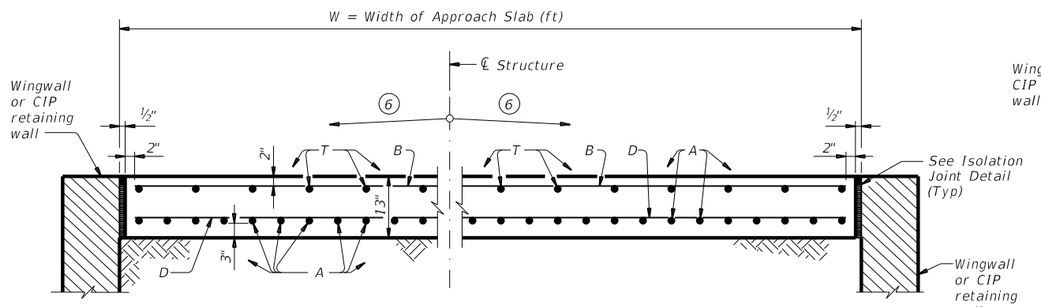
SECTION C-C (5)



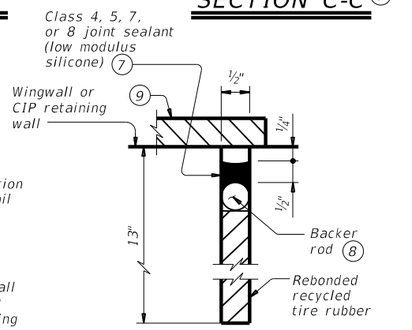
SECTION D-D

SECTION A-A

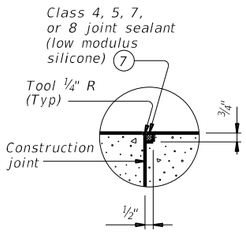
SECTION B-B



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

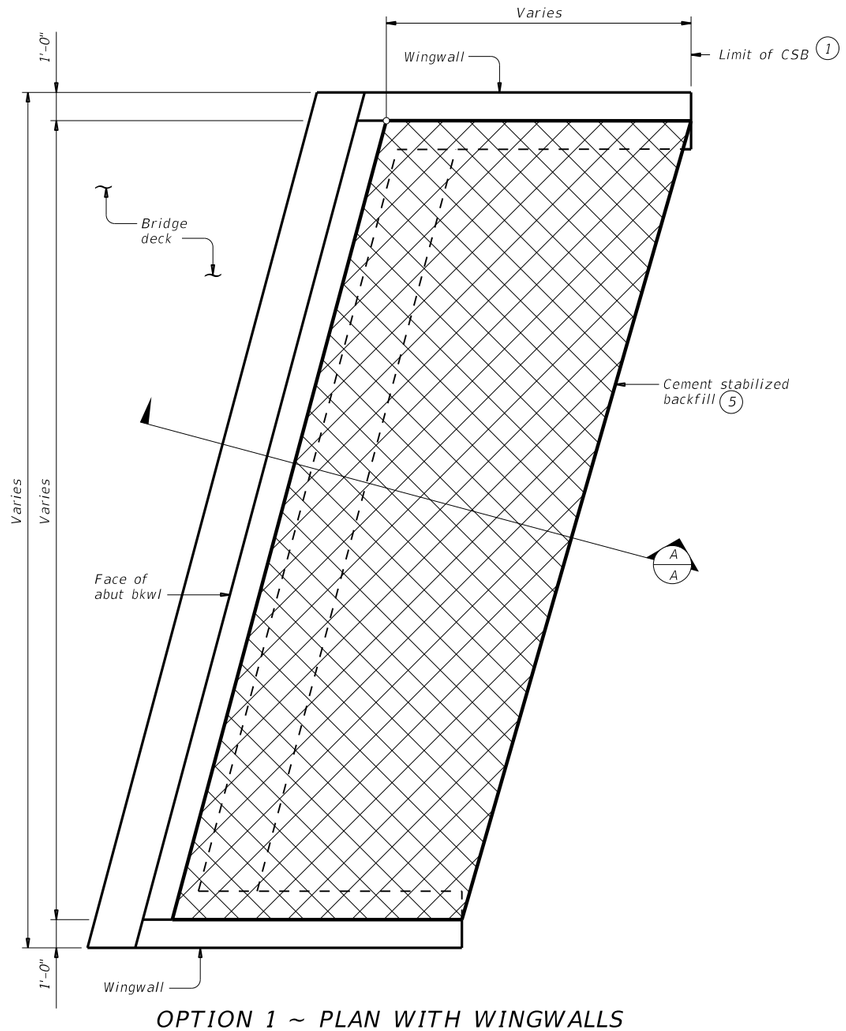
Bridge Division Standard

BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT

BAS-A

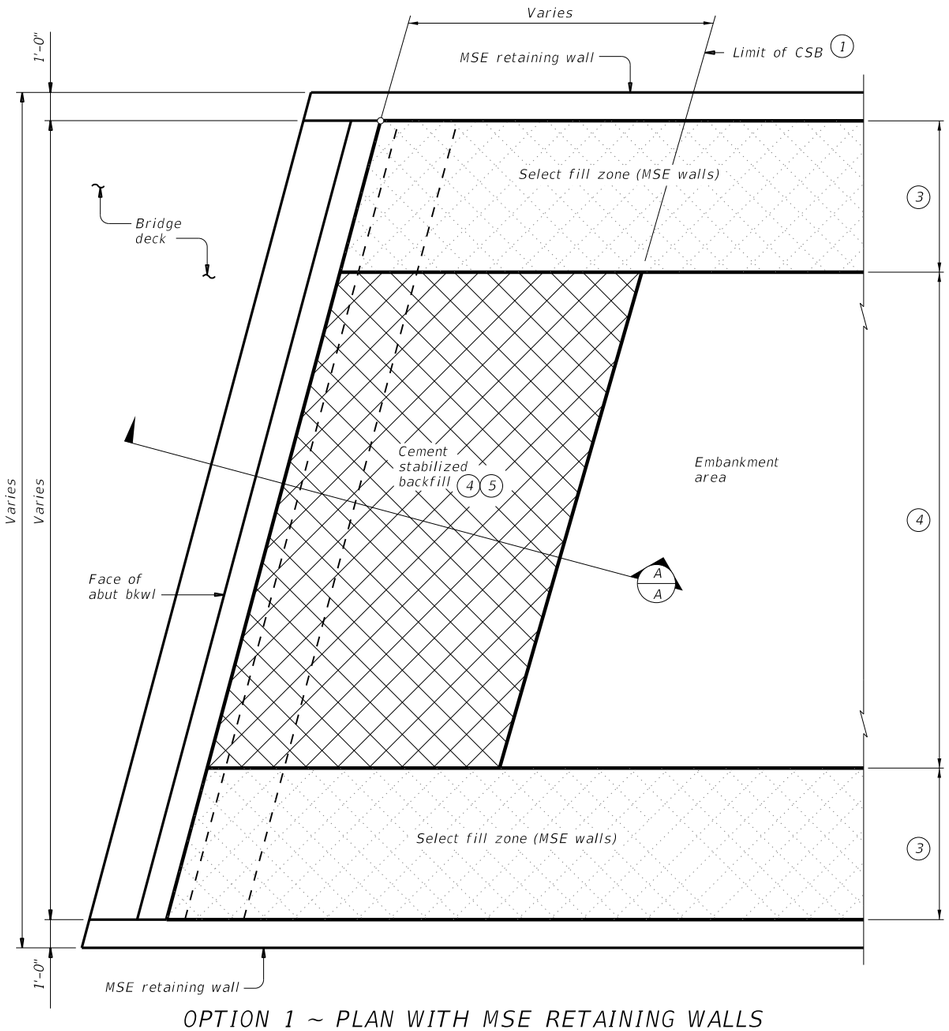
FILE: RL-T223-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		100

DATE:
FILE:

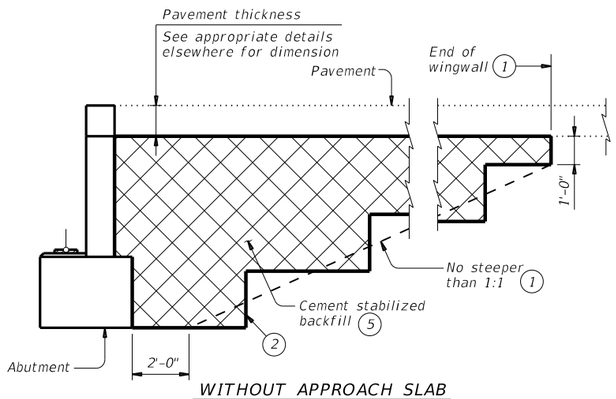


OPTION 1 ~ PLAN WITH WINGWALLS

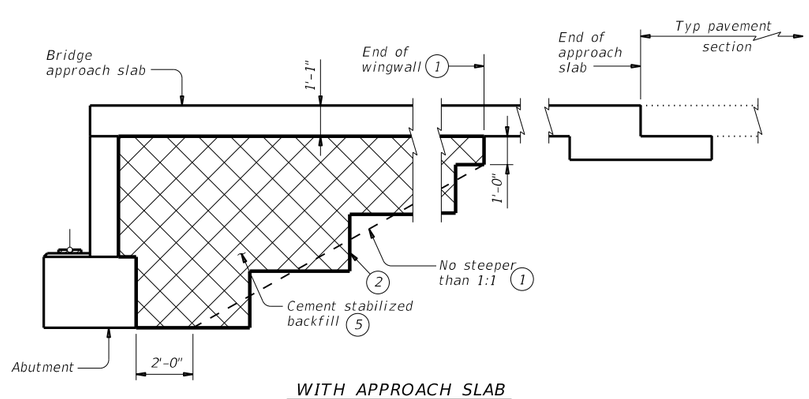
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

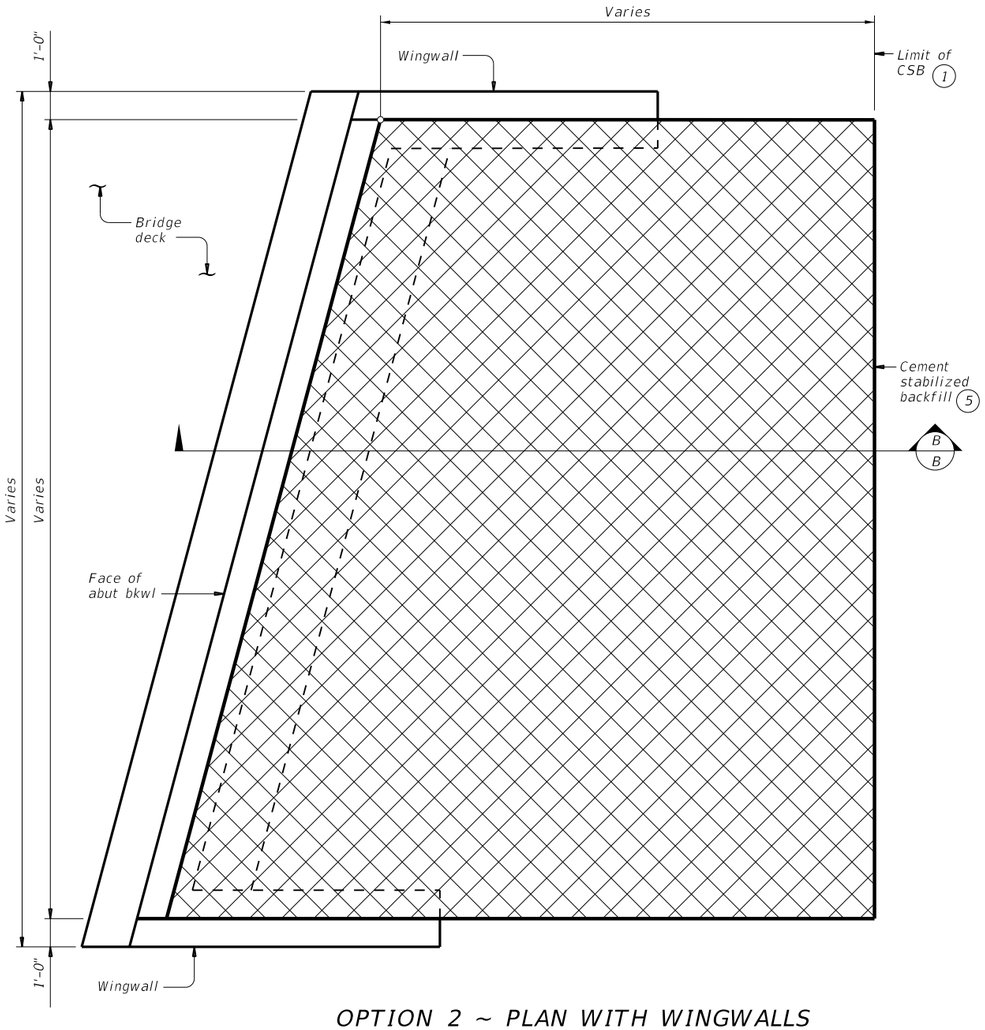
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

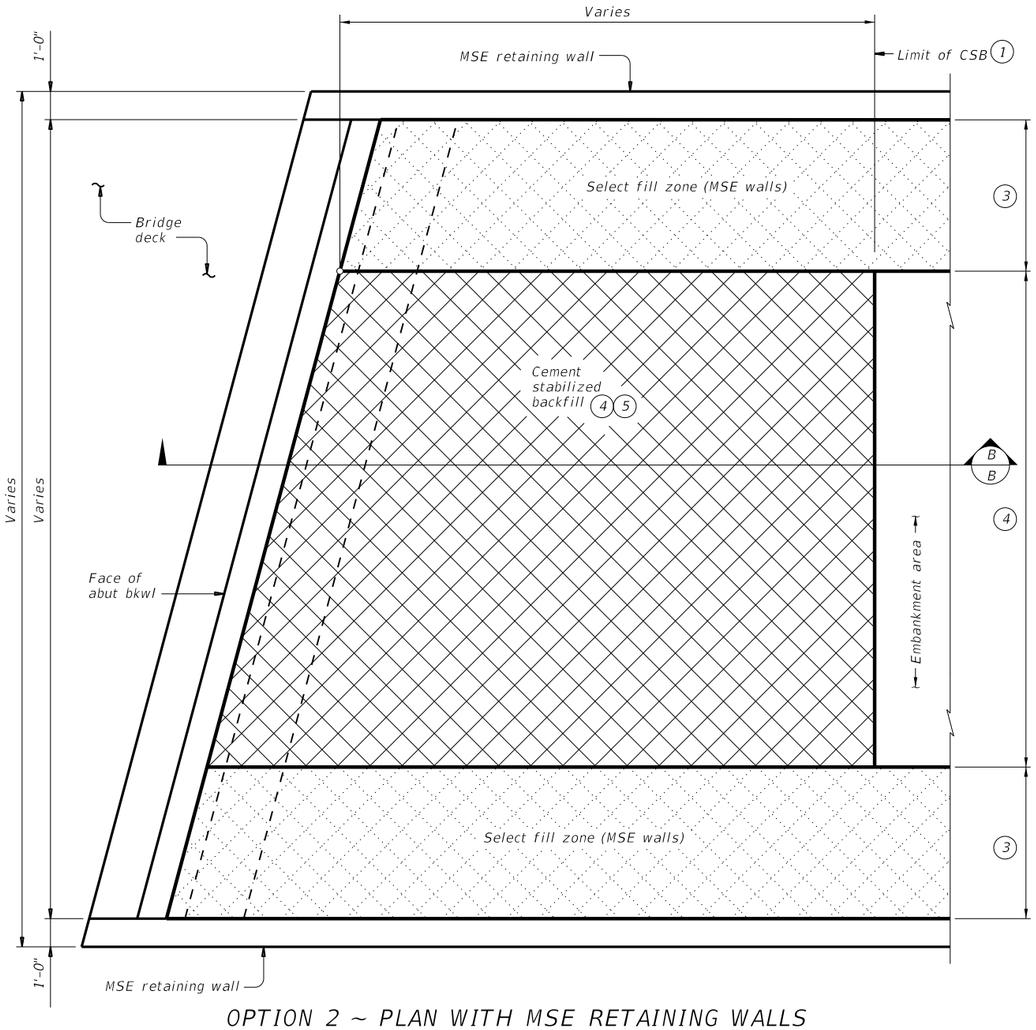
FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		101

DATE:
FILE:



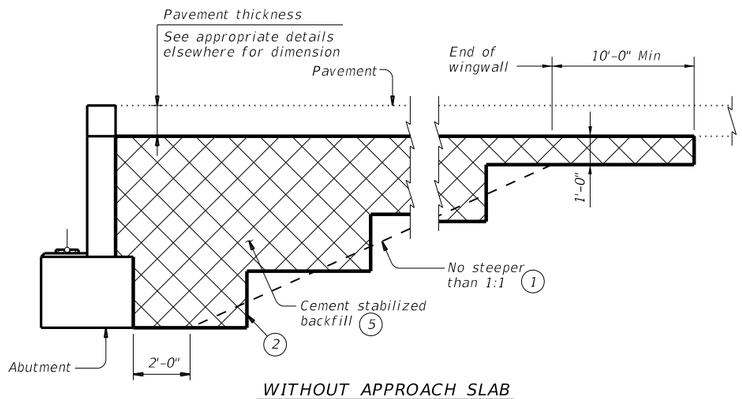
OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.

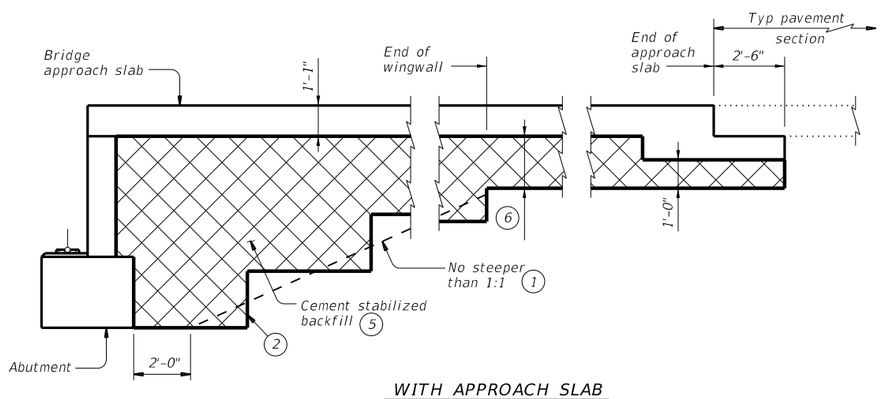


OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

1. Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
2. Bench backfill as shown with 12" (approximate) bench depths.
3. Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
4. When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
5. If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
   a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
   b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).
6. 1'-0" for BAS-A
   1'-10" for BAS-C



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

Texas Department of Transportation

Bridge Division Standard

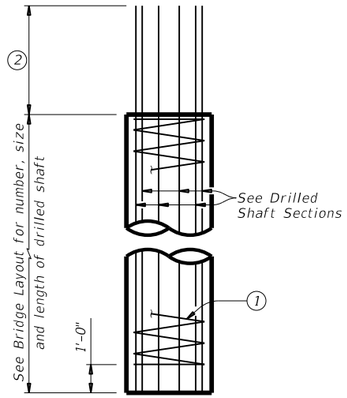
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

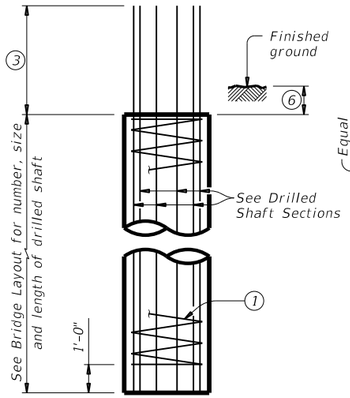
CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
03-23: Updated General Notes.	LRD	WEBB		102

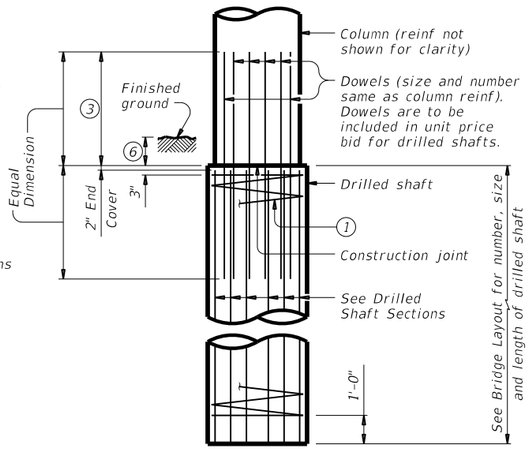
DATE:
FILE:



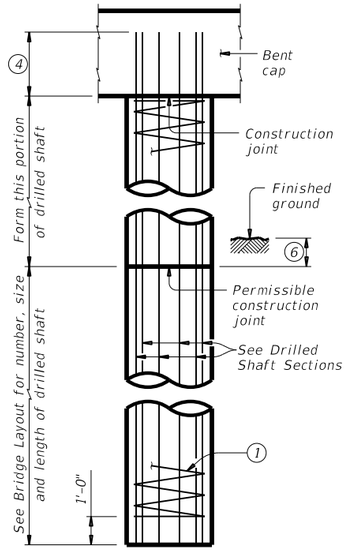
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



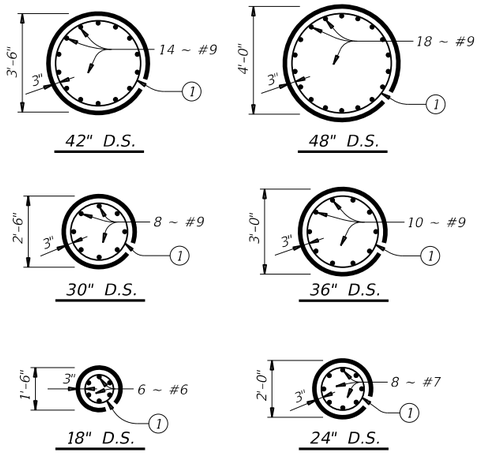
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

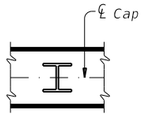


DRILLED SHAFT SECTIONS

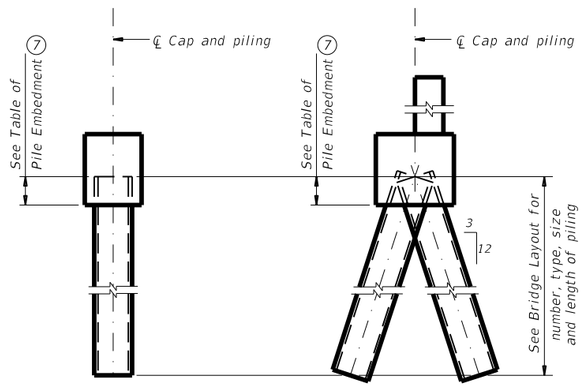
DRILLED SHAFT DETAILS

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

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

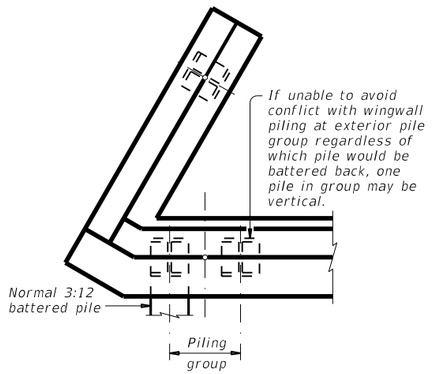


ORIENTATION OF STEEL H-PILING

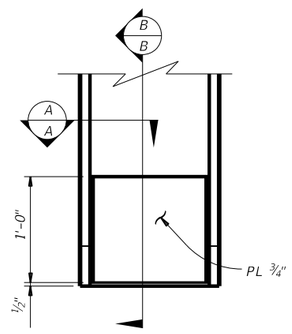


VERTICAL PILE BATTERED PILE

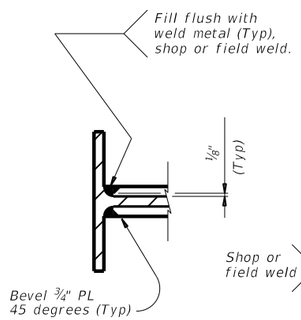
PILING DETAILS
(Concrete or steel H)



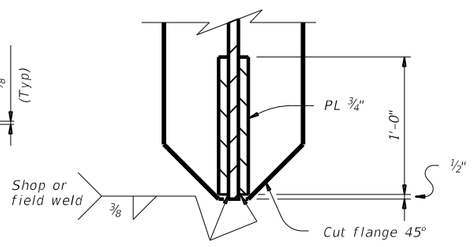
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



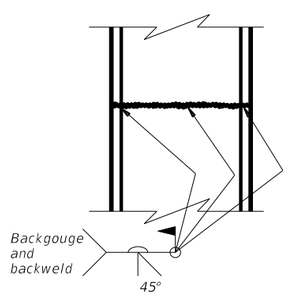
SECTION A-A

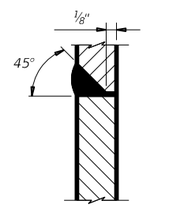


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

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





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

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

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

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

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

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

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

(7) Or as shown on plans.

Texas Department of Transportation

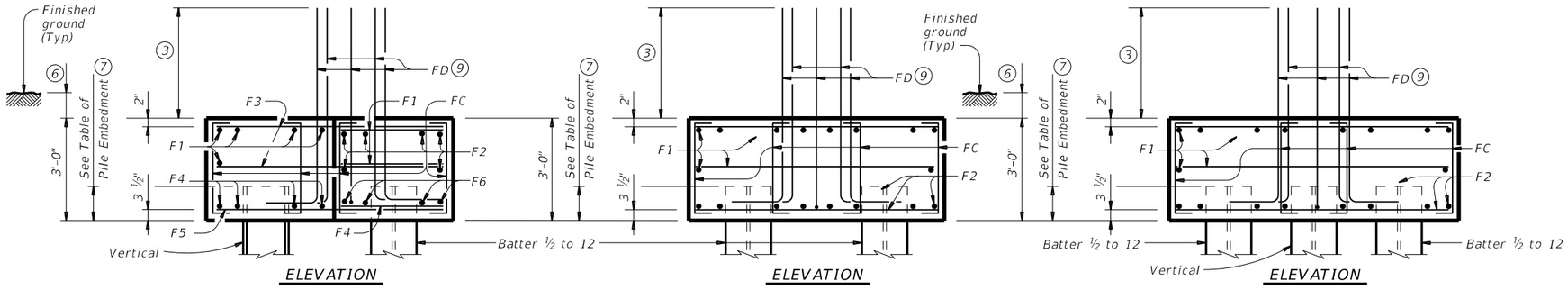
Bridge Division Standard

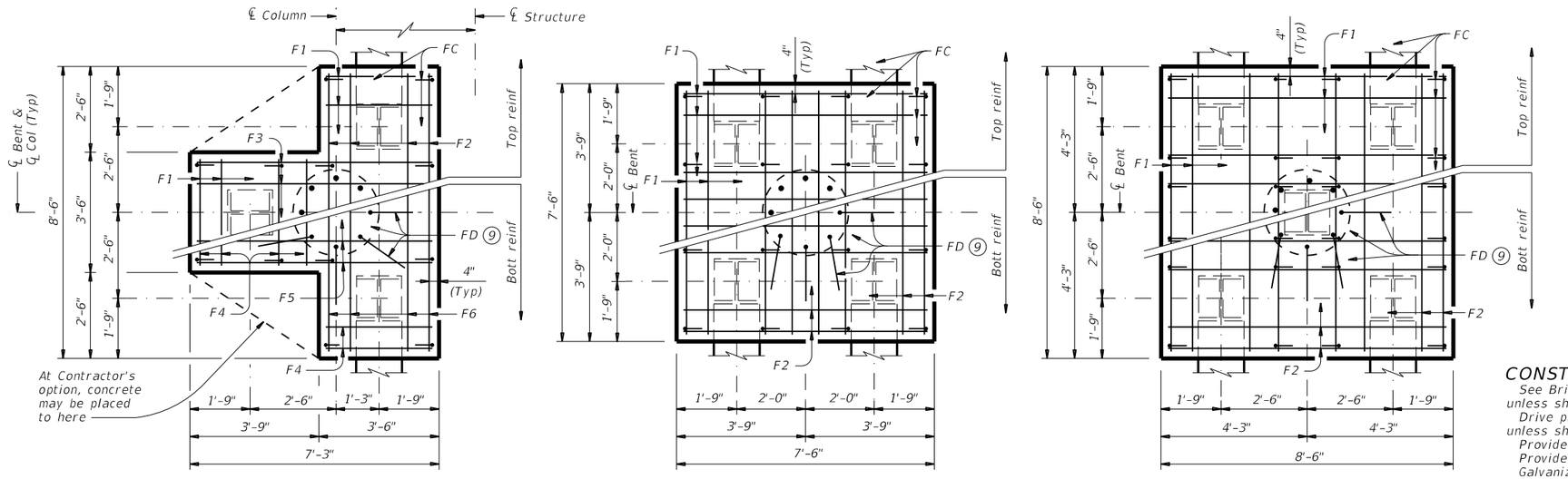
COMMON FOUNDATION DETAILS

FD

FILE: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		103

DATE:
FILE:





THREE PILE FOOTING (8)

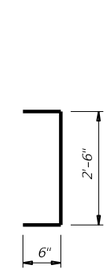
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

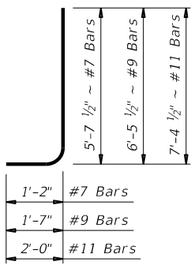
For 42" Dia and smaller columns.

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

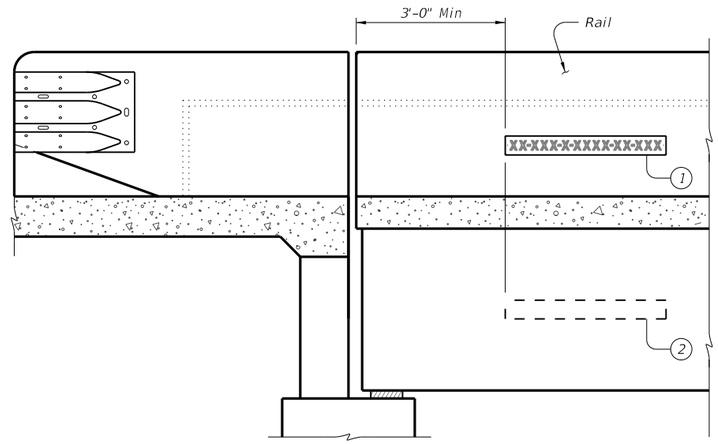
Bridge Division Standard

COMMON FOUNDATION DETAILS

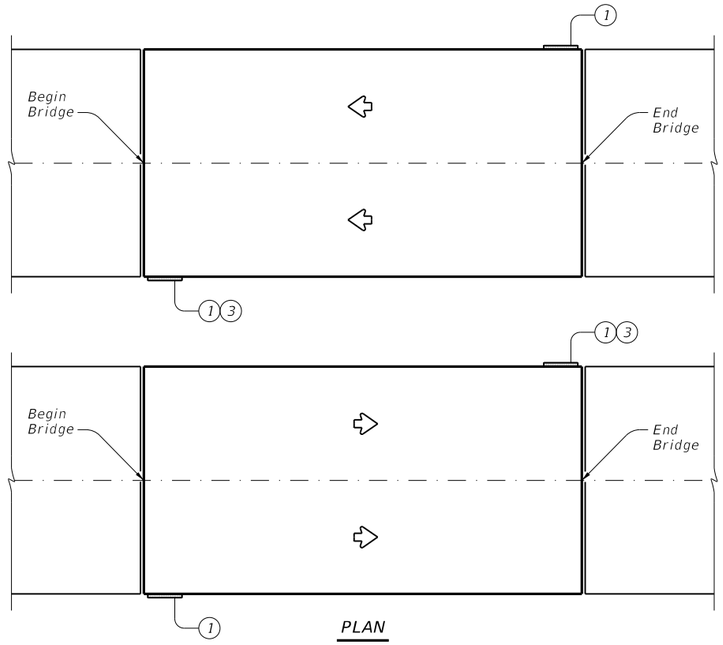
FD

FILE: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		104

DATE:
FILE:

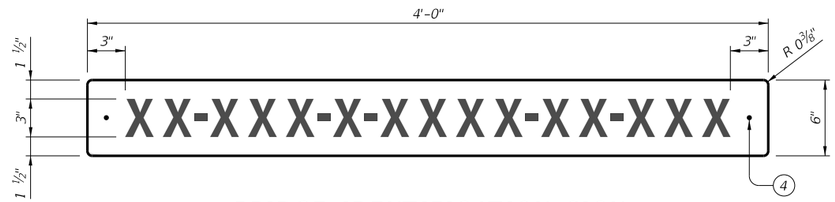


ELEVATION

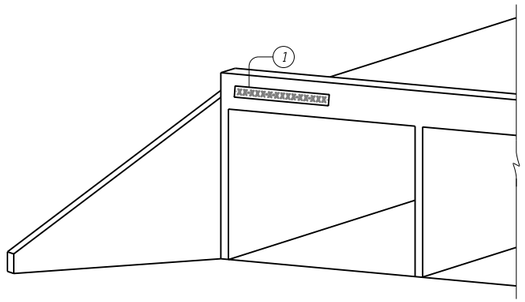


PLAN

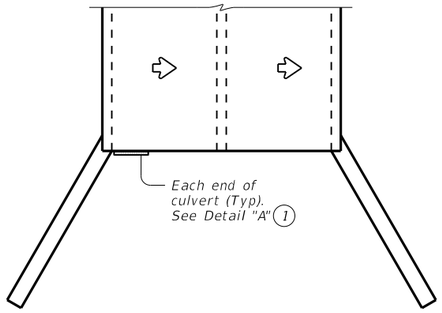
BRIDGE SIGN LOCATIONS



BRIDGE IDENTIFICATION SIGN

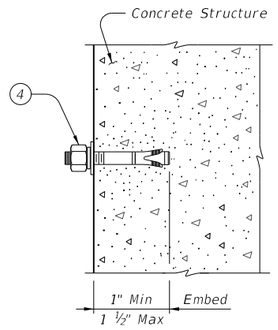


DETAIL "A"



PLAN

BRIDGE CLASS CULVERT SIGN PLACEMENT



ANCHOR DETAIL

SHEETING REQUIREMENTS		
Usage	Color	Sign Face Material
Background	White	Type B or C Sheeting
Letters and Symbols	Black	Type B or C Sheeting

(1) Bridge identification sign location

(2) Alternate sign placement location for exterior concrete beams.

(3) If adjacent bridges are less than 2 feet apart, these signs may be omitted.

(4) ¼" Diameter stainless steel expansion anchor with hex nut, washer, and spring-lock washer.

SIGN NOTES:

Standard sign designs can be found in the Standard Highway Sign Designs for Texas (SHSD).

Use the Clearview Alphabet CV-2W for the letters and symbols.

MATERIAL NOTES:

Provide lateral spacing between letters and numerals conforming with the SHSD, and any approved changes thereto. Provide a balanced appearance when spacing is not shown.

Provide aluminum sign blanks with a minimum thickness of 0.080" that meet the requirements of DMS-7110.

Provide sign face materials that meet the requirements of DMS-8300 and the sheeting requirements shown in the table.

Provide ¼" diameter stainless steel expansion anchors with one hex head nut, one flat washer, and one helical spring-lock washer each.

Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). Provide anchor products that have a designated ICC-ES Evaluation Report number. The approval status must be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

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.

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 environments, provide both stainless steel anchor bodies and expansion wedges.

GENERAL NOTES:

Prior to hole drilling, locate rebar to ensure clearing of existing reinforcement and/or strands.

Prior to installation, obtain approval of sign locations from the Engineer. Avoid placement of sign over travel lanes and pedestrian walkways. Submit proposed installation method to Engineer prior to beginning work. Install anchors as shown on plans and in accordance with the anchor manufacturer's published installation instructions.

Do not install anchors sections of members under tension.

For new construction, the signs and anchors are subsidiary to the bridge. For installations on existing structures, the signs and anchors are paid under Item 442, "Metal for Structures." Each sign weighs 28 lbs.

Texas Department of Transportation

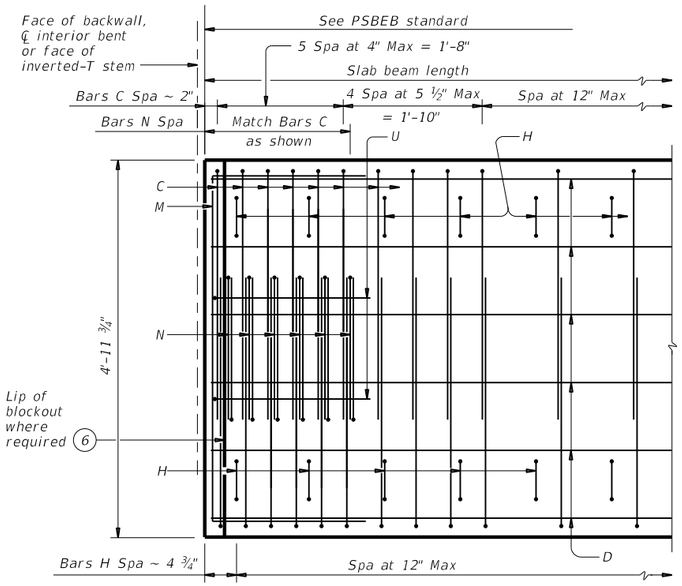
Bridge Division Standard

NBIS BRIDGE IDENTIFICATION SIGN STANDARD

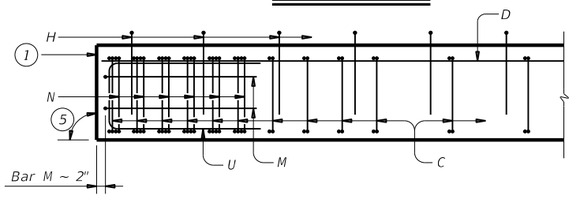
NBIS

FILE: MS-NBIS-23.dgn	DN: TAR	CK: TxDOT	DW: JER	CK: TAR
©TxDOT March 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		105

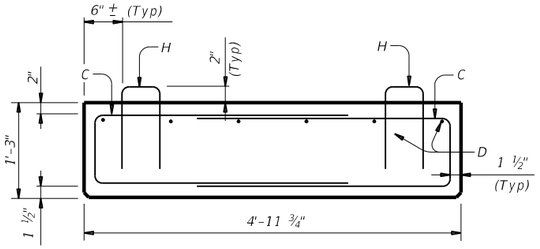
DATE:
FILE:



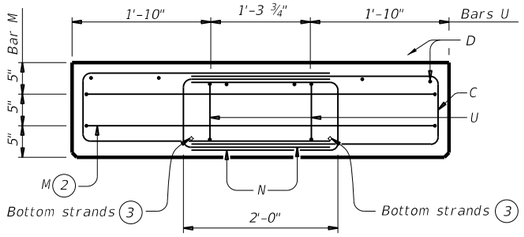
PART PLAN



ELEVATION

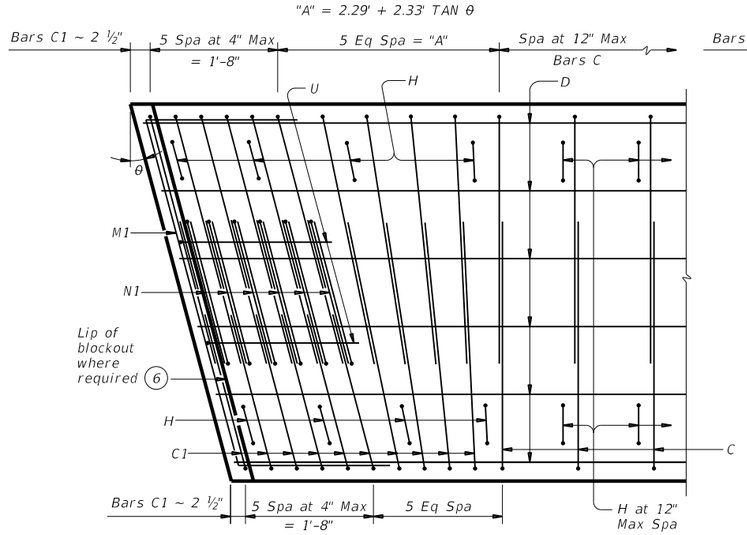


SECTION



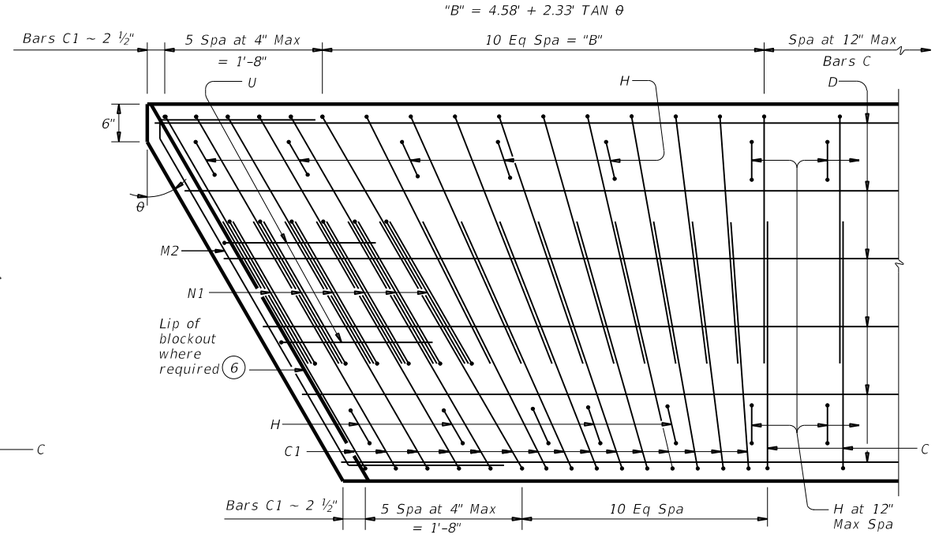
END MAT REINFORCING

Bars H not shown for clarity.



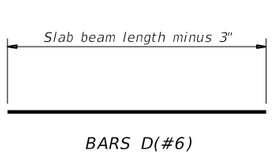
PART SKEW PLAN

(Showing θ over 0° to 15° skew)

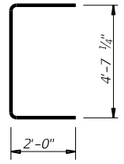


PART SKEW PLAN

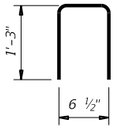
(Showing θ over 15° to 30° skew)



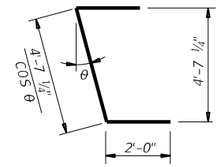
BARS D(#6)



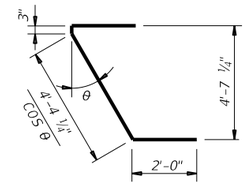
BARS M(#4)



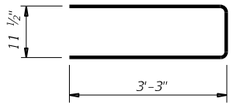
BARS H(#4)



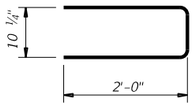
BARS M1(#4)



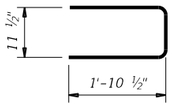
BARS M2(#4)



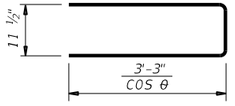
BARS C(#4)



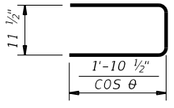
BARS U(#5)



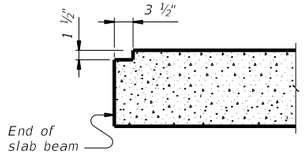
BARS N(#4)



BARS C1(#4)



BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

Provide Grade 60 reinforcing steel.

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

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

BEAM PROPERTIES		
Area	in^2	896.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	16,805
Weight (4)	lb/ft	934

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

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

(4) Assumes 150 pcf weight density of concrete.

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

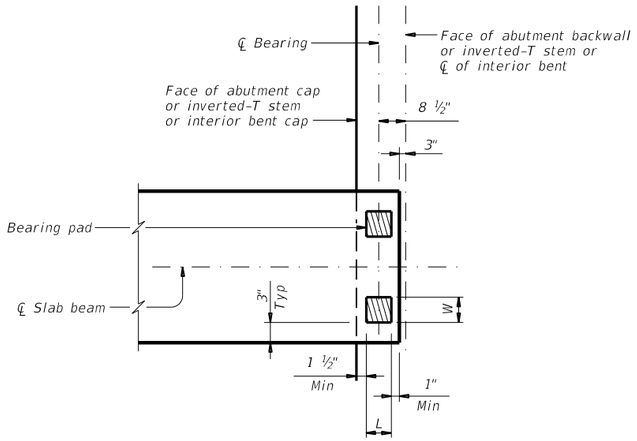
PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

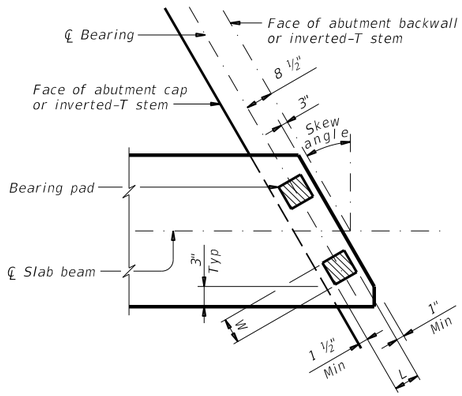
PSB-5SB15

FILE: PSB-5SB15-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		106

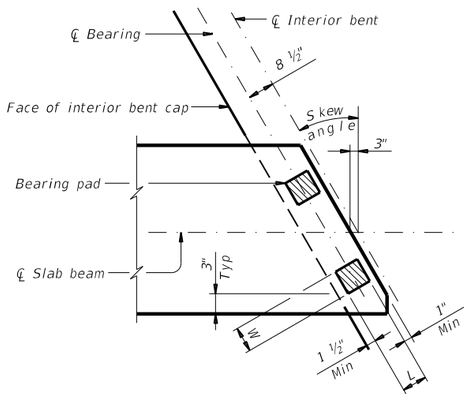
DATE:
FILE:



TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



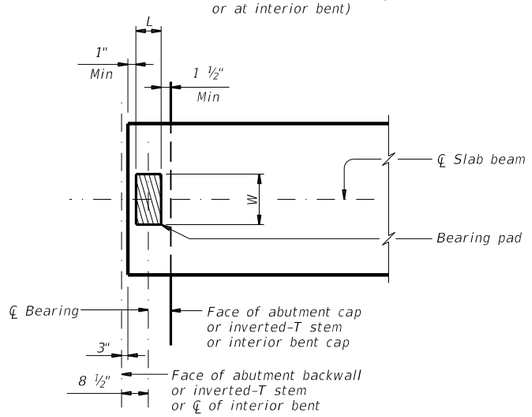
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

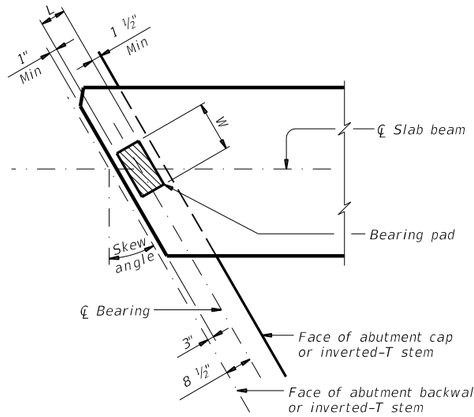
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

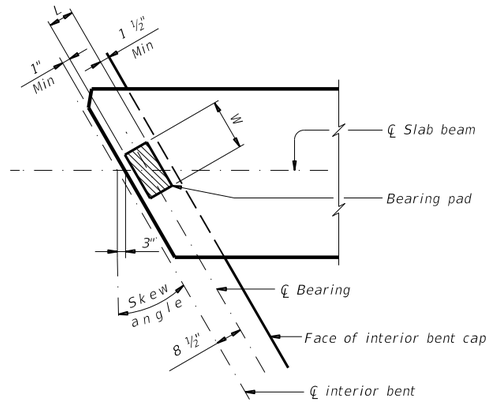
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

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

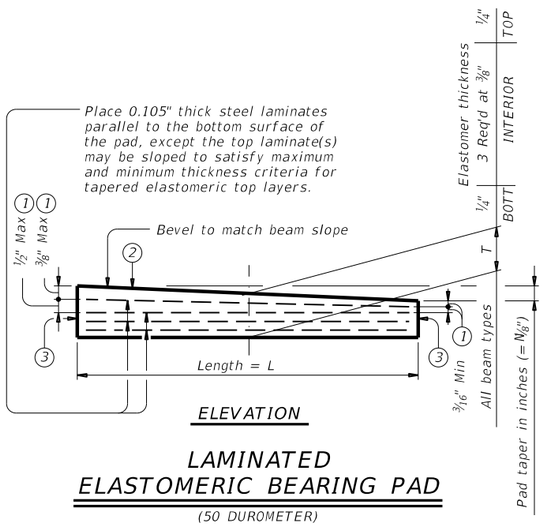
GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

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

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



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

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

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

(3) Locate permanent mark here.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

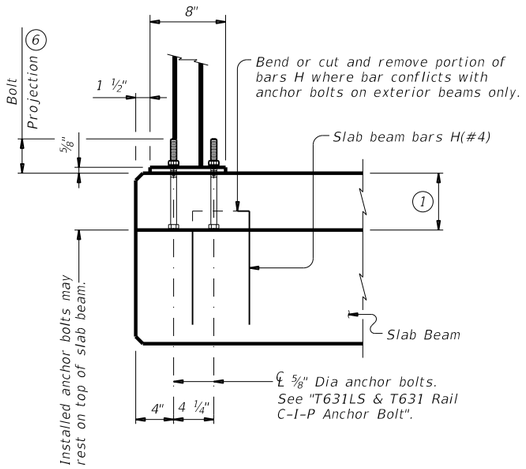
ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

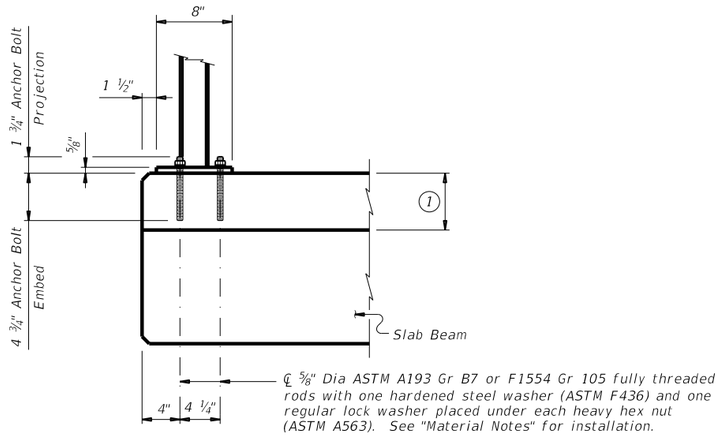
PSBEB

FILE: PSB-PSBEB-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		107

DATE:
FILE:



CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See rail standard for projection from finished grade or top of sidewalk.

(5) Place additional (#5) longitudinal bar.

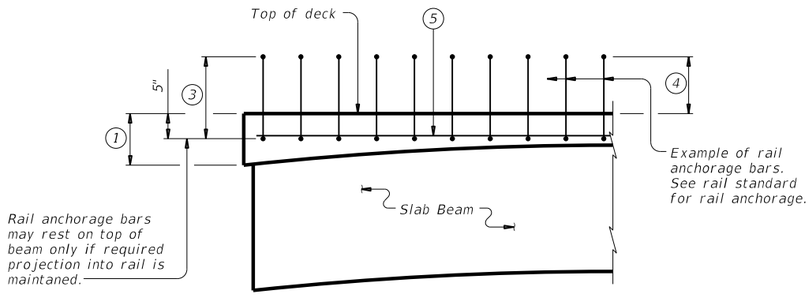
(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

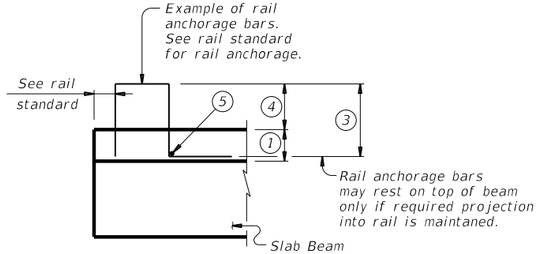
(8) Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" preformed bituminous fiber material under concrete rail, as shown.

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



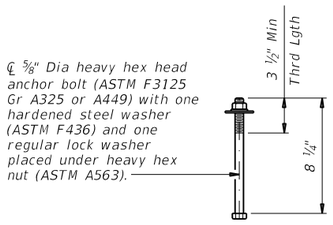
PART SPAN ELEVATION



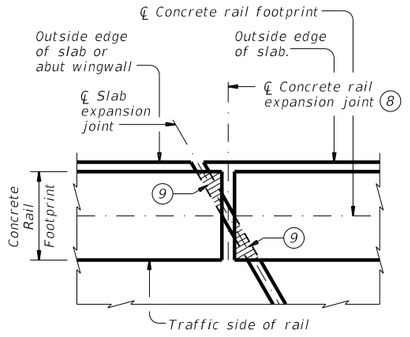
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

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

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

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be 5/8" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

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

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: PSB-PSBRA-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	LRD	WEBB		108

STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																		OPTIONAL DESIGN					LOAD RATING FACTORS		
				PRESTRESSING STRANDS						DEBONDED STRANDS PER ROW								CONCRETE								
	SPAN LENGTH	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e" ℄	"e" END	TOT NO. DEB	DIST FROM BOTTOM	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)					RELEASE STRGTH (1)	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
	(ft)					(in)	fpu (ksi)	(in)	(in)		(in)	TOTAL	DE-BONDED	3	6	9	12	15	f'ci (ksi)	f'c (ksi)	fct (ksi)	fcb (ksi)	(kip-ft)	Moment	Shear	Inv	Opr	Inv
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.914	-1.217	448	0.450	0.450	1.40	1.82	1.71
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.292	-1.685	530	0.450	0.450	1.25	1.62	1.29
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.730	-2.219	675	0.450	0.450	1.33	1.73	1.23
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.218	-2.796	820	0.440	0.440	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.725	-0.897	551	0.450	0.450	1.77	2.29	2.41
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.020	-1.244	574	0.450	0.450	1.23	1.59	1.45
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.361	-1.640	708	0.450	0.450	1.15	1.49	1.14
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.739	-2.068	864	0.440	0.440	1.32	1.71	1.19
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.179	-2.574	1054	0.440	0.440	1.34	1.73	1.08
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	24	8	4	4	0	0	0	4.000	5.000	2.680	-3.153	1276	0.440	0.440	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.903	-1.184	444	0.430	0.430	1.47	1.91	1.80
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.276	-1.639	508	0.430	0.430	1.32	1.71	1.37
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.708	-2.159	647	0.430	0.430	1.18	1.53	1.02
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.200	-2.744	799	0.430	0.430	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.716	-0.874	529	0.430	0.430	1.85	2.40	2.53
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.007	-1.212	570	0.430	0.430	1.29	1.67	1.53
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.343	-1.598	680	0.430	0.430	1.21	1.57	1.22
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.725	-2.032	842	0.430	0.430	1.36	1.76	1.24
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.149	-2.508	1013	0.420	0.420	1.41	1.82	1.16
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	22	6	4	2	0	0	0	4.000	5.000	2.643	-3.073	1227	0.420	0.420	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.904	-1.187	341	0.340	0.340	1.38	1.79	1.67
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.277	-1.646	407	0.340	0.340	1.32	1.71	1.37
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.711	-2.169	518	0.340	0.340	1.24	1.60	1.08
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	2.205	-2.758	640	0.340	0.340	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.723	-0.888	431	0.350	0.350	1.69	2.19	2.32
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	1.017	-1.231	438	0.350	0.350	1.16	1.50	1.37
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.346	-1.605	545	0.340	0.340	1.21	1.57	1.21
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.729	-2.043	675	0.340	0.340	1.47	1.91	1.38
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000	2.166	-2.542	823	0.340	0.340	1.33	1.73	1.06
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000	2.665	-3.115	998	0.340	0.340	1.32	1.71	1.02

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

Full-length debonded strands are not permitted in positions "A" and "B".

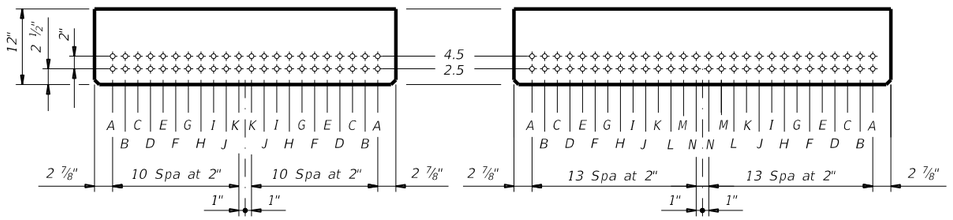
Strand debonding must comply with Item 424.4.2.2.2.4.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

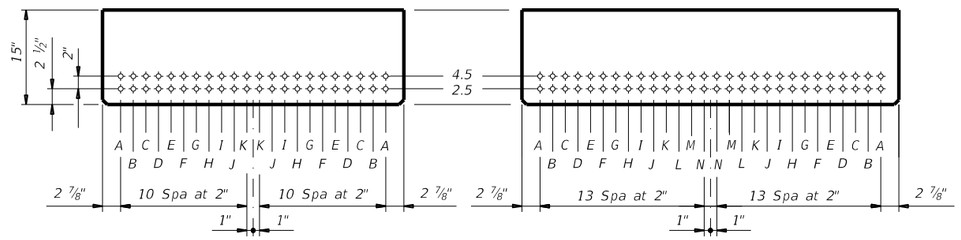
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.

Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



TxDOT 4SB12 SLAB BEAM

TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM

TxDOT 5SB15 SLAB BEAM

HL93 LOADING

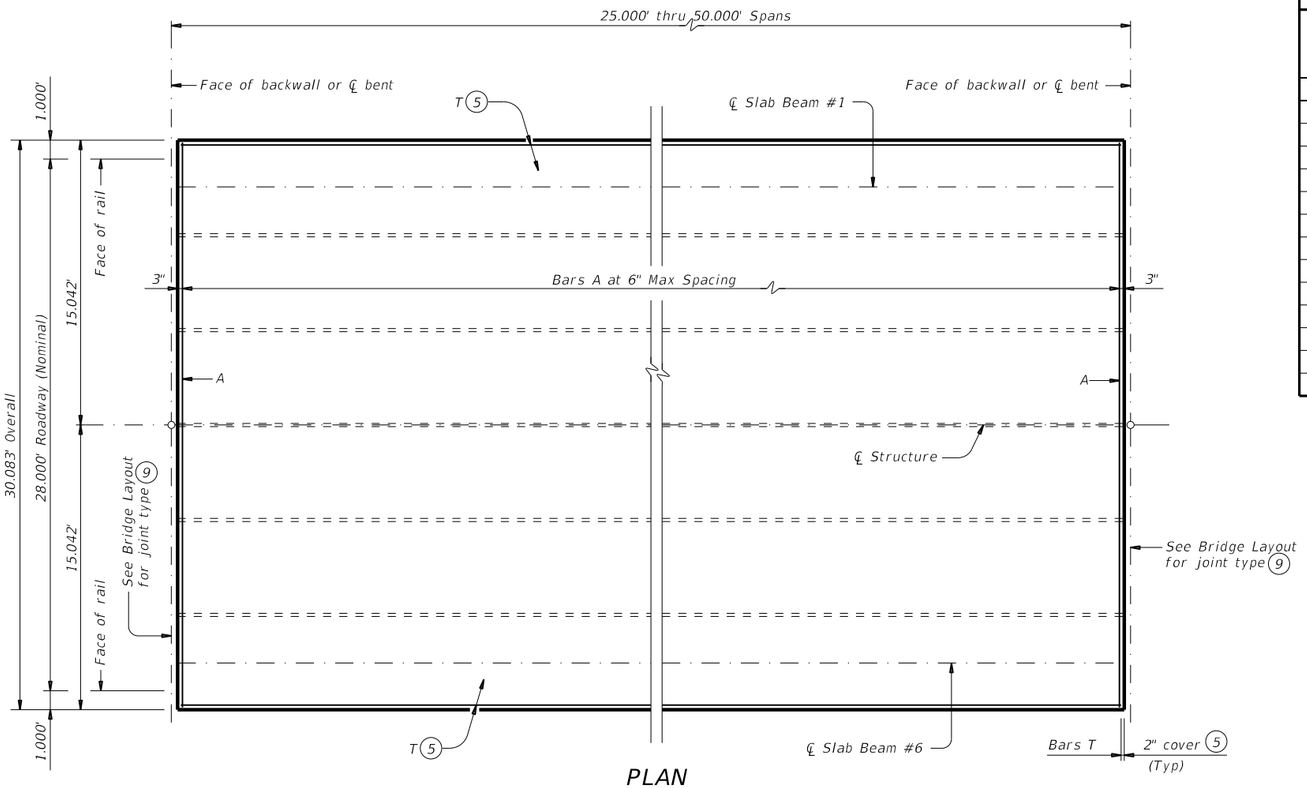
Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS
(TYPE SB12 OR SB15)
24', 28' & 30' ROADWAY
PSBSD

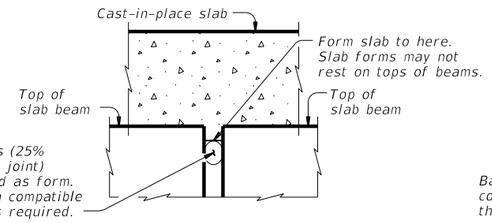
FILE: PSB-PSBSD-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-21: Added load rating.	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		109

DATE:
FILE:

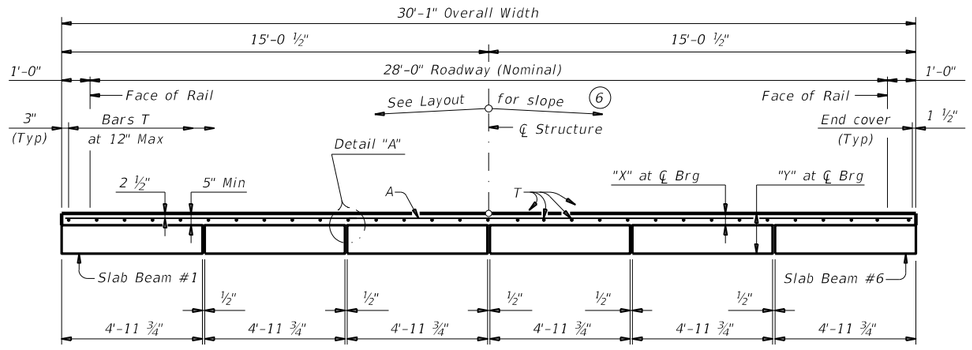
DATE:
FILE:



PLAN



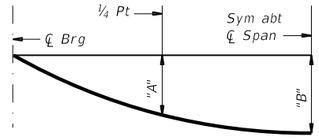
DETAIL "A"



TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.003	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.007	0.010	5 ½"	1'-5 ½"
35	5SB12	0.014	0.020	6"	1'-6"
40	5SB12	0.025	0.035	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.005	5 ½"	1'-8 ½"
35	5SB15	0.007	0.010	5 ½"	1'-8 ½"
40	5SB15	0.013	0.018	5 ¾"	1'-8 ¾"
45	5SB15	0.021	0.029	6 ¼"	1'-9 ¼"
50	5SB15	0.032	0.045	6 ¾"	1'-9 ¾"

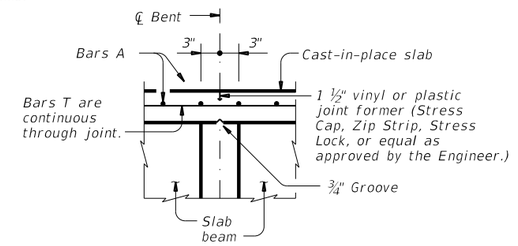


DEAD LOAD DEFLECTION DIAGRAM

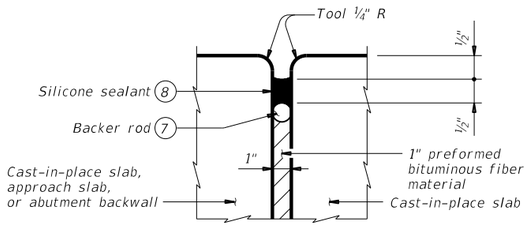
NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL REINF STEEL (2)
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	752	147.00	147.00	147.00	2,110
30	903	177.00	177.00	177.00	2,530
35	1,053	207.00	207.00	207.00	2,950
40	1,203	237.00	237.00	237.00	3,370
45	1,354	267.00	267.00	267.00	3,790
50	1,504	297.00	297.00	297.00	4,210

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

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

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

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

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

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

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

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

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.

See applicable rail details for rail anchorage in slab.

This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).

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

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:

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

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

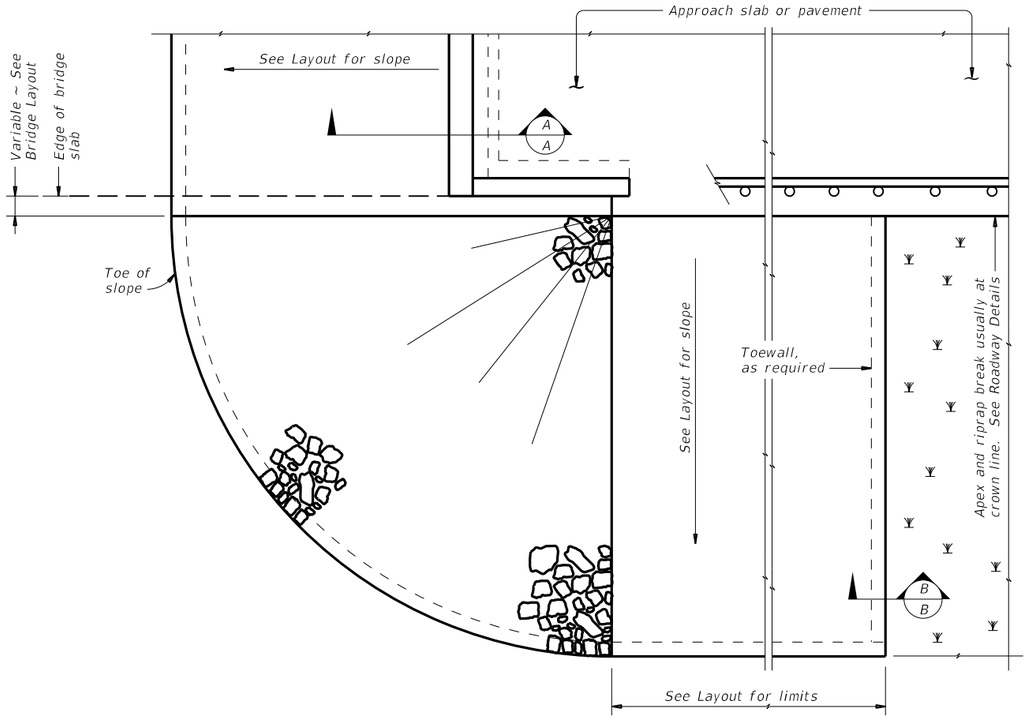
HL93 LOADING

Texas Department of Transportation

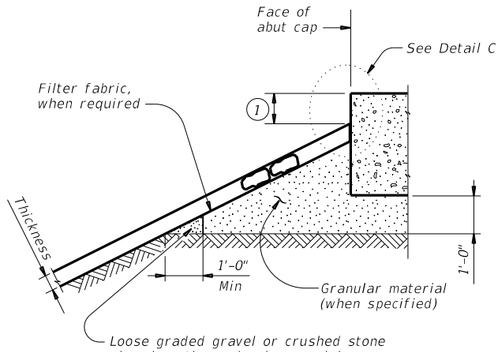
Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM SPANS
(TYPE SB12 OR SB15)
28' ROADWAY
SPSB-28

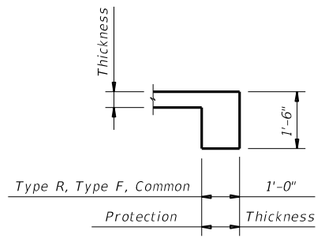
FILE: PSB-SPSB2800-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		110



PLAN

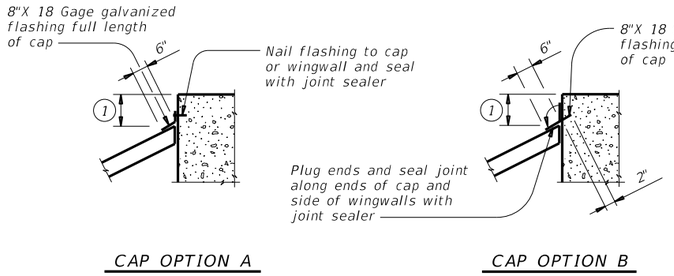


SECTION A-A AT CAP



SECTION B-B

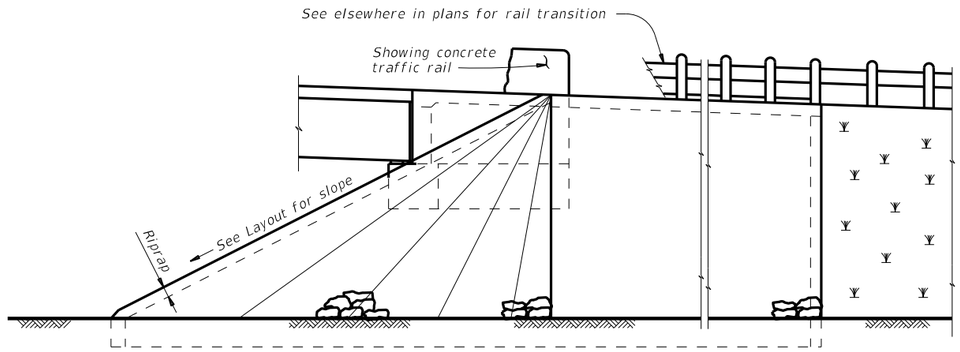
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: MS-SRR-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES			
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0922	33	185,ETC.	CR352, ETC.			
	DIST	COUNTY		SHEET NO.			
	LRD	WEBB		111			

DATE:
FILE:

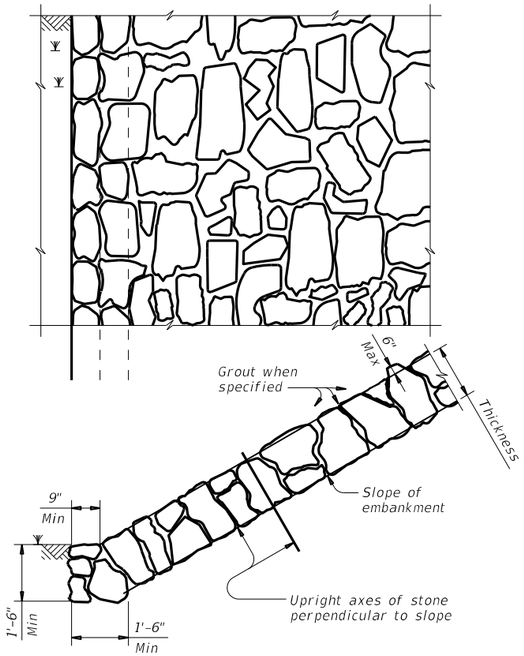


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

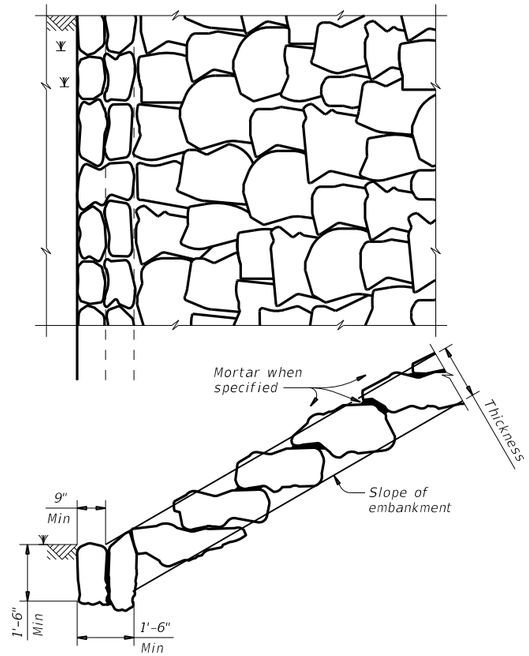


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

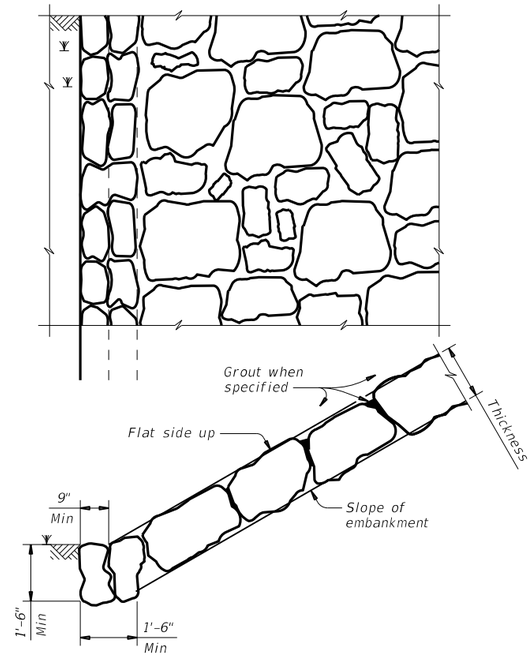


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

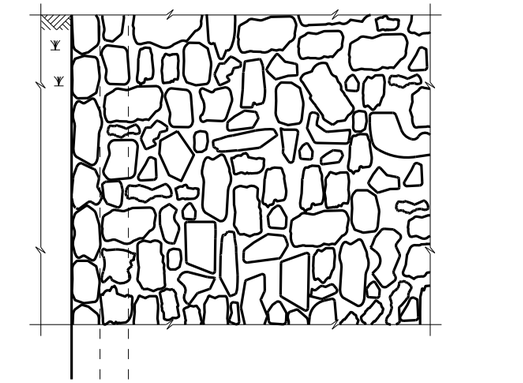


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

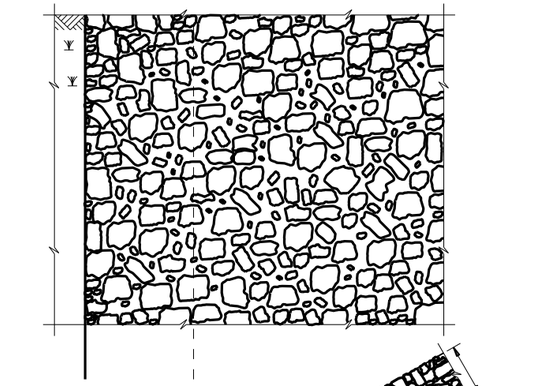


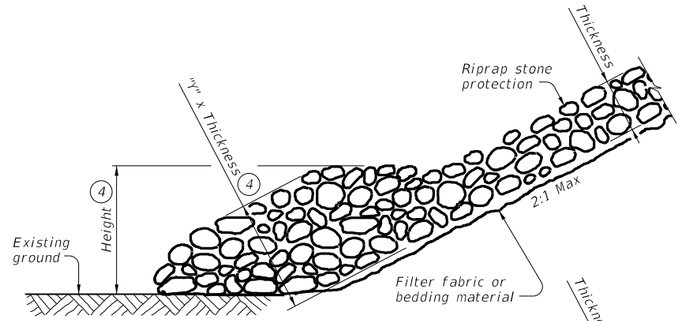
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

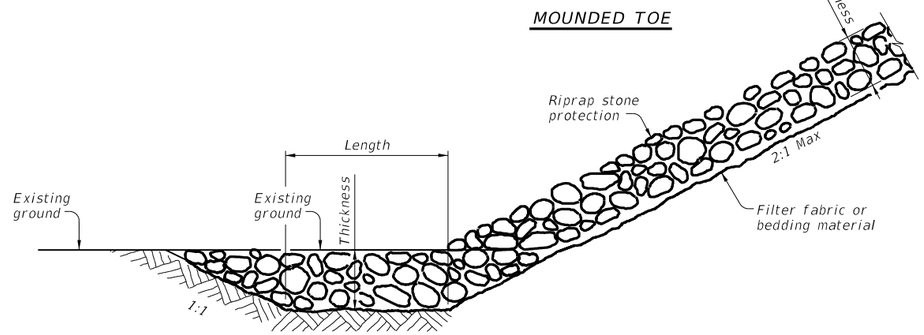
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

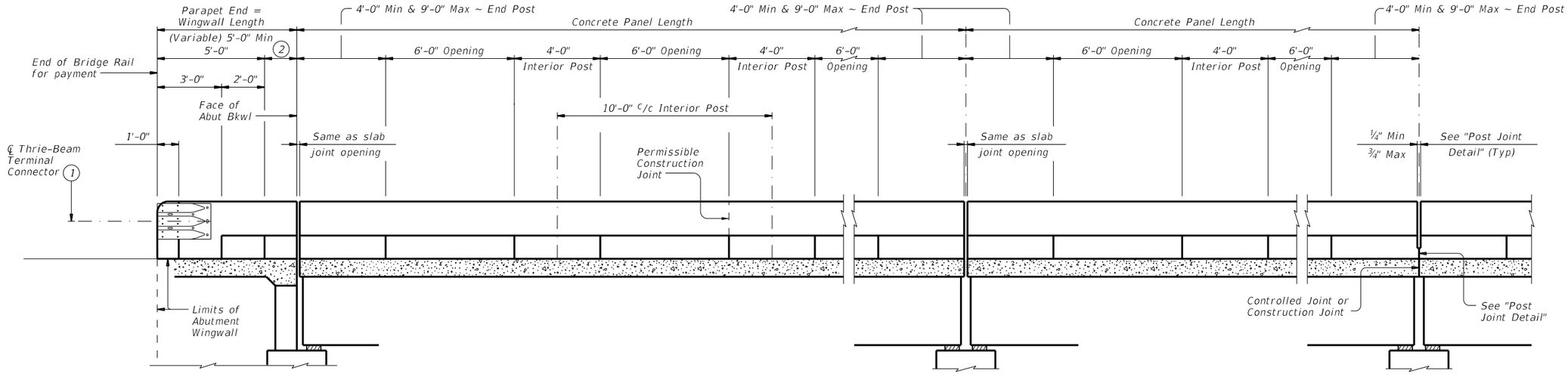
STONE RIPRAP

SRR

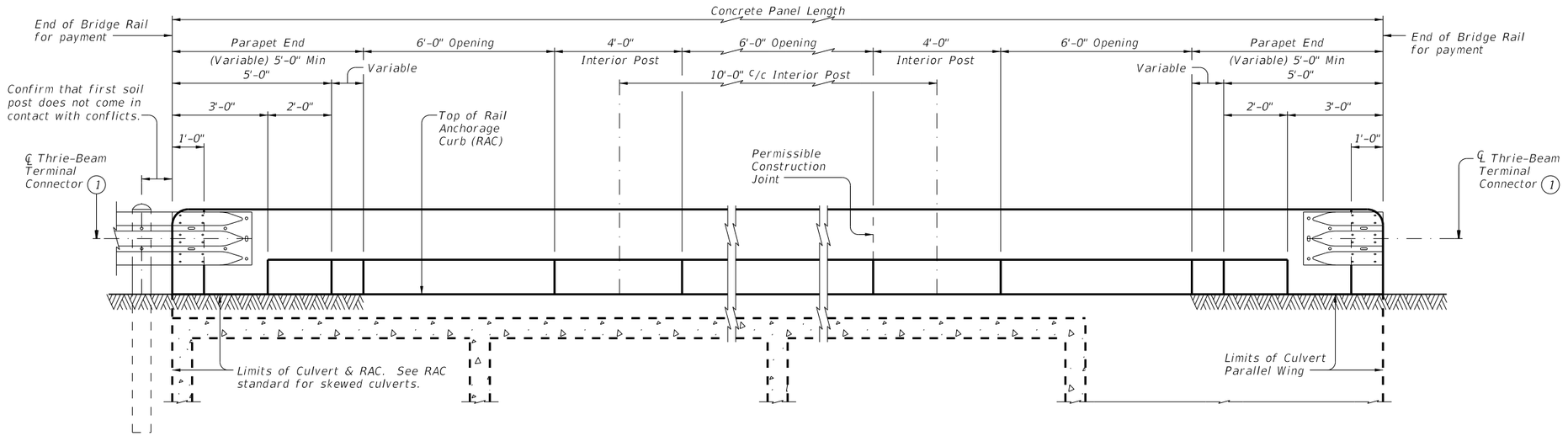
FILE: MS-SRR-19.dgn		DN: AES	CK: JGD	DW: BWH		CK: AES	
©TxDOT April 2019		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0922	33	185,ETC.		CR352, ETC.	
		DIST	COUNTY			SHEET NO.	
		LRD	WEBB			112	

DATE:
FILE:

DATE:
FILE:



ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

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

(1) *Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.*

(2) *Wingwall Length minus 5'-0" (Varies)*

Texas Department of Transportation

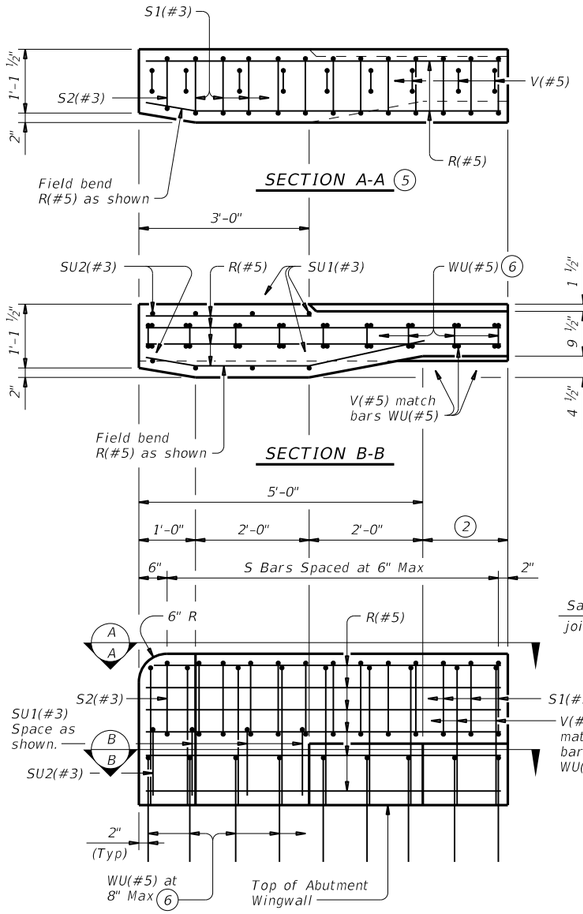
Bridge Division Standard

TRAFFIC RAIL

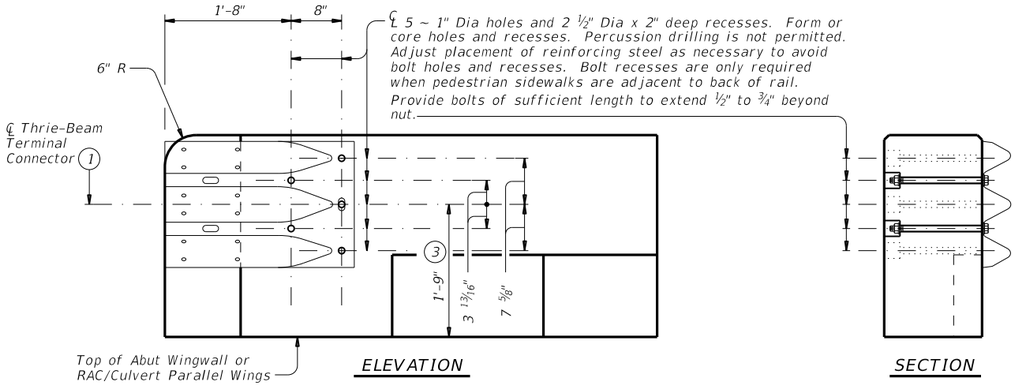
TYPE T223

FILE: RL-T223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		113

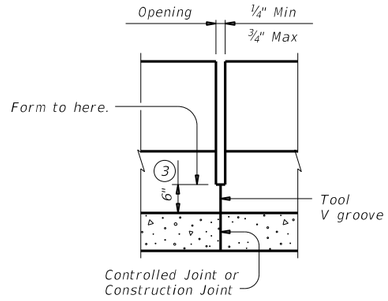
DATE:
FILE:



PARAPET END AT ABUT WINGWALL (6)

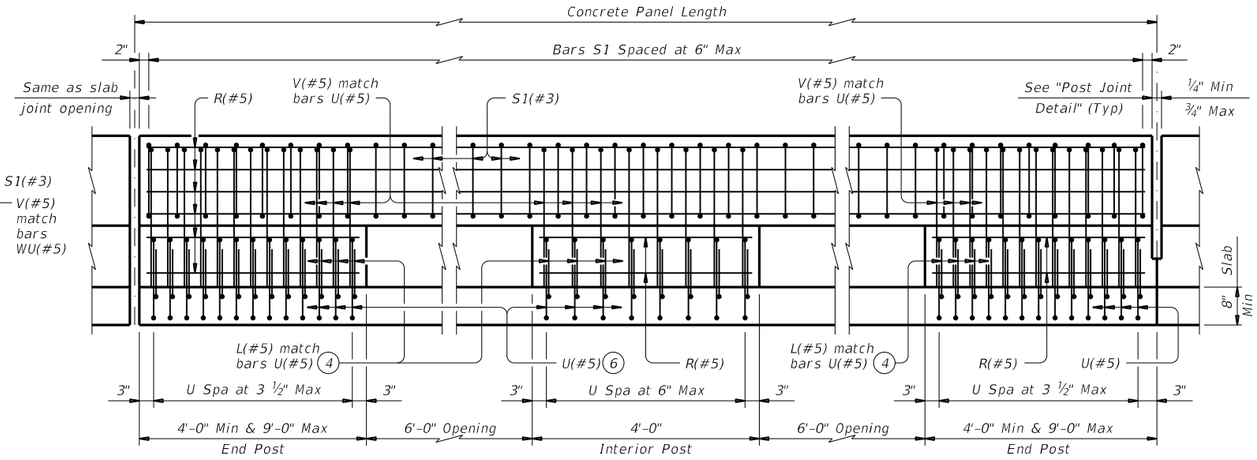


TERMINAL CONNECTION DETAILS



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 anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

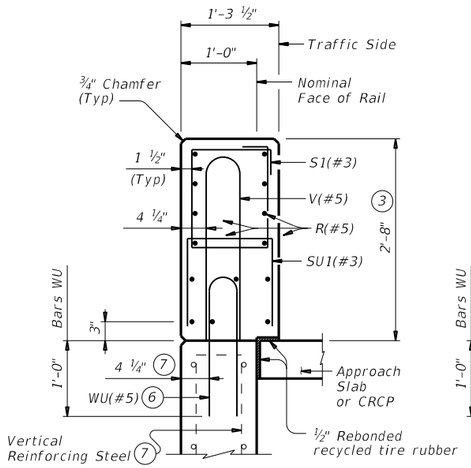
Bridge Division Standard

TRAFFIC RAIL

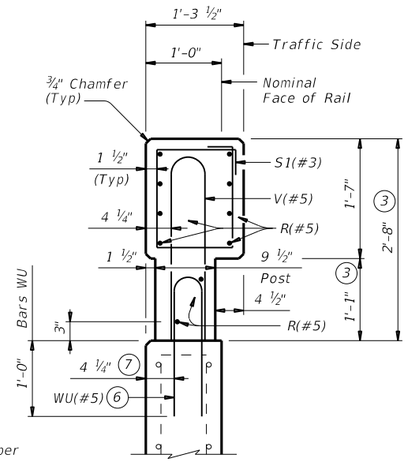
TYPE T223

FILE: RL-T223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		114

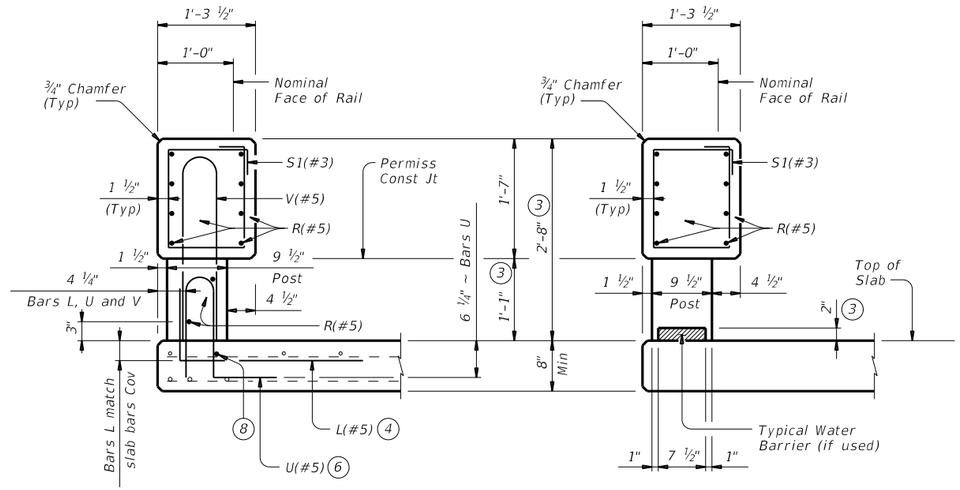
DATE:
FILE:



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

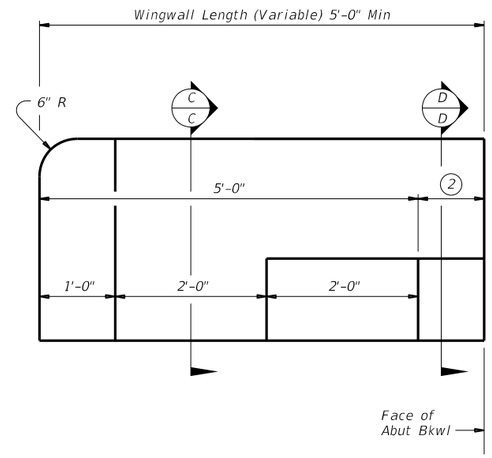


AT POST
ON BRIDGE SLAB

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.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

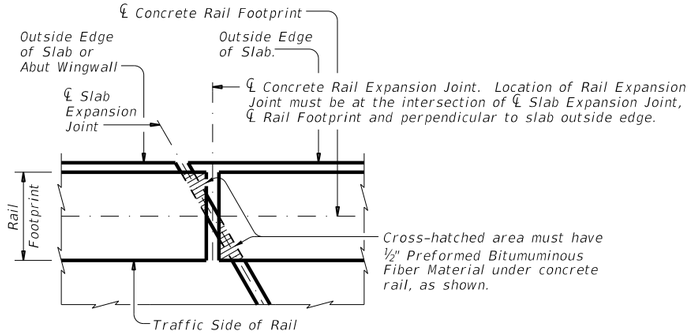
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(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.

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.

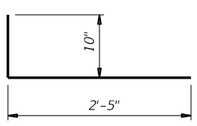
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

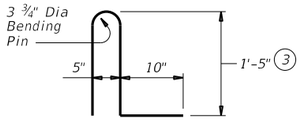
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

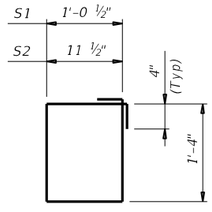
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



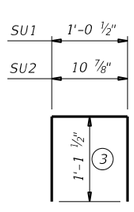
BARS L (#5)



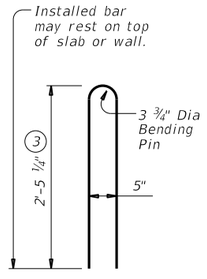
BARS U (#5) 9



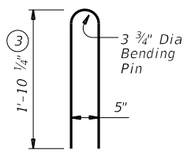
BARS S (#3)



BARS SU (#3)



BARS V (#5) 9



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

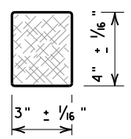
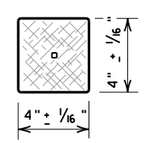
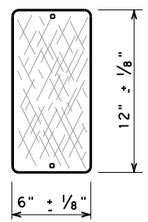
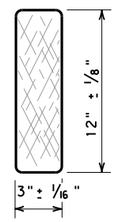
Bridge Division Standard

TRAFFIC RAIL

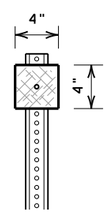
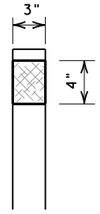
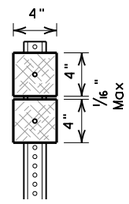
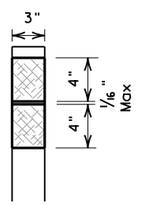
TYPE T223

FILE: RL-T223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185,ETC.	CR352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		115

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

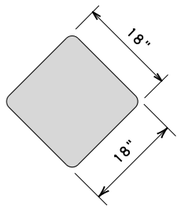
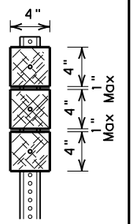
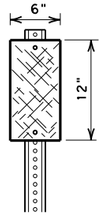
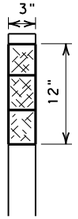
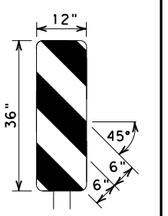
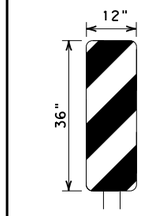
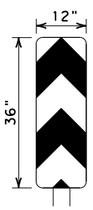
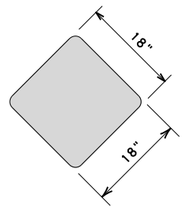
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

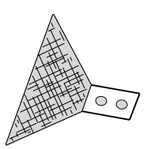
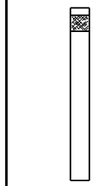
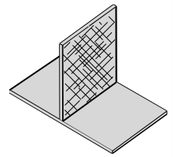
OBJECT MARKERS

	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

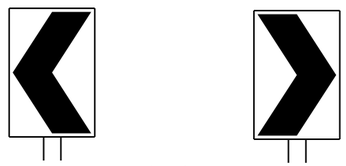
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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



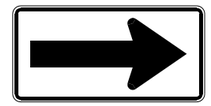
W1-8

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	0922	33	185, ETC.	CR 352, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LRD	WEBB		116

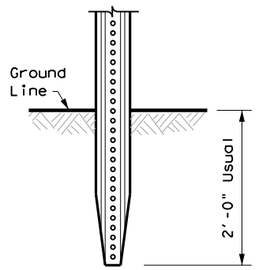
20A

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

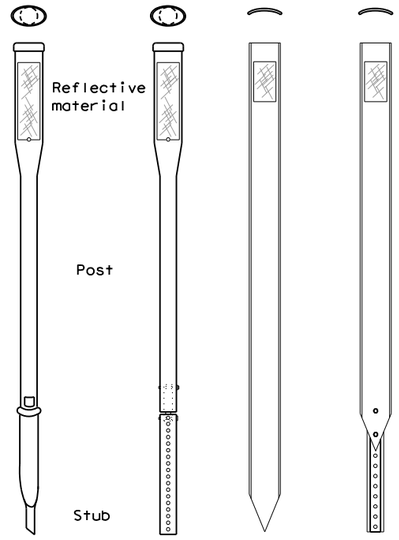


NOTES

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.

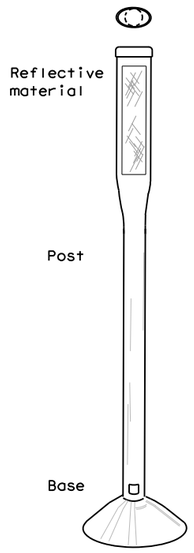
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



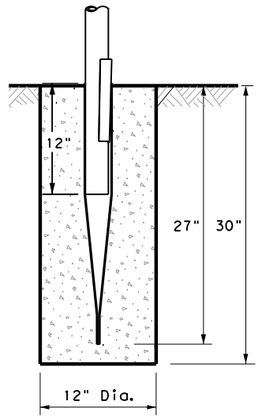
SURFACE MOUNT

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.

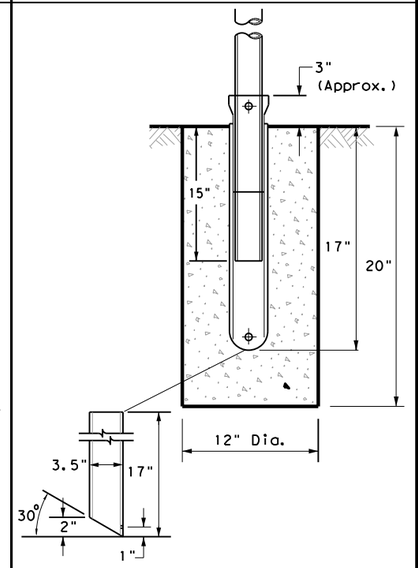
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

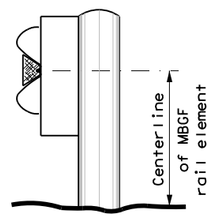
NOTE

1. Install per manufacturer's recommendations.

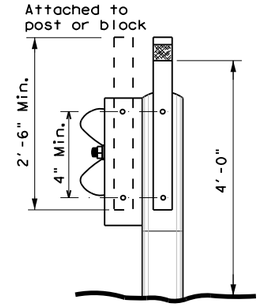
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

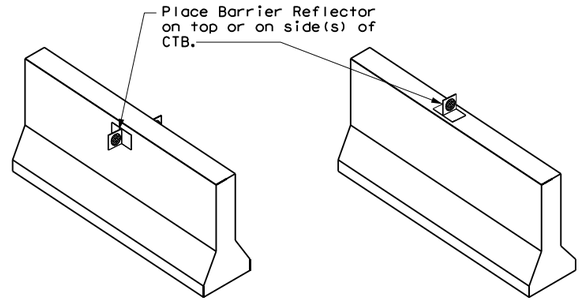
GF1



GF2



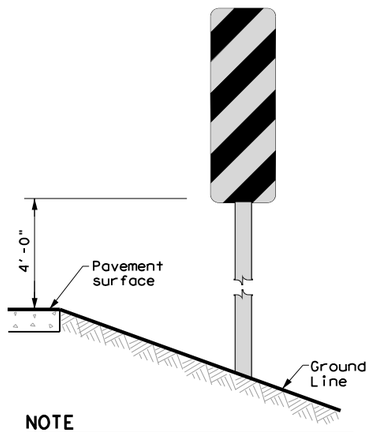
CONCRETE TRAFFIC BARRIER (CTB)



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.

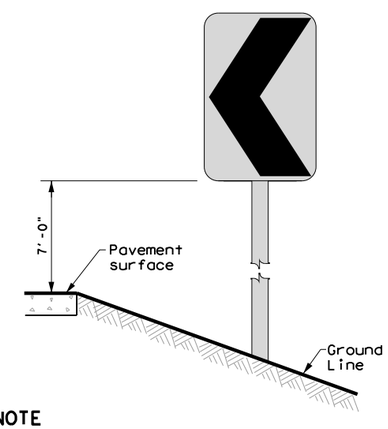
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

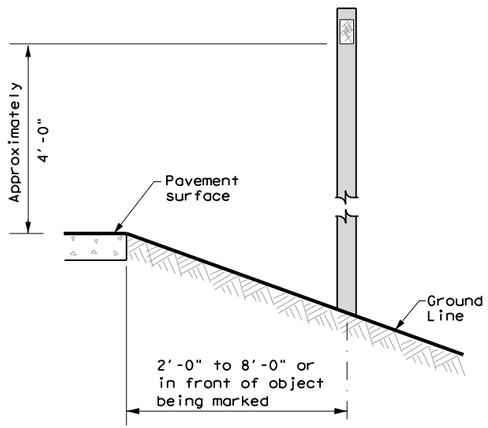
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0922	33	185, ETC.	CR 352, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LRD	WEBB		117

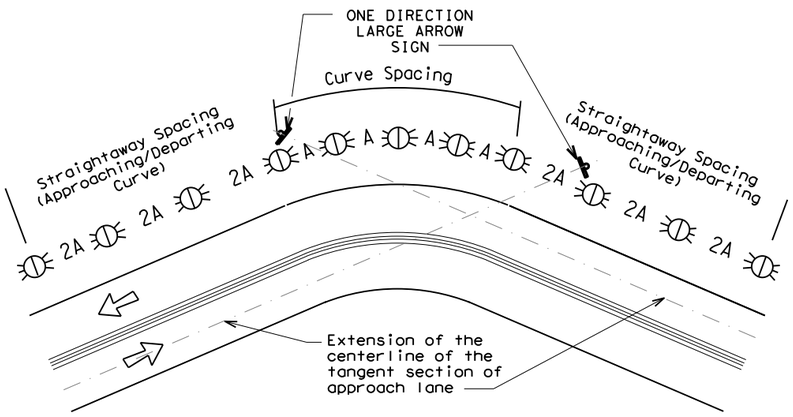
DATE:
FILE:

20B

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

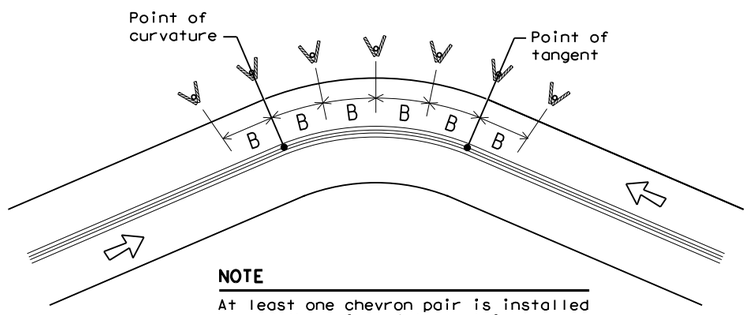
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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.

DATE:
FILE:

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

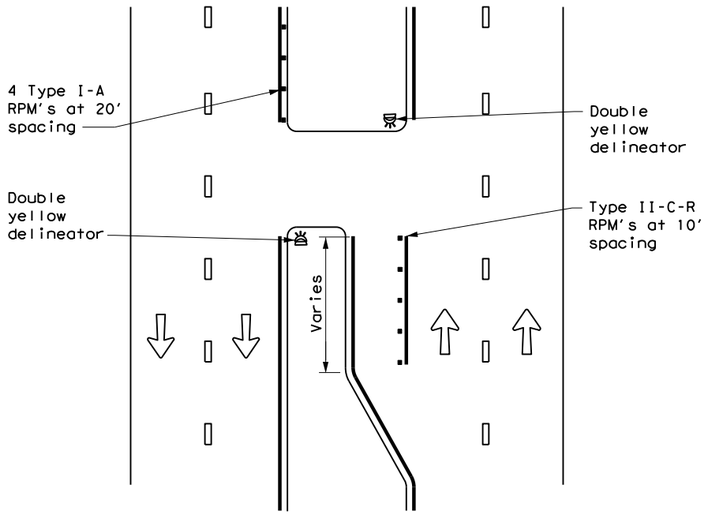
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	LRD	WEBB		118

20C

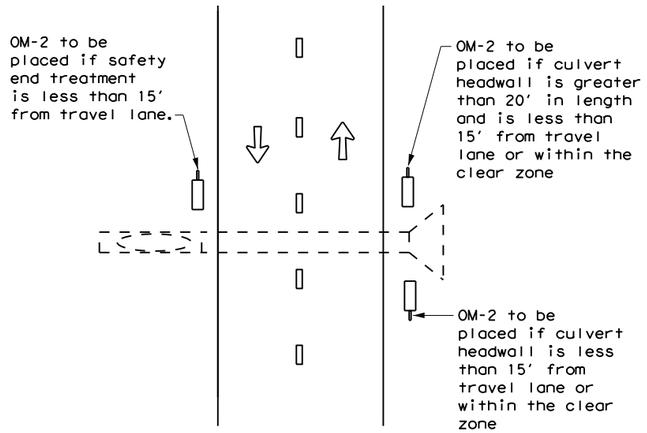
DATE:
FILE:

CROSSOVERS



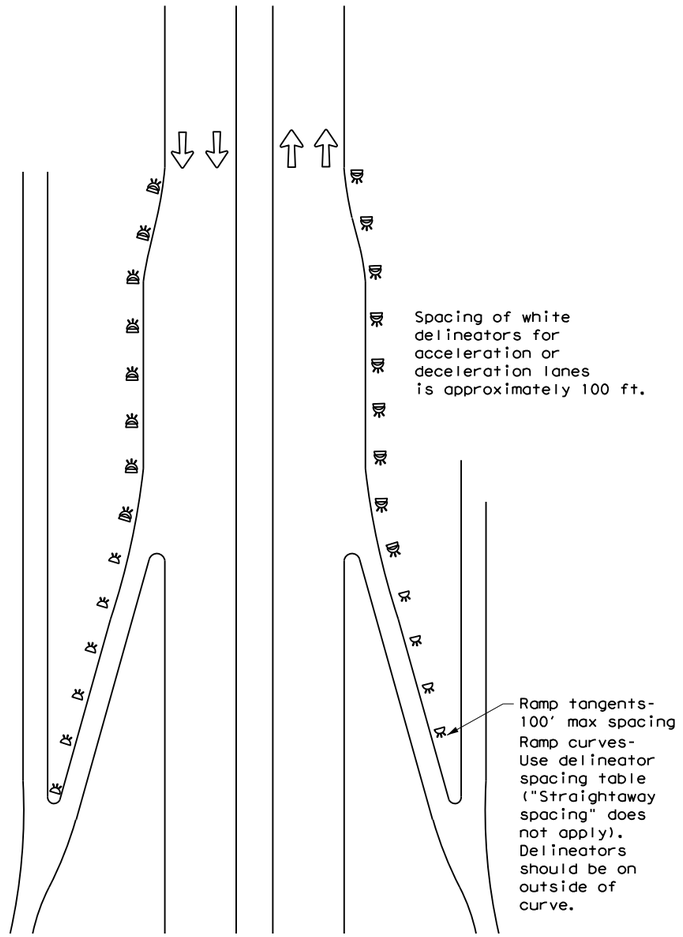
DETAIL 1

FOR CULVERTS WITHOUT MBGF



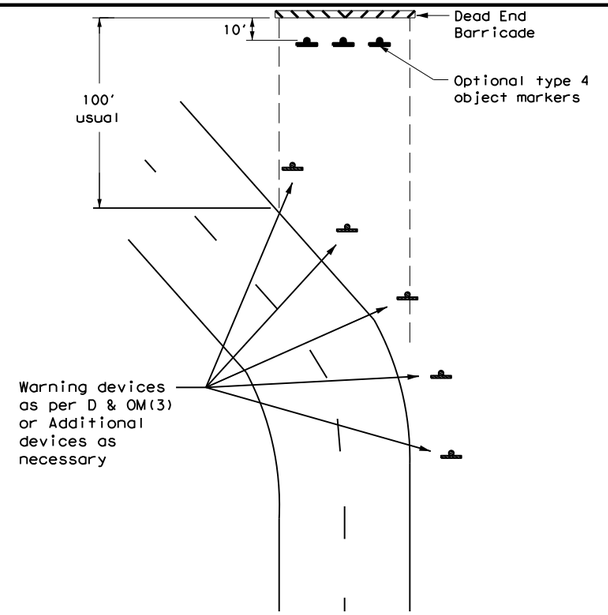
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



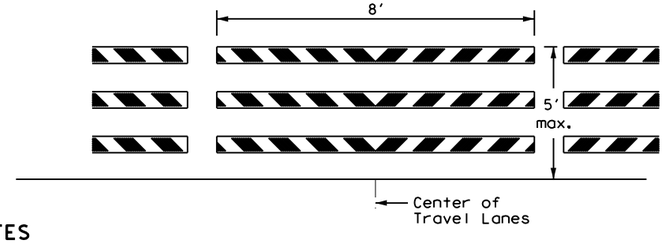
DETAIL 3

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

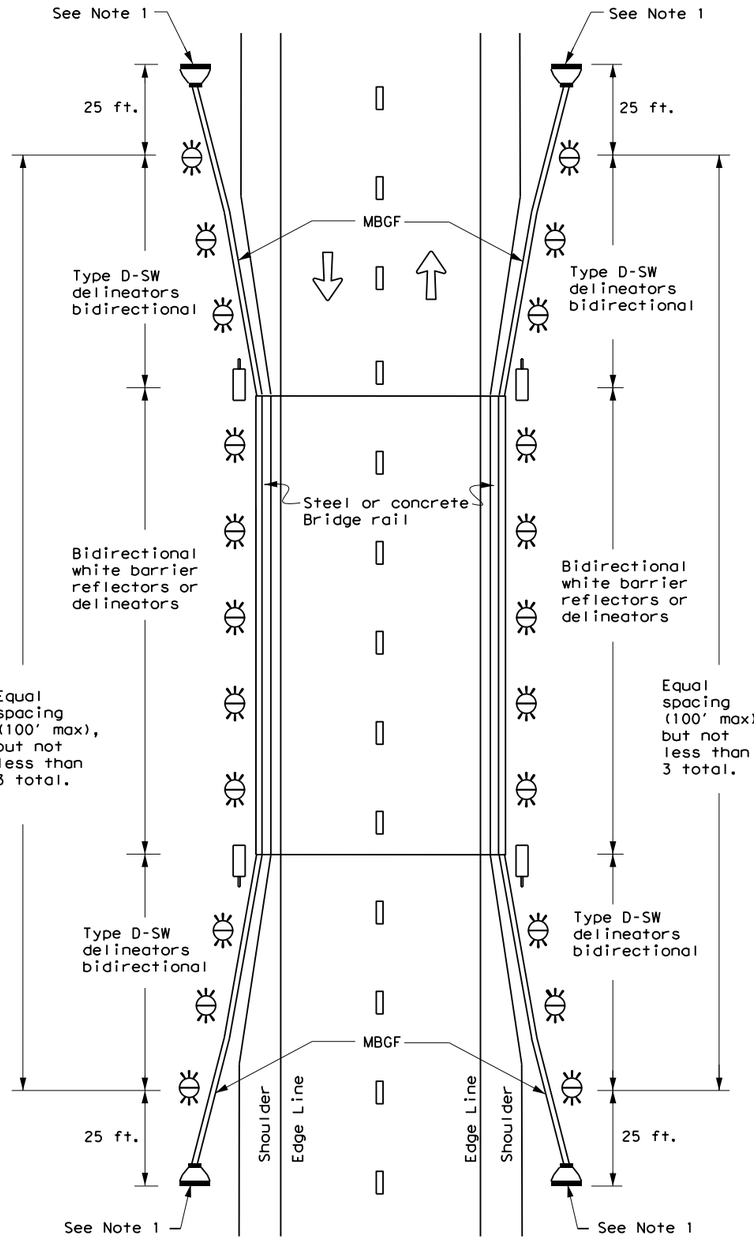
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
3-15	DIST	COUNTY		SHEET NO.
7-20	LRD	WEBB		119

20D

DATE:
FILE:

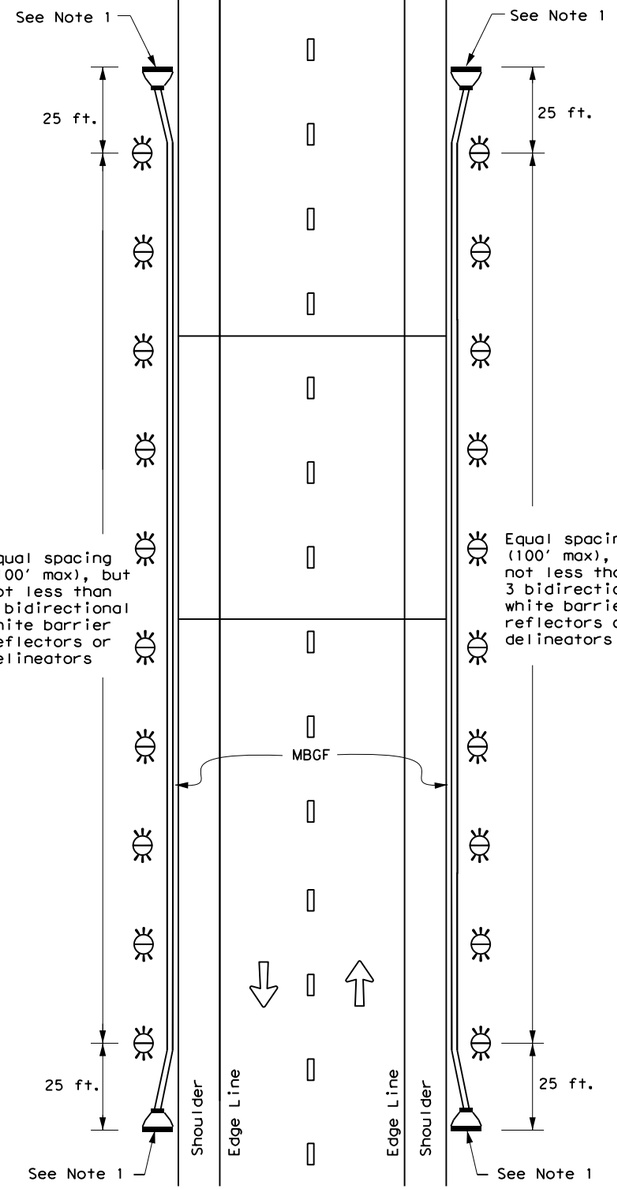
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

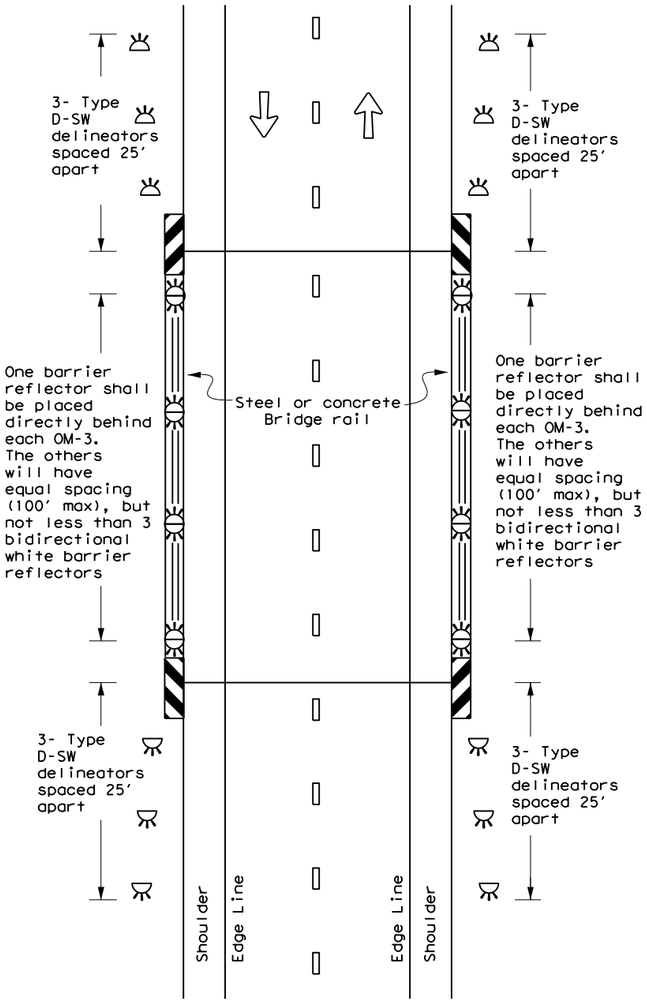
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

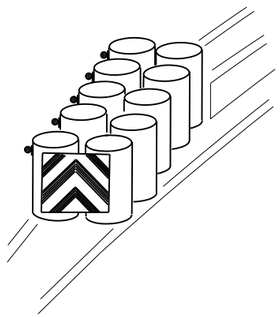
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

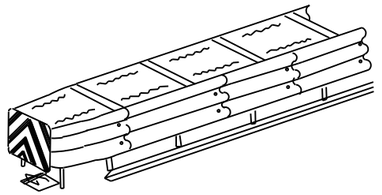
D & OM(5)-20

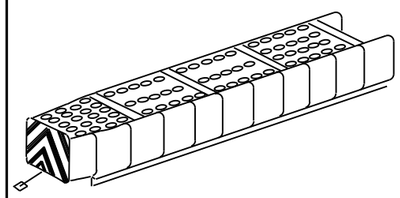
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
7-20	DIST	COUNTY		SHEET NO.
	LRD	WEBB		120

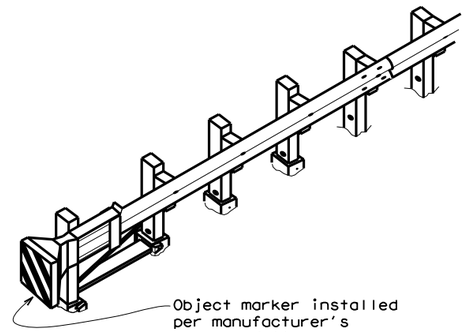
20E

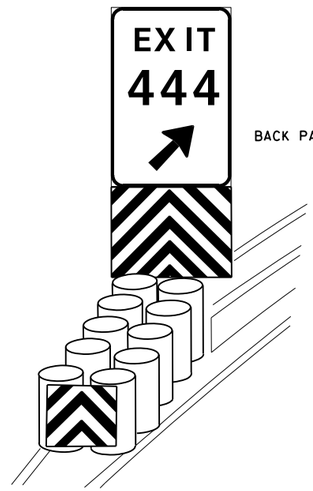
DATE:
FILE:

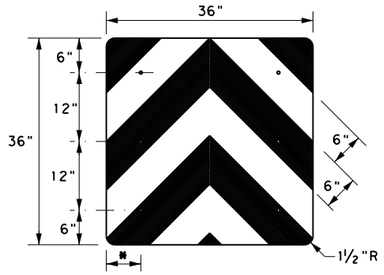


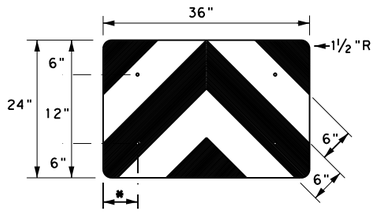




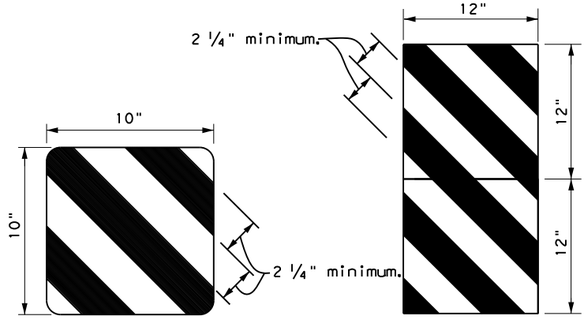




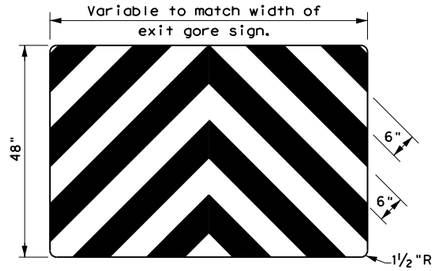


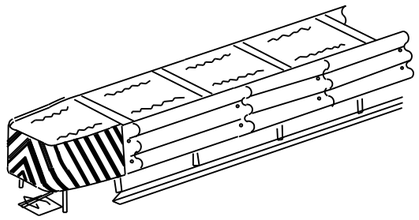


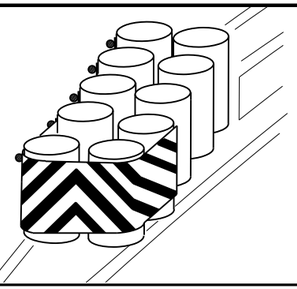
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

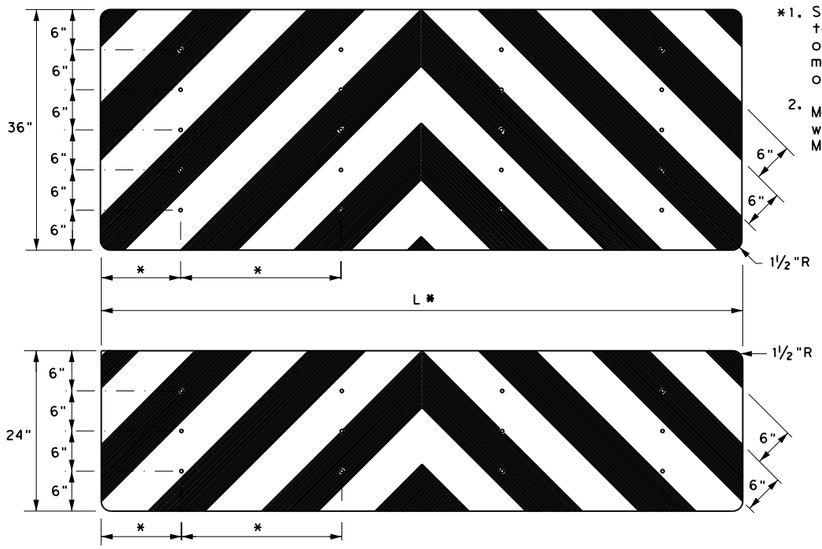


OBJECT MARKERS SMALLER THAN 3 FT^2









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: __domvig20.dgn__	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	33	185, ETC.	CR 352, ETC.
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	LRD	WEBB		121
4-98 7-20				

20C

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. 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.

2.

3.

4.

5.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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. Texas Horned Lizard - The Contractor will avoid harvester ant mound in the selection of PSLs where feasible
2. Texas Tortoise -The Contractor should cover utility trenches overnight, and should visually inspect all trenches before filling.
3. Reticulated Collared Lizard - This lizard may potentially occur in the project area. The Contractor shall avoid harming or handeling this species.
4. Texas Indigo Snake - This snake may potentially occur in the project area. The Contractor shall avoid harming or handeling this species.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

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

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

☐ Yes ☒ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

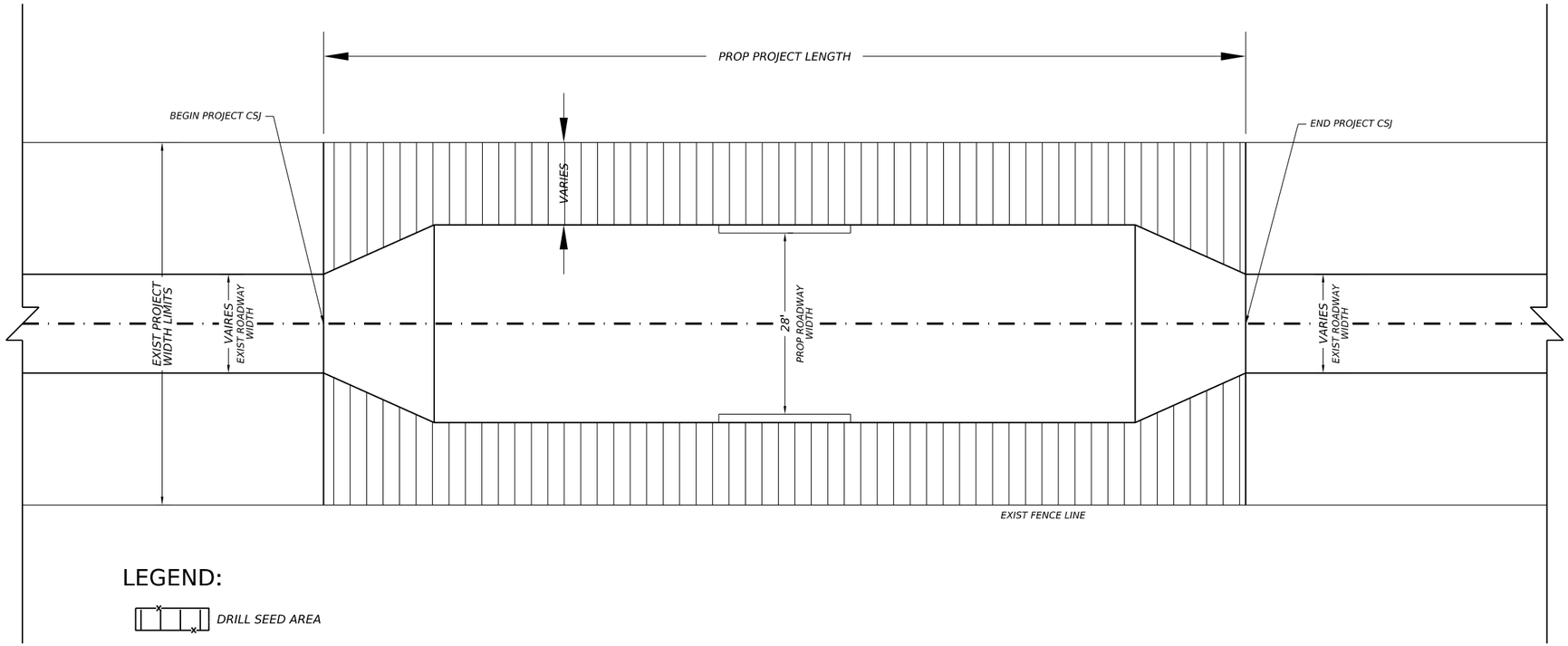
EPIC

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.	0922	33	185, ETC.	CR 352, ETC	
	DIST	COUNTY		SHEET NO.	
	22	Webb		122	

DATE:4/9/2024
FILE:ED101087-EPIC.dgn

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



LEGEND:

DRILL SEED AREA

NOTES:

1. FOR SOIL STABILIZATION ITEMS SPECIFIED ON THIS SHEET, REFER TO "REVEGETATION NOTES AND SPECIFICATIONS" FOR ADDITIONAL INSTRUCTIONS.
2. REFER TO TEMPORARY EROSION, SEDIMENT, AND WATER POLLUTION CONTROL MEASURES EC STANDARDS FOR RELATING TO INSTALLATION AND MAINTENANCE OF TEMPORARY EROSION CONTROL.
3. IDENTIFIED SEDIMENT CONTROL DEVICES SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. FOR PIPE, BRIDGE AND BOX CULVERT LOCATION REFER TO "SW3P DETAIL" SHEET FOR ADDITIONAL DETAILS.
5. QUANTITIES DEPICTED HERE MAY BE ADJUSTED TO MEET EXISITNG FIELD CONDITIONS.

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER
3/28/2024

REV. NO	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

SW3P LAYOUT DETAIL

SCALE: N.T.S.

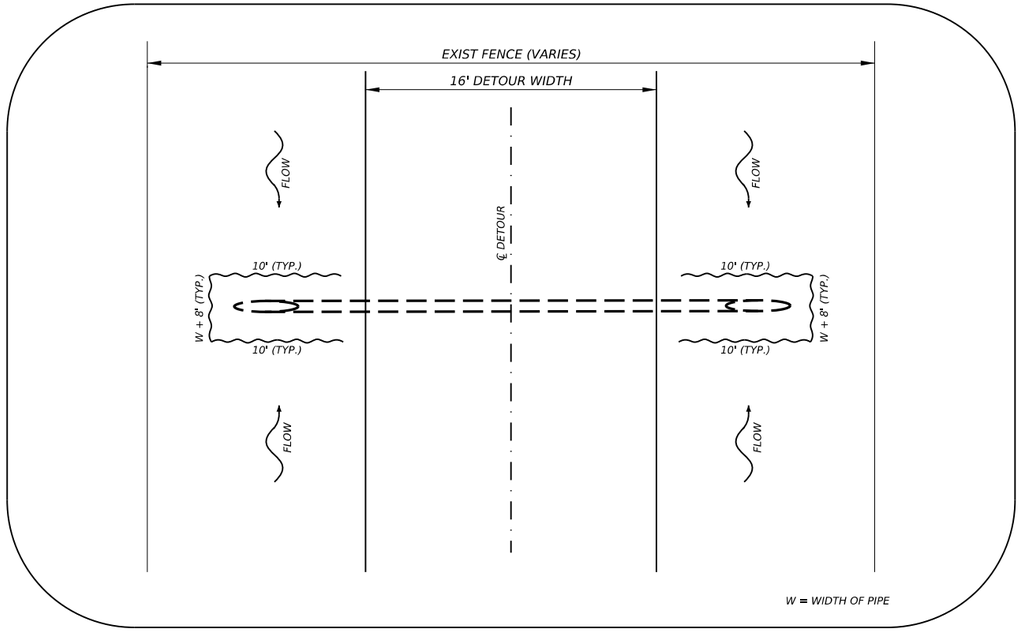
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		123

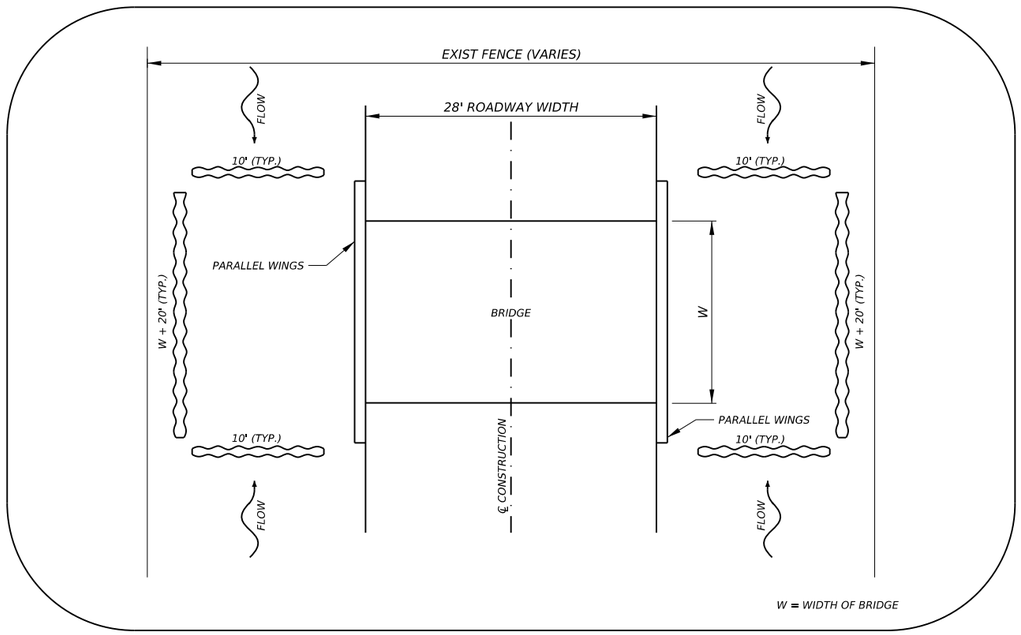
DATE: 3/28/2024 3:25:49 PM
FILE: ...\Miscellaneous\SW3P\SW3P LAYOUT

100% SUBMITTAL

DN:	CF	CK:	RW	DW:	MG	CK:	RW



SILT FENCE DETAIL FOR PIPES
DETOUR



ROCK FILTER DAM DETAIL FOR BRIDGE AND RELIEFS
ROADWAY

LEGEND

ROCK FILTER DAM TYPE 3

SEDIMENT CONTROL FENCE

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

REV. NO.	DATE	REVISION	BY

AtkinsRéalis
TBPE REG. # F-474

Texas Department of Transportation

SW3P
DETAIL

SCALE: N.T.S.

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	33	185, ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		124

DATE: 3/28/2024 3:25:49 PM
FILE: ...\Miscellaneous\SW3P\SW3P LAYOUT

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0922-33-185

1.2 PROJECT LIMITS:

From: LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (SOUTH)

To:

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 27°47'53.62"N ,(Long) 99°37'59.82"N

END: (Lat) 27°47'56.01"N ,(Long) 99°38'0.68"N

1.4 TOTAL PROJECT AREA (Acres): 0.41

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.41

1.6 NATURE OF CONSTRUCTION ACTIVITY:

REPLACEMENT OF EXISTING BRIDGE AND APPROACHES, GRADING, FLEX BASE & SURFACE, AND MBGF

1.7 MAJOR SOIL TYPES:

Soil Type	Description
CaB	Catarina clay, 0 to 2 percent slopes

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
Storage Areas, Field Offices, Staging Areas, Etc.	TBD

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 2.3.)

☒ 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: REMOVE EXISTING BRIDGE
☒ Other: INSTALL PROPOSED BRIDGE
☐ 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
☒ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
☐ 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
Santa Isabel Ck Branch	Unclassified Tributary of Rio Grande River, Segment #2304

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☐ Other:
☐ Other:

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☐ Other:
☐ Other:
☐ Other:

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		125
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION 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: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

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
Stone Riprap	13+21.00	13+67.00

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
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☐ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 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 2.3 of this SWP3 .

2.10 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 2.3 of this SWP3.

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		126
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0922-33-196

1.2 PROJECT LIMITS:

From: LAS TIENDAS RD AT SANTA ISABEL CK BRANCH (NORTH)

To:

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 27°52'43.64"N ,(Long) 99°38'28.83"N

END: (Lat) 27°52'46.51"N ,(Long) 99°38'28.77"N

1.4 TOTAL PROJECT AREA (Acres): 0.74

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.74

1.6 NATURE OF CONSTRUCTION ACTIVITY:

REPLACEMENT OF EXISTING BRIDGE AND APPROACHES, GRADING, FLEX BASE & SURFACE, AND MBGF

1.7 MAJOR SOIL TYPES:

Soil Type	Description
CfA 82%	Catarina Clay, 0 to 1 percent slopes, occasionally flooded
PaB 18%	Palafox Clay loam, 0 to 3 percent slopes

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:

X PSLs determined during preconstruction meeting
X PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s
Storage Areas, Field Offices, Staging Areas, Etc.	TBD

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 2.3.)

X Mobilization X
X Install sediment and erosion controls
X Blade existing topsoil into windrows, prep ROW, clear and grub
X Remove existing pavement
X Grading operations, excavation, and embankment
X Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☐ Remove existing metal beam guard fence (MBGF), bridge rail
X Install proposed pavement per plans
X Install culverts, culvert extensions, SETs
X Install mow strip, MBGF, bridge rail
X Place flex base
X Rework slopes, grade ditches
X Blade windrowed material back across slopes
X Revegetation of unpaved areas
X Achieve site stabilization and remove sediment and erosion control measures
X Other: REMOVE EXISTING BRIDGE
X Other: INSTALL PROPOSED BRIDGE
☐ Other:

1.10 POTENTIAL POLLUTANTS AND SOURCES:

X Sediment laden stormwater from stormwater conveyance over disturbed area
X Fuels, oils, and lubricants from construction vehicles, equipment, and storage
X Solvents, paints, adhesives, etc. from various construction activities
X Transported soils from offsite vehicle tracking
X Construction debris and waste from various construction activities
X Contaminated water from excavation or dewatering pump-out water
X Sanitary waste from onsite restroom facilities
X Trash from various construction activities/receptacles
X Long-term stockpiles of material and waste
X Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
☐ 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
Santa Isabel Ck Branch	Unclassified Tributary of Rio Grande River, Segment #2304

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

X Development of plans and specifications
X Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
☐ Other:
☐ Other:

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
☐ Other:
☐ Other:
☐ Other:

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		127
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION 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: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

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
Stone Riprap	12+60.00	13+22.00

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
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☐ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 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 2.3 of this SWP3 .

2.10 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 2.3 of this SWP3.

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		128
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0922-33-187

1.2 PROJECT LIMITS:
From: KREUGER RD AT JABONCILLO CK BRANCH

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 28°5'48.48"N ,(Long) 99°25'16.88"W

END: (Lat) 28°5'46.90"N ,(Long) 99°25'13.71"W

1.4 TOTAL PROJECT AREA (Acres): 0.47

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.47

1.6 NATURE OF CONSTRUCTION ACTIVITY:
REPLACEMENT OF EXISTING BRIDGE AND APPROACHES, GRADING, FLEX BASE & SURFACE, AND MBGF

1.7 MAJOR SOIL TYPES:

Soil Type	Description
DsB 49%	Dilley fine sandy loam, 0 to 3 percent slopes
DvB 51%	Duval very fine sandy loam, 0 to 3 percent slopes

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
Storage Areas, Field Offices, Staging Areas, Etc.	TBD

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 2.3.)
☒ 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: REMOVE EXISTING BRIDGE
☒ Other: INSTALL PROPOSED BRIDGE
☐ 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
☒ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
☐ 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
Jaboncillo Ck Branch	Unclassified Tributary of Rio Grande River, Segment #2304

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT
☒ Development of plans and specifications
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☐ Other:
☐ Other:

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR
☒ Day To Day Operational Control
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☐ Other:
☐ Other:
☐ Other:

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER
3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		129
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION 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

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
Stone Riprap	14+72.00	14+99.00

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
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☐ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 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 2.3 of this SWP3 .

2.10 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 2.3 of this SWP3.

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		130
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0922-33-197

1.2 PROJECT LIMITS:
From: VAQUILLAS RD AT AGUA AZUL CK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 27°21'50.18"N ,(Long) 99°1'48.00"W

END: (Lat) 27°21'52.85"N ,(Long) 99°1'49.79"W

1.4 TOTAL PROJECT AREA (Acres): 0.47

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.47

1.6 NATURE OF CONSTRUCTION ACTIVITY:
REPLACEMENT OF EXISTING BRIDGE AND APPROACHES, GRADING, FLEX BASE & SURFACE, AND MBGF

1.7 MAJOR SOIL TYPES:

Soil Type	Description
MCE	Maverick-Catarina complex, gently rolling

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
Storage Areas, Field Offices, Staging Areas, Etc.	TBD

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 2.3.)
☒ 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: REMOVE EXISTING BRIDGE
☒ Other: INSTALL PROPOSED BRIDGE
☐ 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
☒ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
☐ 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
Agua Azul Ck	Unclassified Tributary of Rio Grande River, Segment #2304

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT
☒ Development of plans and specifications
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☐ Other:
☐ Other:

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR
☒ Day To Day Operational Control
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☐ Other:
☐ Other:
☐ Other:

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		131
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

STORMWATER POLLUTION PRVENTION 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: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

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
Stone Riprap	12+27.00	12+96.00

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
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☐ Dust Control
- ☒ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 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 2.3 of this SWP3 .

2.10 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 2.3 of this SWP3.

STATE OF TEXAS
REESE WILLIAMS
106385
LICENSED
PROFESSIONAL ENGINEER

3/28/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024 (920)		132
STATE	STATE DIST.	COUNTY	
TEXAS	LRD	WEBB	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	33	185, ETC.	CR 352, ETC.

CK
DW
CK
DW

DRILL SEEDING WITH STRAW/HAY MULCH
PREFERRED RURAL/SMALL URBAN SEEDING METHOD

RECOMMENDED USES:
PERMANENT SEEDING (BARE SOIL)
(YEAR-ROUND)

REQUIRED BID ITEMS:

164 6001 DRILL SEEDING (PERM) (RURAL) (SANDY)
OR
164 6003 DRILL SEEDING (PERM) (RURAL) (CLAY)
OR
164 6005 DRILL SEEDING (PERM) (URBAN) (SANDY)
OR
164 6007 DRILL SEEDING (PERM) (URBAN) (CLAY)
AND
164 6045 STRAW OR HAY MULCHING
AND

CONSTRUCTION SEQUENCE:

■ Refer to Items 162 & 164 of the Texas Standard Specifications for Construction of Highways, Streets, and Bridges 2014 for specifications, dimensions, volumes and measurements that have been modified or not shown.

1. Distribute topsoil
Refer to Item 160 for instructions and requirements. Uniformly distribute topsoil at a thickness of 6 inches unless otherwise specified in the plans.

2. Prepare seed bed
Refer to section 164.3 for instructions.

3. Apply seed mixture
Refer to Item 164 for instructions. Refer to "Seed Mix" shown on sheet 2 of 2 for a list of species and rates.

4. Apply fertilizer
Refer to Item 166 for instructions.

5. Apply straw/hay mulch & emulsion
Refer to section 164.3.E for instructions.
Anchor mulch with emulsion (SS-1, CSS-1, MS-2, CMS-2); undiluted, at the following rates:
Hay - 0.15 gallons/sy
Straw - 0.30 gallons/sy

*Vegetative watering is not required unless otherwise specified in the general notes under Item 168.

STRAW/HAY MULCH SEEDING
PREFERRED RURAL/SMALL URBAN SEEDING METHOD

RECOMMENDED USES:
- PERMANENT SEEDING (BARE SOIL)(YEAR-ROUND)
- TEMPORARY SEEDING (BARE SOIL)(YEAR-ROUND)

REQUIRED BID ITEMS:

164 6013 STRAW / HAY MLCH SEED (PERM) (RURAL) (SANDY)
OR
164 6015 STRAW / HAY MLCH SEED (PERM) (RURAL) (CLAY)
OR
164 6017 STRAW / HAY MLCH SEED (PERM) (URBAN) (SANDY)
OR
164 6019 STRAW / HAY MLCH SEED (PERM) (URBAN) (CLAY)
OR
164 6029 STRAW / HAY MLCH SEED (TEMP) (WARM)
OR
164 6031 STRAW / HAY MLCH SEED (TEMP) (COOL)
AND

CONSTRUCTION SEQUENCE:

■ Refer to Items 162 & 164 of the Texas Standard Specifications for Construction of Highways, Streets, and Bridges 2014 for specifications, dimensions, volumes and measurements that have been modified or not shown.

1. Distribute topsoil
Refer to Item 160 for instructions and requirements. Uniformly distribute topsoil at a thickness of 6 inches unless otherwise specified in the plans.

2. Prepare seed bed
Refer to section 164.3 for instructions.

3. Apply seed mixture
Refer to Item 164 for instructions. Refer to "Seed Mix" shown on sheet 2 of 2 for a list of species and rates.

4. Apply fertilizer
Refer to Item 166 for instructions.

5. Apply straw/hay mulch & emulsion
Refer to section 164.3.B for instructions.
Anchor mulch with emulsion (SS-1, CSS-1, MS-2, CMS-2); undiluted, at the following rates:
Hay - 0.15 gallons/sy
Straw - 0.30 gallons/sy

*Vegetative watering is not required unless otherwise specified in the general notes under Item 168.

CELLULOSE FIBER MULCH SEEDING
PREFERRED LARGE URBAN SEEDING METHOD

RECOMMENDED USES:
- TEMPORARY SEEDING (BARE SOIL)(COOL ONLY)
- OVERSEEDING PERMANENT GRASSES INTO TEMP GRASSES (YEAR-ROUND)

REQUIRED BID ITEMS:

164 6031 CELL FBR MLCH SEED (TEMP) (COOL)
OR
164 6021 CELL FBR MLCH SEED (PERM) (RURAL) (SANDY)
OR
164 6023 CELL FBR MLCH SEED (PERM) (RURAL) (CLAY)
OR
164 6025 CELL FBR MLCH SEED (PERM) (URBAN) (SANDY)
OR
164 6027 CELL FBR MLCH SEED (PERM) (URBAN) (CLAY)

CONSTRUCTION SEQUENCE:

■ Refer to Items 162 & 164 of the Texas Standard Specifications for Construction of Highways, Streets, and Bridges 2014 for specifications, dimensions, volumes and measurements that have been modified or not shown.

1. Distribute topsoil
Refer to Item 160 for instructions and requirements. Uniformly distribute topsoil at a thickness of 6 inches unless otherwise specified in the plans.

2. Prepare seed bed
Refer to section 164.3 for instructions.
Prior to seeding:
- If seeding into bare ground - till soil to a 4 inch depth.
- If seeding into temporary vegetation cover - mow at a height range of 4-7 inches.

3. Apply seed, fertilizer, mulch mixture & emulsion
Refer to Items 164 and 166 for instructions.
Refer to "Seed Mix" shown on sheet 2 of 2 for a list of species and rates.
Use the 2-step method in which the seed and less than 10% of the required mulch is applied in the first application. The remainder of the mulch and is then applied in the subsequent applications.

4. Begin vegetative watering
Initiate vegetative watering as follows:
Cool temporary vegetation - within 5 days of placing the seed.
Permanent vegetation - delay watering until after next rainfall of 1/2" or greater or as directed by the Area Engineer.

BROADCAST SEEDING

RECOMMENDED USES:
- TEMPORARY SEEDING (BARE SOIL)(COOL ONLY)
- OVERSEEDING PERMANENT GRASSES INTO TEMP GRASSES (YEAR-ROUND)

REQUIRED BID ITEMS:

164 6011 BROADCAST SEED (TEMP) (COOL)
OR
164 6001 BROADCAST SEED (PERM) (RURAL) (SANDY)
OR
164 6003 BROADCAST SEED (PERM) (RURAL) (CLAY)
OR
164 6005 BROADCAST SEED (PERM) (URBAN) (SANDY)
OR
164 6007 BROADCAST SEED (PERM) (URBAN) (CLAY)

CONSTRUCTION SEQUENCE:

■ Refer to Items 162 & 164 of the Texas Standard Specifications for Construction of Highways, Streets, and Bridges 2014 for specifications, dimensions, volumes and measurements that have been modified or not shown.

1. Distribute topsoil
Refer to Item 160 for instructions and requirements. Uniformly distribute topsoil at a thickness of 6 inches unless otherwise specified in the plans.

2. Prepare seed bed
Refer to section 164.3 for instructions.
Prior to seeding:
- If seeding into bare ground - till soil to a 4 inch depth.
- If seeding into temporary vegetation cover - mow at a height range of 4-7 inches.

3. Apply seed mixture
Refer to Items 164 and 166 for instructions.
Refer to "Seed Mix" shown on sheet 2 of 2 for a list of species and rates.

4. Apply fertilizer
Refer to Item 166 for instructions.

5. Begin vegetative watering
Initiate vegetative watering as follows:
Cool temporary vegetation - within 5 days of placing the seed.
Permanent vegetation - delay watering until after next rainfall of 1/2" or greater or as directed by the Area Engineer.

DRILL SEEDING
PREFERRED RURAL/URBAN OVER-SEEDING METHOD

RECOMMENDED USES:
- OVERSEEDING PERMANENT GRASSES INTO TEMP GRASSES (YEAR-ROUND)

REQUIRED BID ITEMS:

164 6034 DRILL SEEDING (PERM) (RURAL) (SANDY)
OR
164 6036 DRILL SEEDING (PERM) (RURAL) (CLAY)
OR
164 6038 DRILL SEEDING (PERM) (URBAN) (SANDY)
OR
164 6040 DRILL SEEDING (PERM) (URBAN) (CLAY)

CONSTRUCTION SEQUENCE:

■ Refer to Items 162 & 164 of the Texas Standard Specifications for Construction of Highways, Streets, and Bridges 2014 for specifications, dimensions, volumes and measurements that have been modified or not shown.

1. Distribute topsoil
Refer to Item 160 for instructions and requirements. Uniformly distribute topsoil at a thickness of 6 inches unless otherwise specified in the plans.

2. Prepare seed bed
Refer to section 164.3 for instructions.
Prior to seeding:
- If seeding into bare ground - till soil to a 4 inch depth.
- If seeding into temporary vegetation cover - mow at a height range of 4-7 inches.

3. Apply seed mixture
Refer to Items 164 and 166 for instructions.
Refer to "Seed Mix" shown on sheet 2 of 2 for a list of species and rates.

4. Apply fertilizer
Refer to Item 166 for instructions.

5. Begin vegetative watering
Initiate vegetative watering as follows:
Cool temporary vegetation - within 5 days of placing the seed.
Permanent vegetation - delay watering until after next rainfall of 1/2" or greater.

DATE: 3/28/2024 3:26:15 PM
FILE: ...\LAREDO REVEGETATION NOTES.dgn

Texas Department of Transportation

LAREDO DISTRICT REVEGETATION NOTES AND SPECIFICATIONS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	33	185,ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		133

CK:
DW:
CK:
DW:

PERMANENT SOIL STABILIZATION

PERMANENT SEED MIX

January 15 thru May 1

RURAL

Clay Soils	*
Green Sprangletop (Van Horn)	1.0
Sideoats Grama (South Texas)	1.0
Texas Grama (Atascosa)	1.0
Slender Grama (Dilley)	1.0
Shortspike Windmillgrass (Welder)	0.2
Pink Pappusgrass (Maverick)	0.6
Halls Panicum (Oso)	0.2
Plains Bristlegrass(Catarina Blend)	0.2
False Rhodes Grass (Kinney)	0.1
Hooded Windmillgrass (Mariah)	0.2
Arizona Cottontop (La Salle)	0.2

Sandy Soils	*
Green Sprangletop (Van Horn)	1.0
Slender Grama (Dilley)	1.0
Shortspike Windmillgrass (Welder)	0.2
Pink Pappusgrass (Maverick)	0.6
Halls Panicum (Oso)	0.2
Plains Bristlegrass(Catarina Blend)	0.2
False Rhodes Grass (Kinney)	0.1
Hooded Windmillgrass (Mariah)	0.2
Arizona Cottontop (La Salle)	0.2

URBAN

Clay Soils	*
Green Sprangletop (Van Horn)	0.3
Sideoats Grama (South Texas)	4.5
Buffalograss (Texoka)	1.6
Bermudagrass	1.8

Sandy Soils	*
Green Sprangletop (Van Horn)	0.3
Buffalograss (Texoka)	1.6
Bermudagrass	3.6
Sand Dropseed	0.4

May 2 thru August 31

RURAL

Clay Soils	*
Green Sprangletop (Van Horn)	0.3
Sideoats Grama (South Texas)	3.6
Plains Bristlegrass(Catarina Blend)	1.2
Buffalograss (Texoka)	1.6
Bermudagrass	1.2
Illinois Bundleflower	1.0
Foxtail Millet	9.0

Sandy Soils	*
Green Sprangletop (Van Horn)	0.3
Bermudagrass	0.6
Sand Dropseed	0.4
Lehmans Lovegrass	0.2
Purple Prairieclover	0.5
Foxtail Millet	9.0

URBAN

Clay Soils	*
Green Sprangletop (Van Horn)	0.3
Sideoats Grama (South Texas)	4.5
Buffalograss (Texoka)	1.6
Bermudagrass	1.2
Foxtail Millet	9.0

Sandy Soils	*
Green Sprangletop (Van Horn)	0.3
Bermudagrass	0.8
Buffalograss (Texoka)	3.2
Sand Dropseed	0.3
Foxtail Millet	9.0

September 1 thru January 14

RURAL

Clay Soils	*
Green Sprangletop (Van Horn)	0.3
Sideoats Grama (South Texas)	3.6
Plains Bristlegrass(Catarina Blend)	0.2
Buffalograss (Texoka)	1.6
Bermudagrass	1.2
Illinois Bundleflower	1.0
Oats	40.0

Sandy Soils	*
Green Sprangletop (Van Horn)	1.0
Bermudagrass	0.6
Sand Dropseed	0.2
Lehmans Lovegrass	0.2
Purple Prairieclover	0.5
Oats	40.0

URBAN

Clay Soils	*
Green Sprangletop (Van Horn)	0.3
Sideoats Grama (South Texas)	4.5
Buffalograss (Texoka)	1.6
Bermudagrass	1.8
Oats	40.0

Sandy Soils	*
Green Sprangletop (Van Horn)	0.3
Bermudagrass	0.8
Buffalograss (Texoka)	3.2
Sand Dropseed	0.3
Oats	40.0

* SEED QUANTITIES ARE POUNDS PURE LIVE SEED (PLS) PER ACRE.

TEMPORARY SOIL STABILIZATION

TEMPORARY SEED MIX

February 15 thru September 31

WARM SEASON

Foxtail Millet	34.0 Lbs PLS/Acre

October 1 thru February 14

COOL SEASON

Oats	72.0

VEGETATIVE WATERING FOR SEED AND SOD

ITEM 168---VEGETATIVE WATERING

RURAL---NO VEGETATIVE WATERING

URBAN---TEMPORARY IRRIGATION---REFER TO IRRIGATION PLAN SHEETS FOR ZONE TIME.

URBAN---TRUCK IRRIGATION---REFER TO WATERING SCHEDULE BELOW:

WATERING SCHEDULE	DAYS 1-14	DAYS 15-28	DAYS 29-42	TOTAL CYCLES
Seeded Sites	Twice per day	Twice per day	Once per day	70
Sodded Sites	Twice per day	Once per day	————	42

Standard watering rate is 1/4 inch per cycle. However, rate and frequency may be adjusted, with the approval of the engineer, to meet site conditions.

SEEDING NOTES:

1. All seed shall meet labeling, delivery, analysis, and testing requirements as described in Item 164.2.
2. All drill seeding shall be accomplished using a pasture or rangeland type drill seeder. Grain drills or Brillion seeders are not acceptable. Seedbed prep is required, even for no-till drill seeders, when seeding into bare soil.
3. All seed shall be drilled to a depth of 1/4 inch to 1/3 inch.
4. Seeding with compost:
   - Prior to seeding, one inch of compost shall be applied to the soil followed by an application of fertilizer. Refer to Item 166 Fertilizer for specifications and application rate.
   - Compost/fertilizer shall be tilled into the soil to a depth of four inches. Seed into prepared seedbed.
5. Where drill seeding is specified, and site conditions prevent it, broadcast seeding is permitted as approved by the engineer.
6. CELL FIBER MULCH SEEDING shall only be used where site conditions prevent drill seeding (refer to plan sheets for type of seeding). Seeding shall be a two-step process as detailed above.
7. Vegetative watering shall be paid for under Item 168. Watering rate and specifications shall be as shown on sheet 2 of 2 under Item 168.

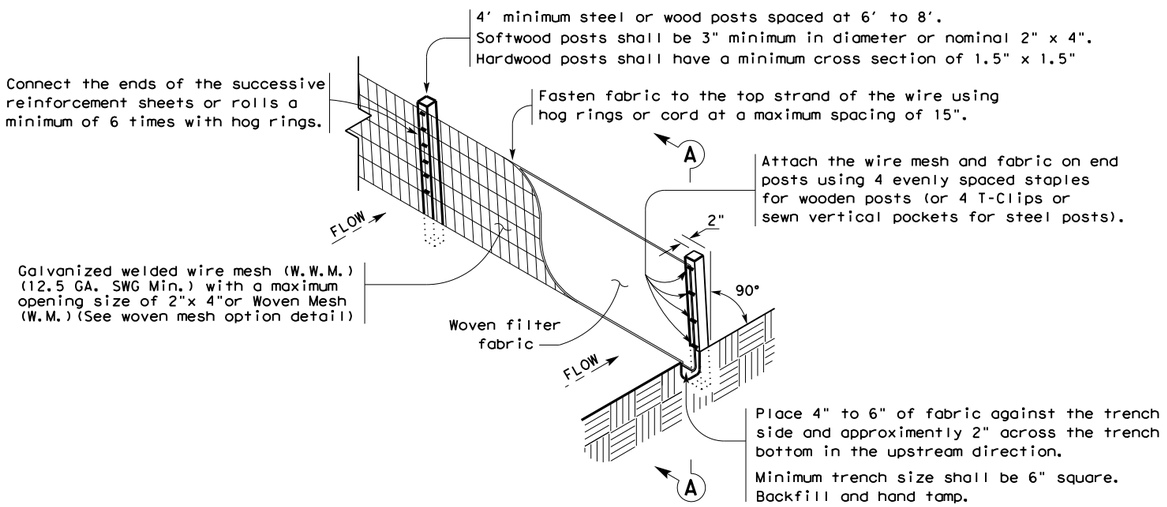
Texas Department of Transportation

LAREDO DISTRICT
REVEGETATION
NOTES AND
SPECIFICATIONS

SHEET 2 OF 2

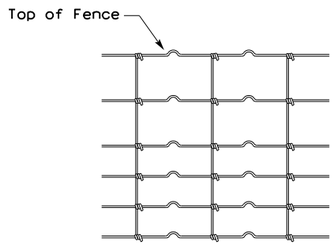
CONT	SECT	JOB	HIGHWAY
0922	33	185,ETC.	CR 352, ETC.
DIST	COUNTY		SHEET NO.
LRD	WEBB		134

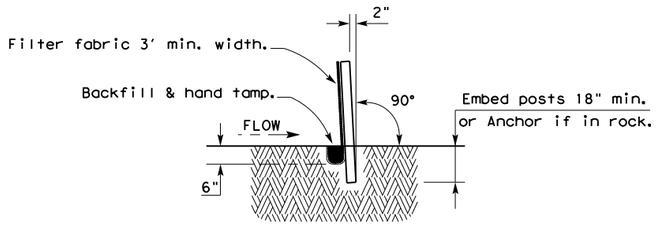
DATE: 3/28/2024 3:26:16 PM
FILE: ...\LAREDO REVEGETATION NOTES.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

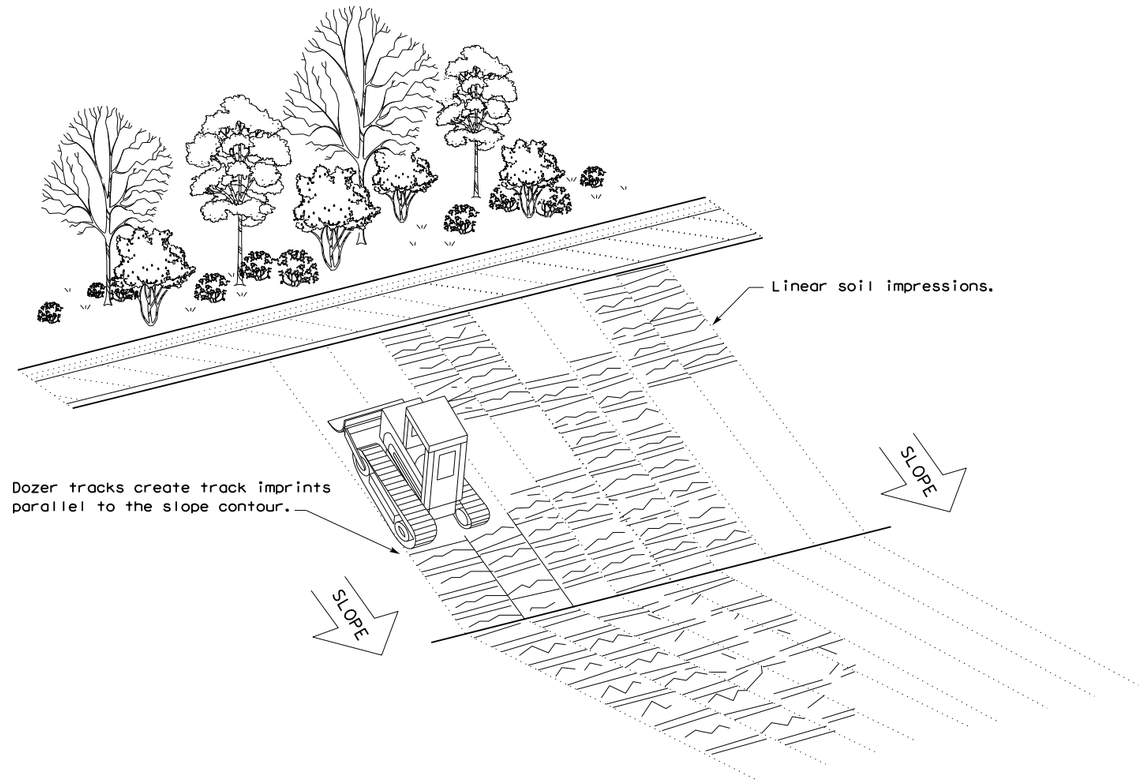
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

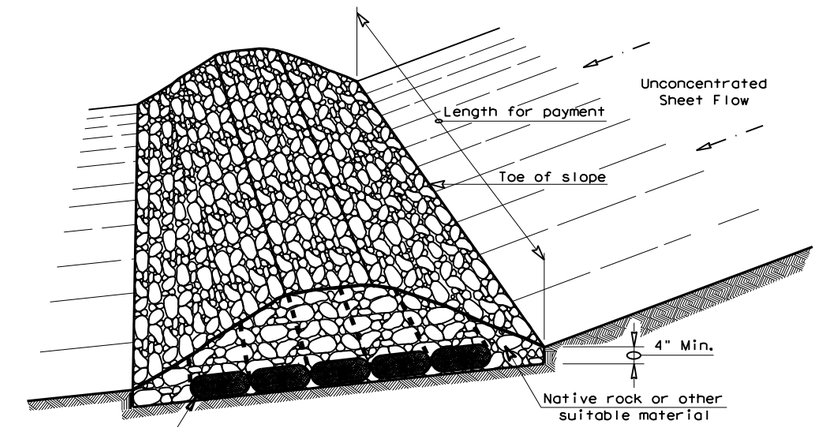
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0922	33	185, ETC.		CR 352, ETC.	
	DIST	COUNTY			SHEET NO.	
	LRD	WEBB			135	

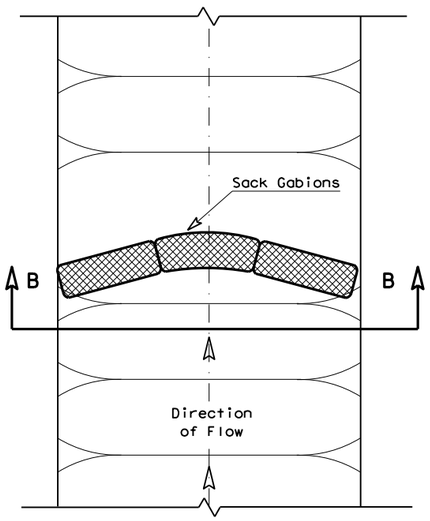
DATE
FILE

DATE:
FILE:

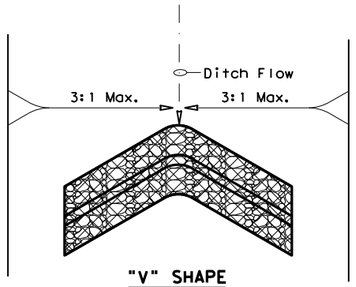


FILTER DAM AT TOE OF SLOPE

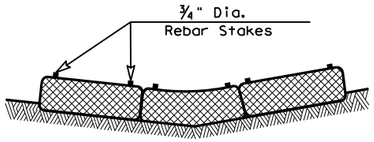
RFD1



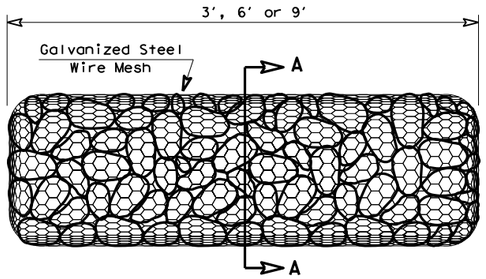
PLAN VIEW



"V" SHAPE PLAN VIEW

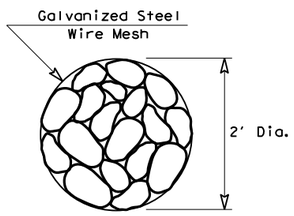


SECTION B-B

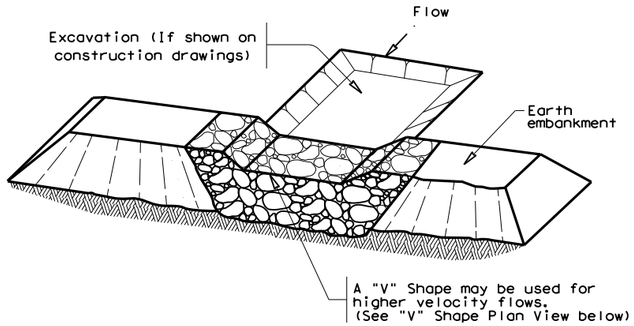


TYPE 4 (SACK GABIONS)

RFD4

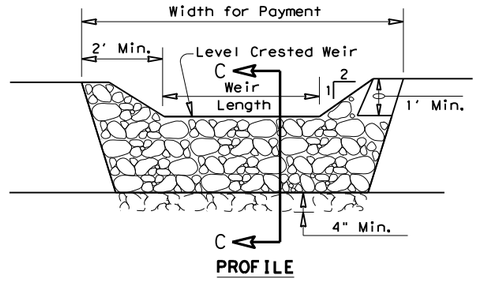


SECTION A-A

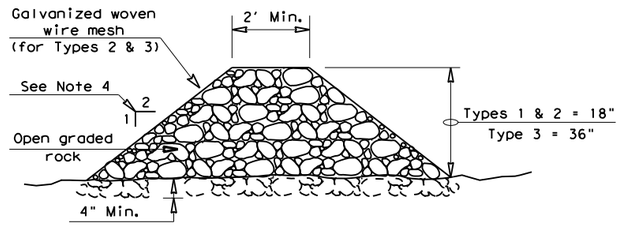


FILTER DAM AT SEDIMENT TRAP

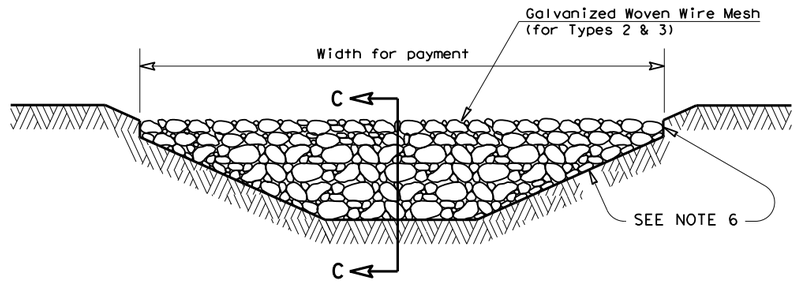
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

PLAN SHEET LEGEND

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

Texas Department of Transportation

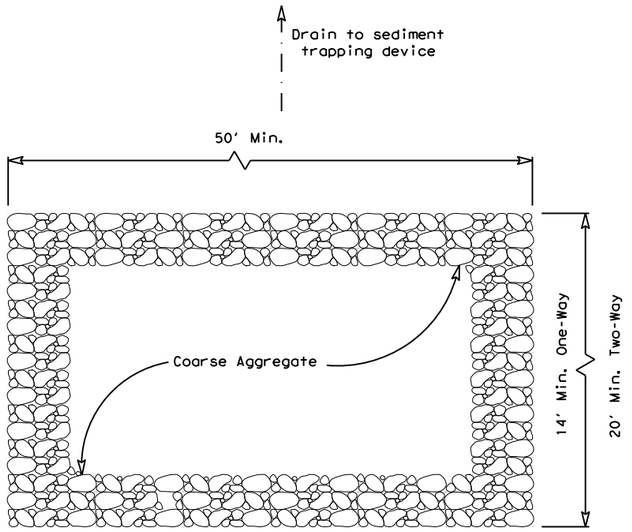
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

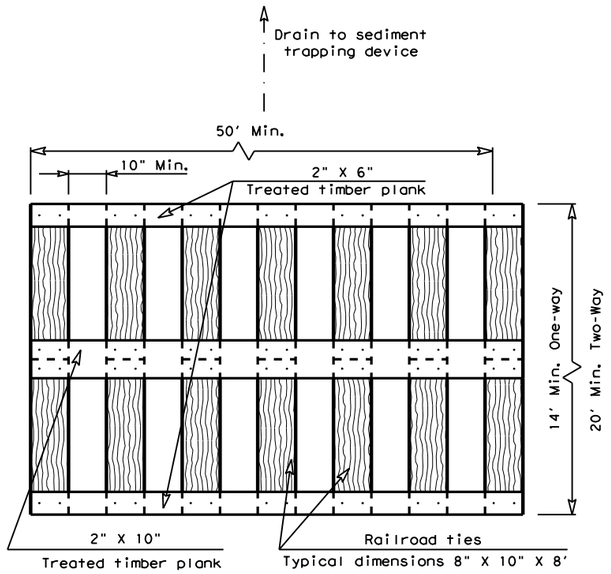
ROCK FILTER DAMS

EC(2)-16

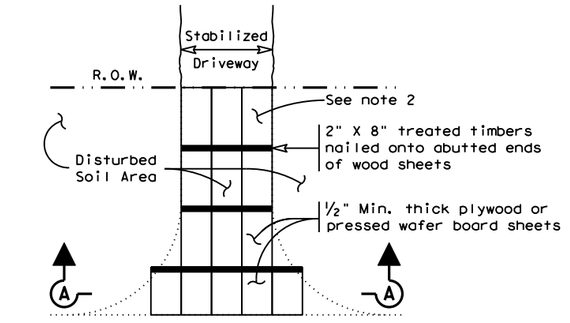
FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0922	33	185, ETC.		CR 352, ETC.	
	DIST	COUNTY			SHEET NO.	
	LRD	WEBB			136	



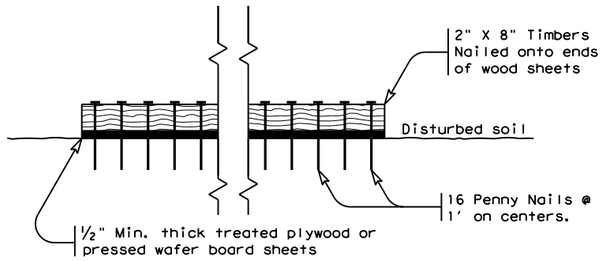
PLAN VIEW



PLAN VIEW



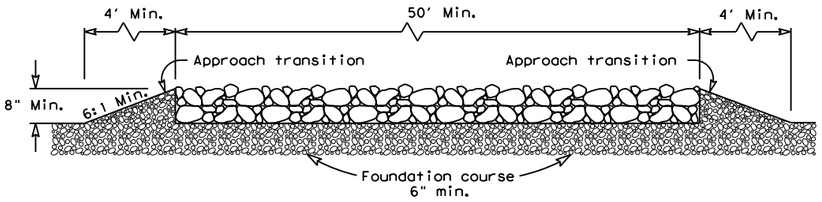
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

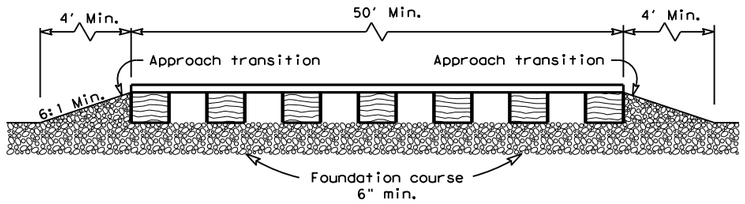
SHORT TERM



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	0922	33	185, ETC.	CR 352, ETC.
	DIST	COUNTY		SHEET NO.
	LRD	WEBB		137

DATE: 3/28/2024
FILE: ...\STDS\ec316.dgn