STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6	C 1257-1-52	1
STATE	DIST.	COUNTY
TEXAS	HOU	FORT BEND
CONT.	SECT.	JOB / HIGHWAY NO.
1257	01	052, ETC. / FM 1092

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

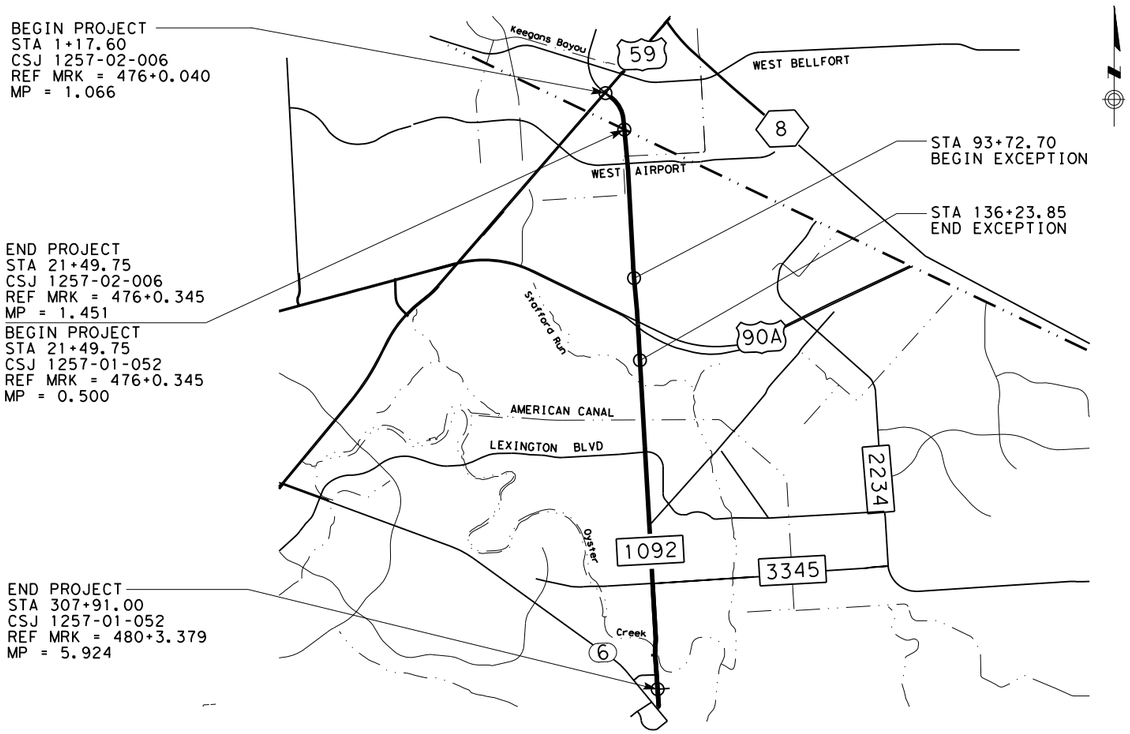
TDLR NO: TABS2022003123

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

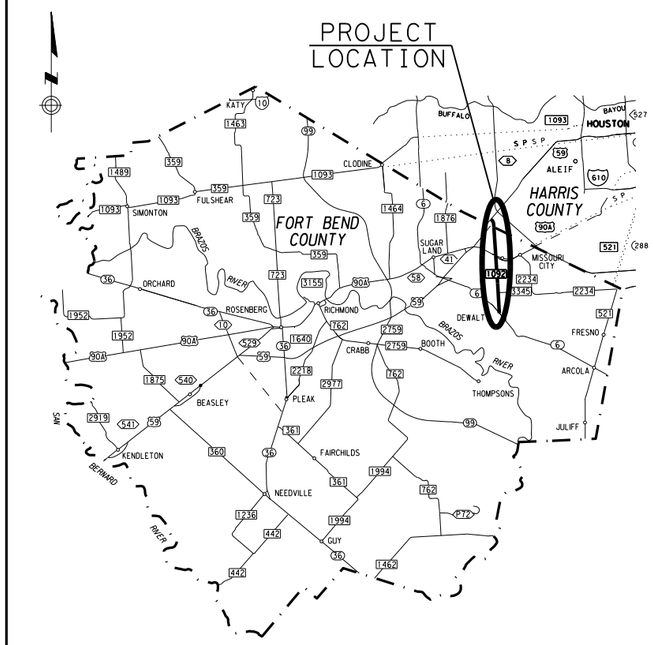
FORT BEND COUNTY
FM 1092
LIMITS: IH 69 TO SH 6
PROJECT C 1257-1-52
CONTROL 1257-01-052, ETC.

FOR THE CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING OF BASE REPAIR, 1.5" PLANING, SEAL COAT, 1" TOM OVERLAY, SIGNING & PAVEMENT MARKINGS

CSJ	ROADWAY LENGTH	BRIDGE LENGTH	TOTAL LENGTH
1257-02-006	2032.15 FT / 0.385 MI	0.00 FT / 0.000 MI	2032.15 FT / 0.385 MI
1257-01-052	23,993.99 FT / 4.544 MI	396.20 FT / 0.0750 MI	24,390.10 FT / 4.619 MI
TOTAL	26,026.14 FT / 4.929 MI	396.20 FT / 0.0750 MI	26,422.25 FT / 5.004 MI



PROJECT LAYOUT MAP
N. T. S.



VICINITY MAP
N. T. S.

FUNCTIONAL CLASSIFICATION: MINOR ARTERIAL

DESIGN SPEED = 35 MPH

CSJ	ADT (2021)	ADT (2041)
1257-02-006	32,600 VPD	40,000 VPD
1257-01-052	40,400 VPD	50,800 VPD

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND THE SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED SPECIAL LABOR PROVISION FOR STATE PROJECTS: SP000---008.

SUBMITTED FOR LETTING: 12/9/2021

DocuSigned by:
Carlos M. Zepeda, Jr., P.E.
AREA ENGINEER
999EB2AF5ACE472...

APPROVED FOR LETTING: 12/20/2021

DocuSigned by:
Larry W. Blackburn, P.E.
FOR DISTRICT ENGINEER
B9928A60F03E42F...

COUNTY FORT BEND PROJ. NO. C 1257-1-52
HWY. NO. FM 1092 LETTING DATE 03/2022
DATE ACCEPTED

	SHEET NO.	DESCRIPTION
		I. GENERAL
	1	TITLE SHEET
	2	INDEX OF SHEETS
	3-9	EXISTING TYPICAL SECTIONS
	10-16	PROPOSED TYPICAL SECTIONS
	17	INTERNATIONAL ROUGHNESS INDEX DATA
	18,18A-18J	GENERAL NOTES
	19,19A-19B	ESTIMATE AND QUANTITY SHEETS
	20,20A	SUMMARY OF ROADWAY QUANTITIES
	21,21A-21B	SUMMARY OF SIGNING & PAVEMENT MARKING QUANTITIES
	22-25	SUMMARY OF SMALL SIGNS
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*	38	TRAFFIC CONTROL PLAN TYPICAL DETAILS WZ(TD)-17
*	39	WORK ZONE "GIVE US A BRAKE" SIGNS WZ(BRK)-13
*	40	SIGNING FOR UNEVEN LANES WZ(UL)-13
*	41	TEMPORARY RUMBLE STRIPS WZ(RS)-16
*	42	WORK ZONE SHORT TERM PAVEMENT MARKINGS WZ(STPM)-13
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*	44	TCP LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS TCP(2-4)-18(MOD)
*	45	TCP MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS TCP(3-4)-13
*	46	TCP LONG TERM LANE CLOSURES ON MULTILANE CONVENTIONAL RDS TCP(2-5)-18
*	47	TCP MOBILE OPERATIONS UNDIVIDED HIGHWAYS TCP(3-1)-13
*	48	TCP MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/REMOVAL TCP(3-3)-14
*	49	DRIVEWAY SIGNING DS TC8020-04
*	50	TRAFFIC SIGNAL WORK TYPICAL DETAILS WZ(BTS-1)-13
*	51	TRAFFIC SIGNAL WORK BARRICADES AND SIGNS WZ(BTS-2)-13
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*	69	XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY MB (2)-21
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*	71	NIGP PARTS LIST AND COMPATIBILITY MB(4)-21
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*	73	METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL)TL-3 MASH COMPLIANT GF(31)DAT-19
*	74	METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT GF(31)LS-19
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*	77	METAL BEAM GUARD FENCE TRANSITION (T101) GF(31)T101-19
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	112	FM 1092 AT AIRPORT BLVD TRAFFIC SIGNAL EXISTING LAYOUT
	113	FM 1092 AT AIRPORT BLVD TRAFFIC SIGNAL PROPOSED LAYOUT
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	119-121	FM 1092 AT CASH RD TRAFFIC SIGNAL PROPOSED LAYOUT
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	129	FM 1092 AT 5TH STREET TRAFFIC SIGNAL EXISTING LAYOUT
	130	FM 1092 AT 5TH STREET TRAFFIC SIGNAL PROPOSED LAYOUT
	131	FM 1092 AT CARTWRIGHT RD TRAFFIC SIGNAL EXISTING LAYOUT
	132	FM 1092 AT CARTWRIGHT RD TRAFFIC SIGNAL PROPOSED LAYOUT
	133	FM 1092 AT EL DORADO BLVD/PLANTATION RIDGE DR TRAFFIC SIGNAL EXISTING LAYOUT
	134	FM 1092 AT EL DORADO BLVD/PLANTATION RIDGE DR TRAFFIC SIGNAL PROPOSED LAYOUT
	135	FM 1092 AT PLANTATION SETTLEMENT LN TRAFFIC SIGNAL EXISTING LAYOUT
	136	FM 1092 AT PLANTATION SETTLEMENT LN TRAFFIC SIGNAL PROPOSED LAYOUT
	137	FM 1092 AT TOWNSHIP LN TRAFFIC SIGNAL EXISTING LAYOUT
	138	FM 1092 AT TOWNSHIP LN TRAFFIC SIGNAL PROPOSED LAYOUT
	139	FM 1092 AT HAMPTON DR TRAFFIC SIGNAL EXISTING LAYOUT
	140-141	FM 1092 AT HAMPTON DR TRAFFIC SIGNAL PROPOSED LAYOUT
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*	146-148	SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
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*	160	PAVEMENT MARKINGS (WORDS, ARROWS & SYMBOLS PM(WAS)07(HOU)
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*	166	SIGNAL DETAILS-STANDARDS LOOP DETECTOR DETAILS PLACEMENT LDDP(HOU)
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* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

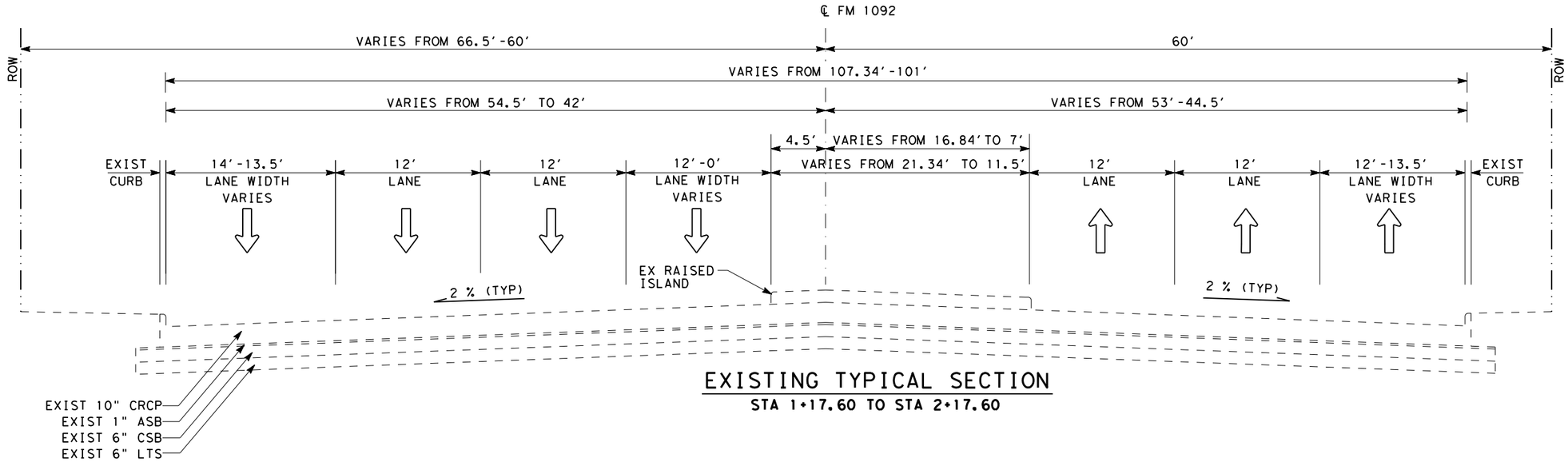
Luull, P.E

DATE 12-08-2021

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED
PROFESSIONAL ENGINEER

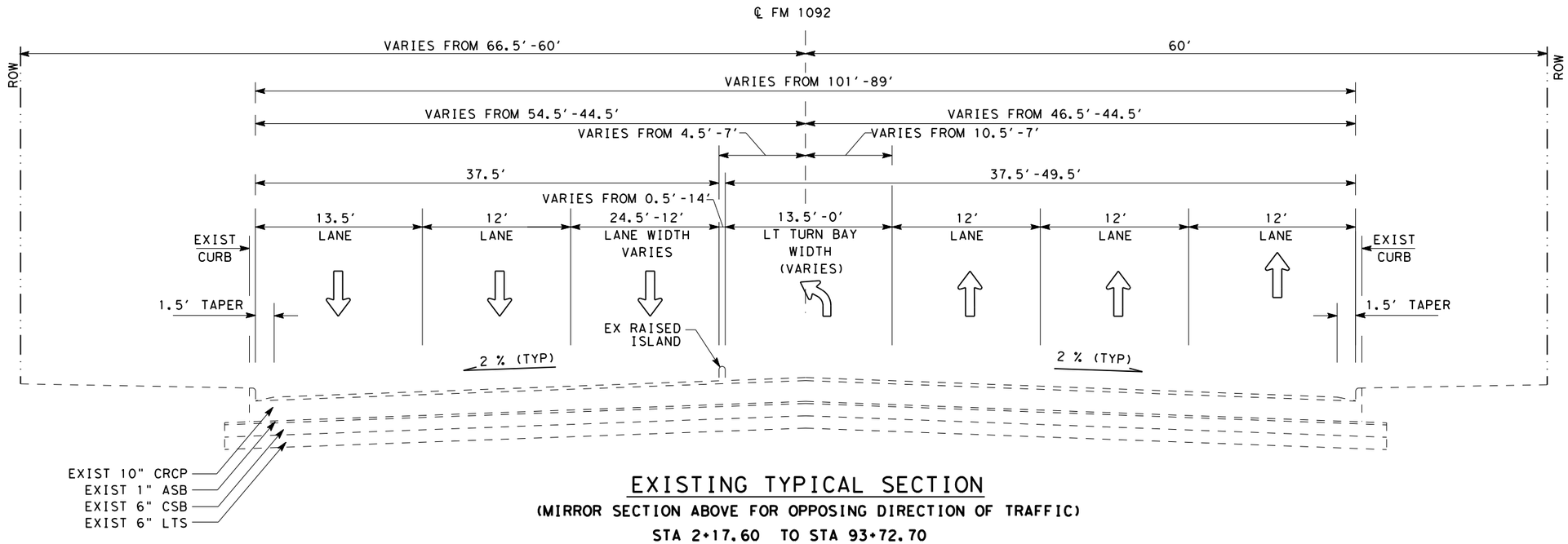
INDEX OF SHEET

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	C-1257-1-52		2
STATE	DIST.	COUNTY	
TEXAS	HOU	FORT BEND	
CONT.	SECT.	JOB	HIGHWAY NO.
1257	01	052,ETC.	FM 1092



EXISTING TYPICAL SECTION

STA 1+17.60 TO STA 2+17.60



EXISTING TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 2+17.60 TO STA 93+72.70

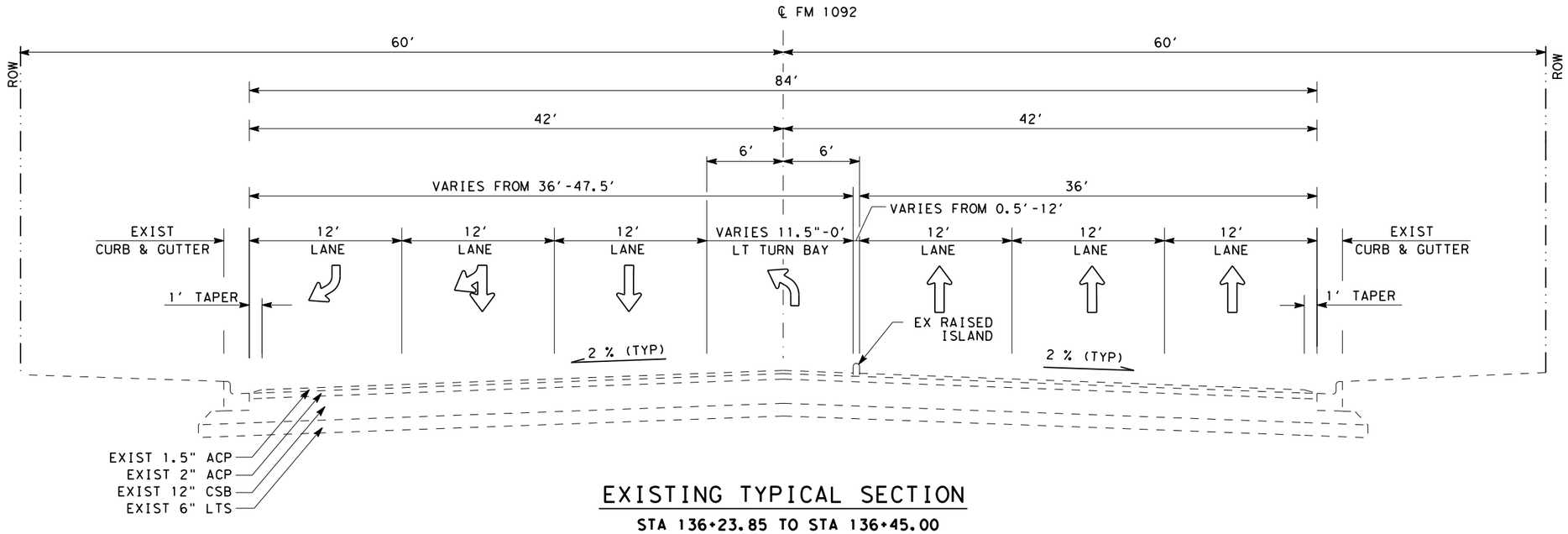
12-7-2021

EXISTING TYPICAL SECTIONS

SCALE: 1"=10'

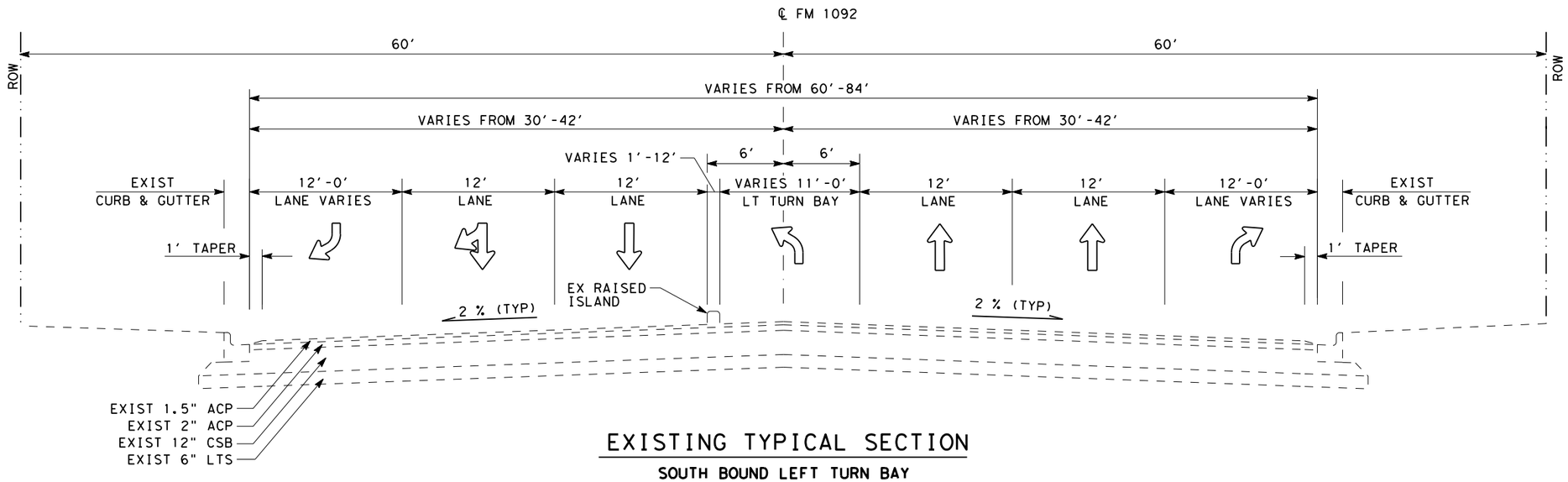
SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		3



EXISTING TYPICAL SECTION

STA 136+23.85 TO STA 136+45.00



EXISTING TYPICAL SECTION

SOUTH BOUND LEFT TURN BAY

STA 136+47.00 TO STA 139+59.00

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

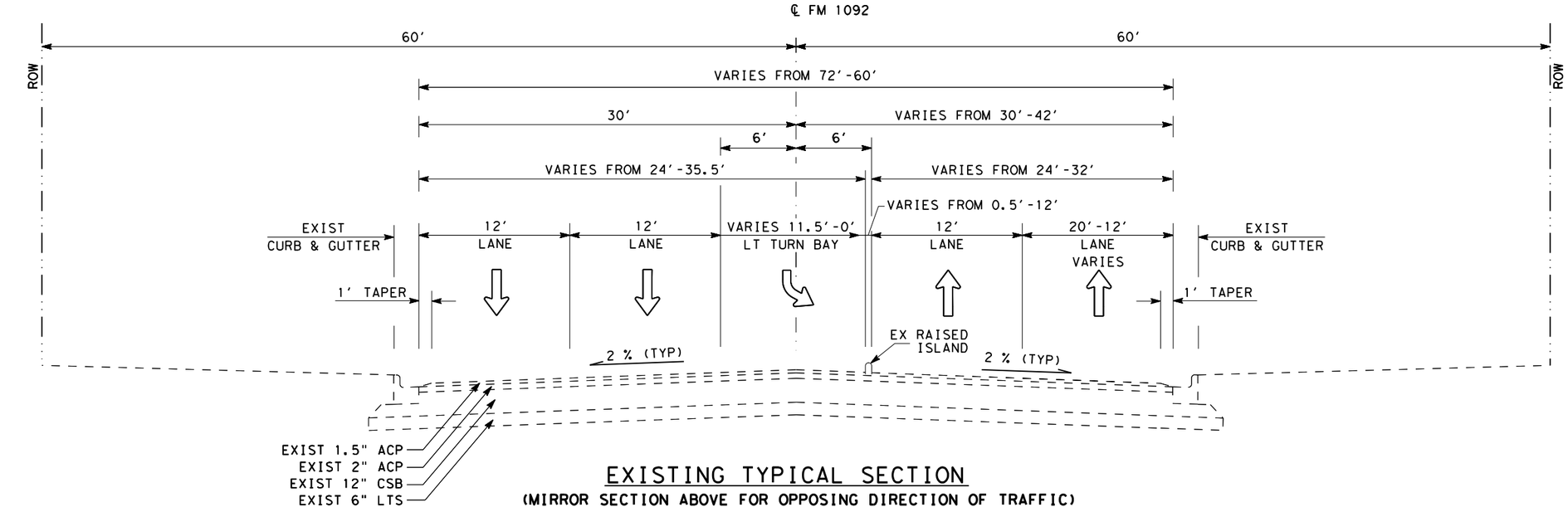
P.E

12-07-2021

EXISTING TYPICAL SECTIONS

SCALE: 1"=10′

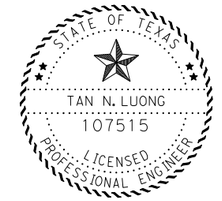
CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		4



EXISTING TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 140+75.00 TO STA 149+17.00



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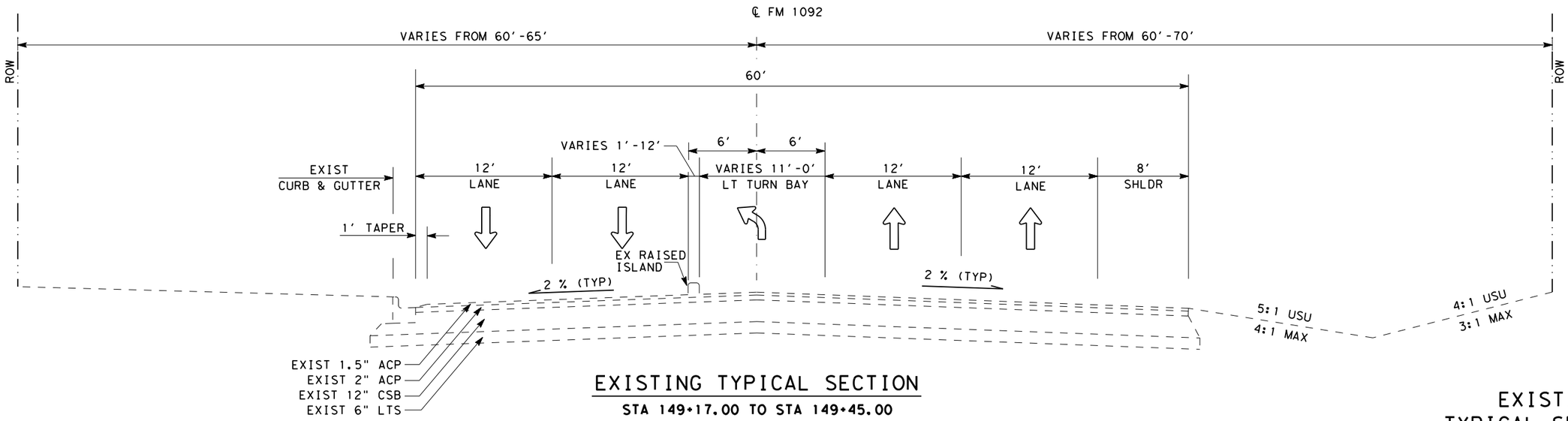
12-07-2021



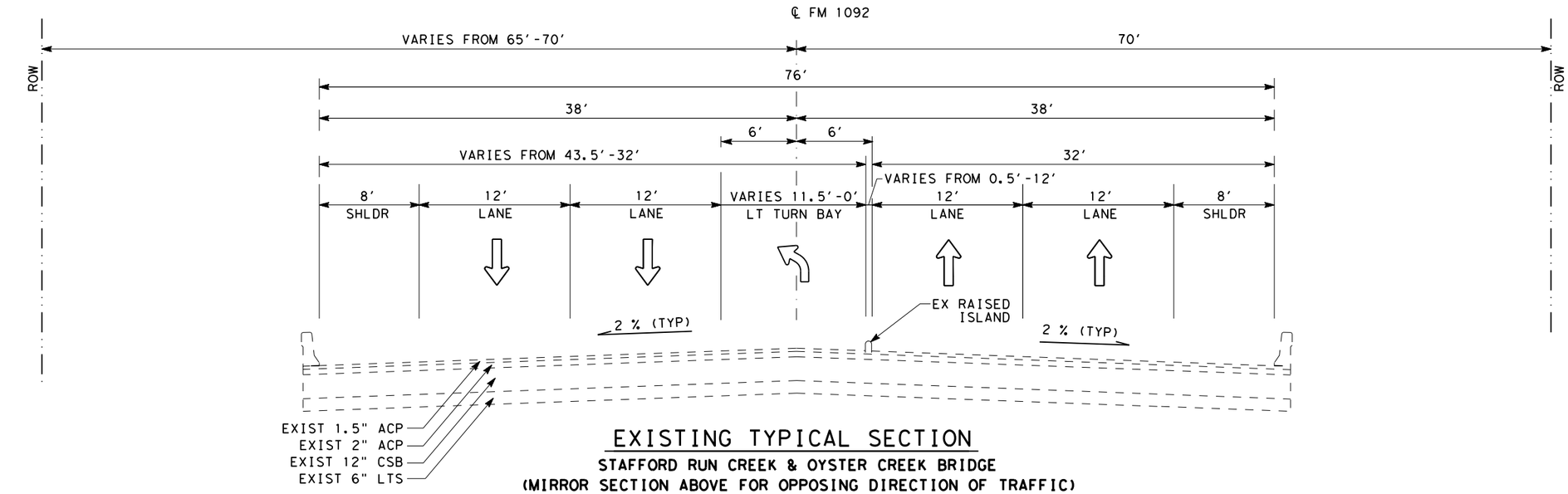
EXISTING TYPICAL SECTION

STA 149+17.00 TO STA 149+45.00

EXISTING TYPICAL SECTIONS

SCALE: 1"=10′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		5



EXISTING TYPICAL SECTION

STAFFORD RUN CREEK & OYSTER CREEK BRIDGE
(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)
STA 149+48.00 TO STA 152+37.00
STA 281+62.32 TO STA 288+34.00

STATE OF TEXAS
TAN N. LUONG
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LICENSED
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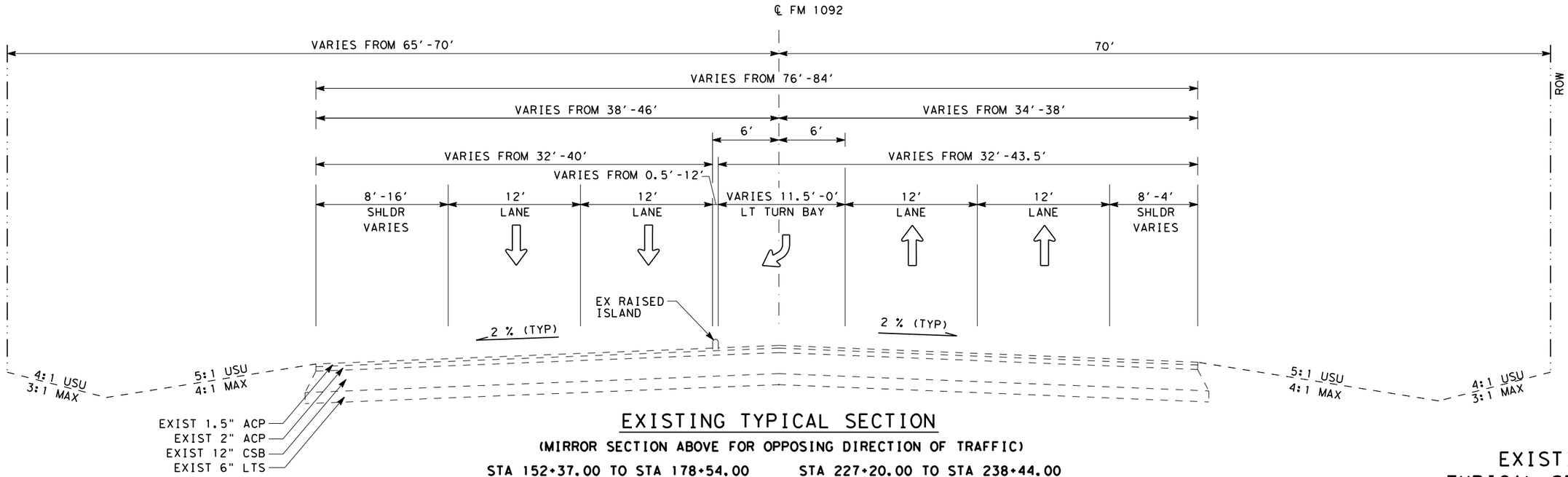
12-07-2021



EXISTING TYPICAL SECTION

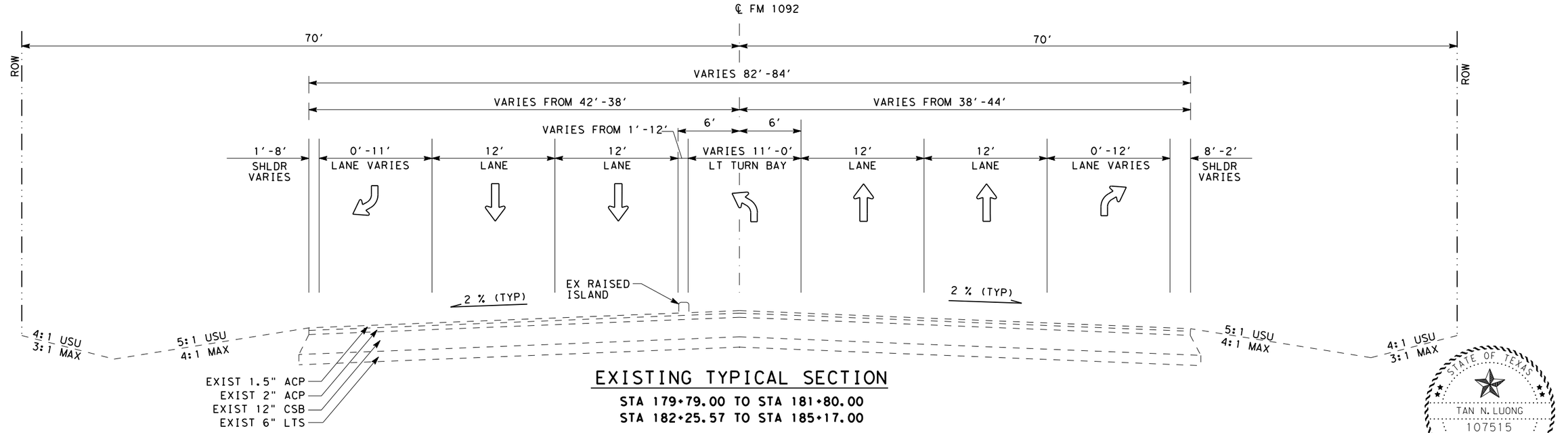
(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 152+37.00 TO STA 178+54.00
STA 181+80.00 TO STA 182+25.57
STA 190+16.50 TO STA 221+54.00
STA 227+20.00 TO STA 238+44.00
STA 259+50.00 TO STA 295+00.00
STA 299+71.00 TO STA 302+60.00

EXISTING TYPICAL SECTIONS

SCALE: 1"=10'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		6



EXISTING TYPICAL SECTION

STA 179+79.00 TO STA 181+80.00
STA 182+25.57 TO STA 185+17.00

STATE OF TEXAS
TAN N. LUONG
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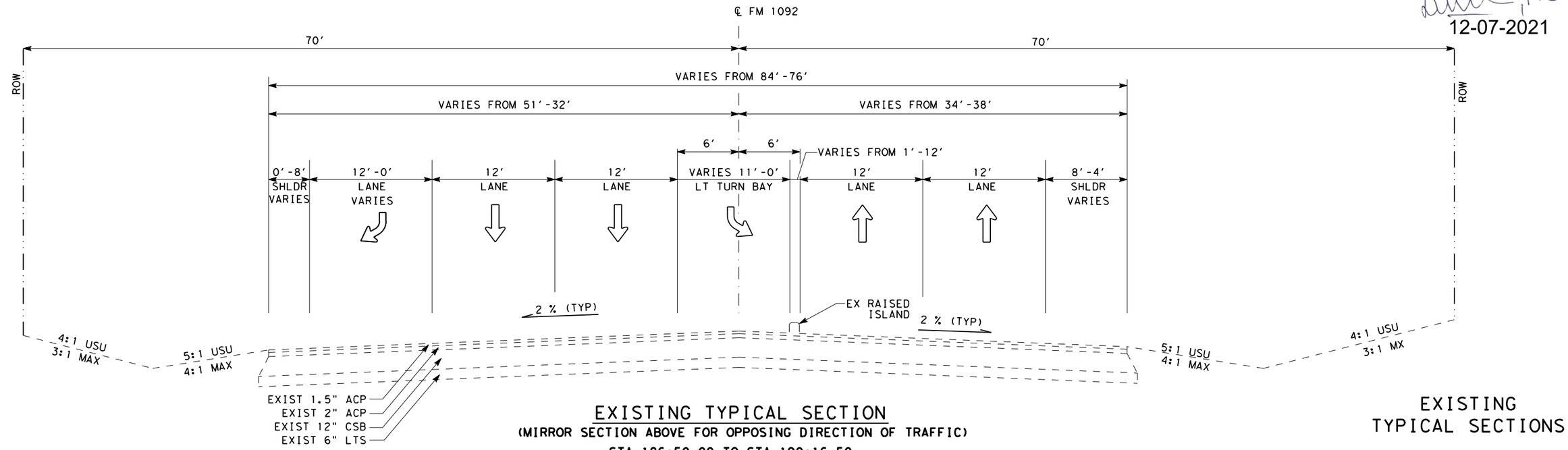
12-07-2021



EXISTING TYPICAL SECTION

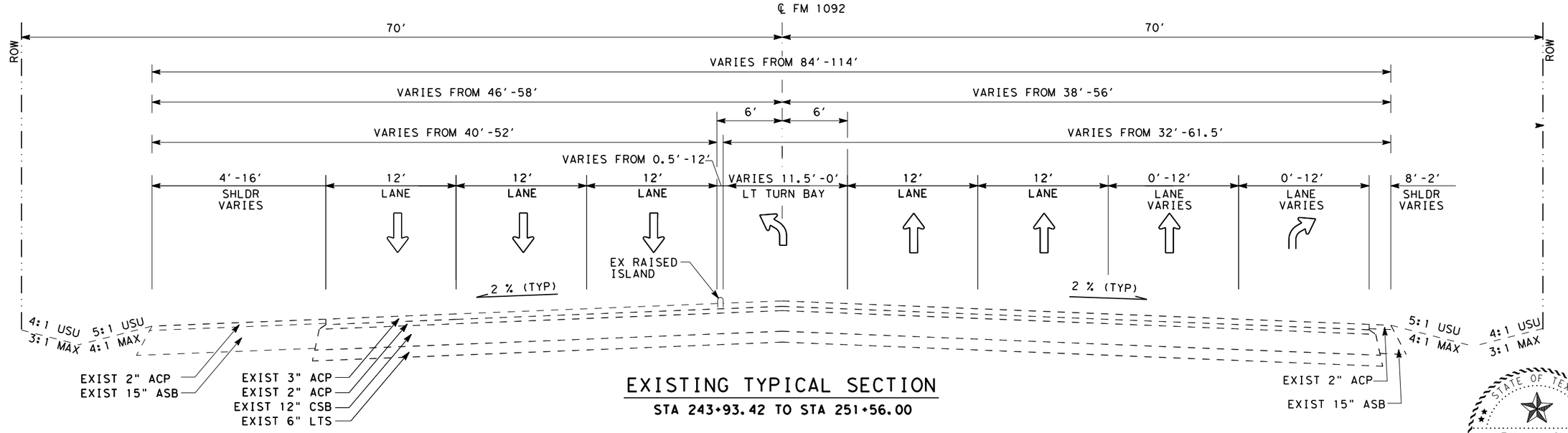
(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 186+50.00 TO STA 190+16.50
STA 222+64.00 TO STA 227+20.00
STA 239+32.00 TO STA 243+93.42
STA 295+00.00 TO STA 298+55.00

EXISTING TYPICAL SECTIONS

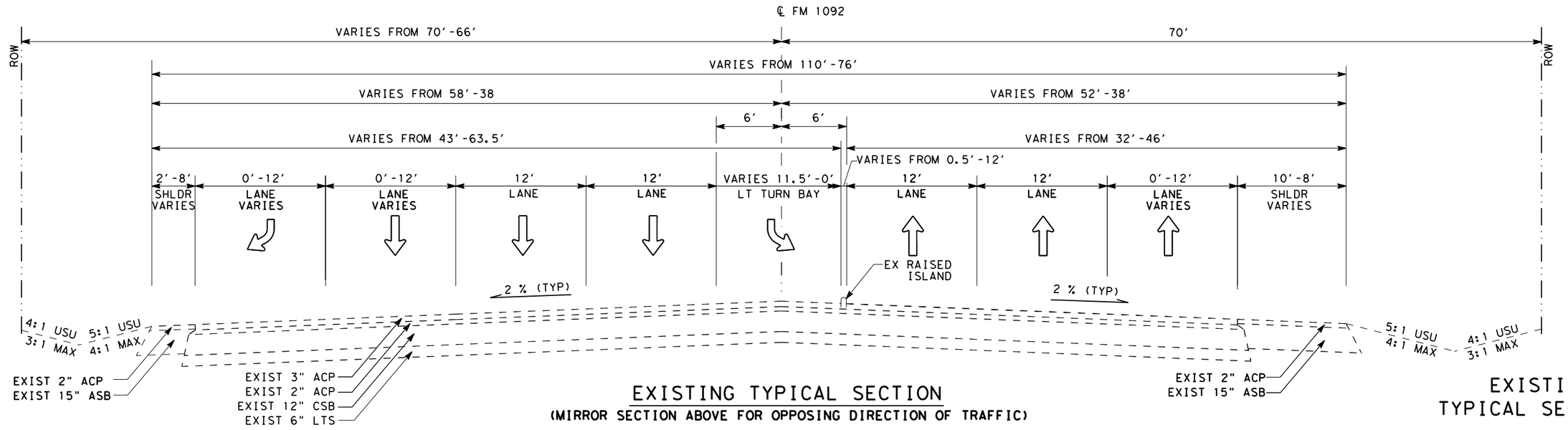
SCALE: 1"=10'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		7



EXISTING TYPICAL SECTION

STA 243+93.42 TO STA 251+56.00



EXISTING TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 252+64.00 TO STA 259+50.00

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

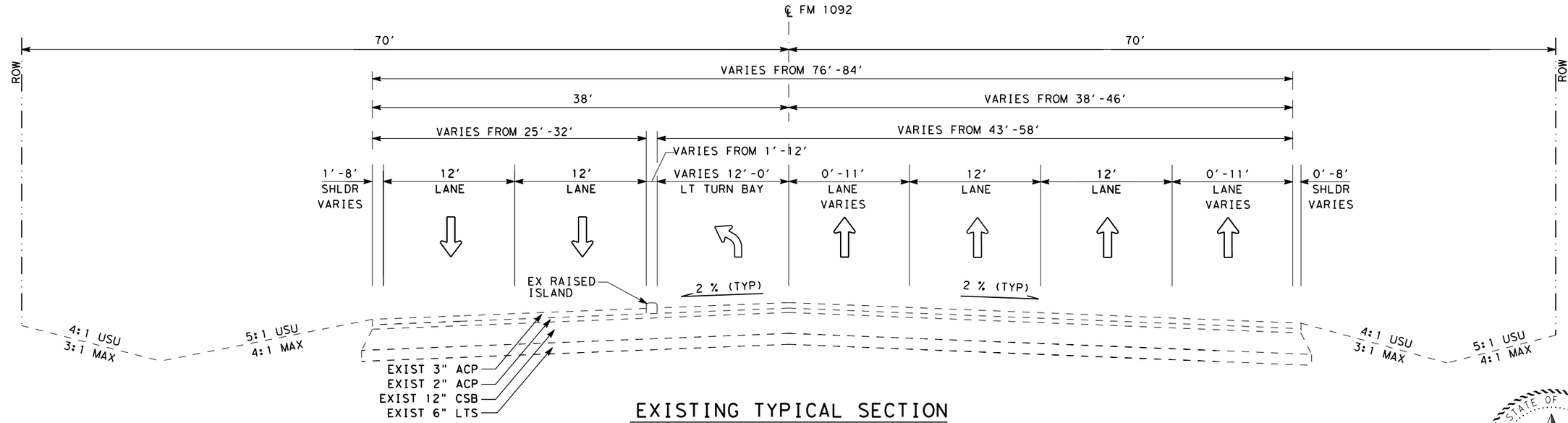
12-07-2021

EXISTING TYPICAL SECTIONS

SCALE: 1"=10'

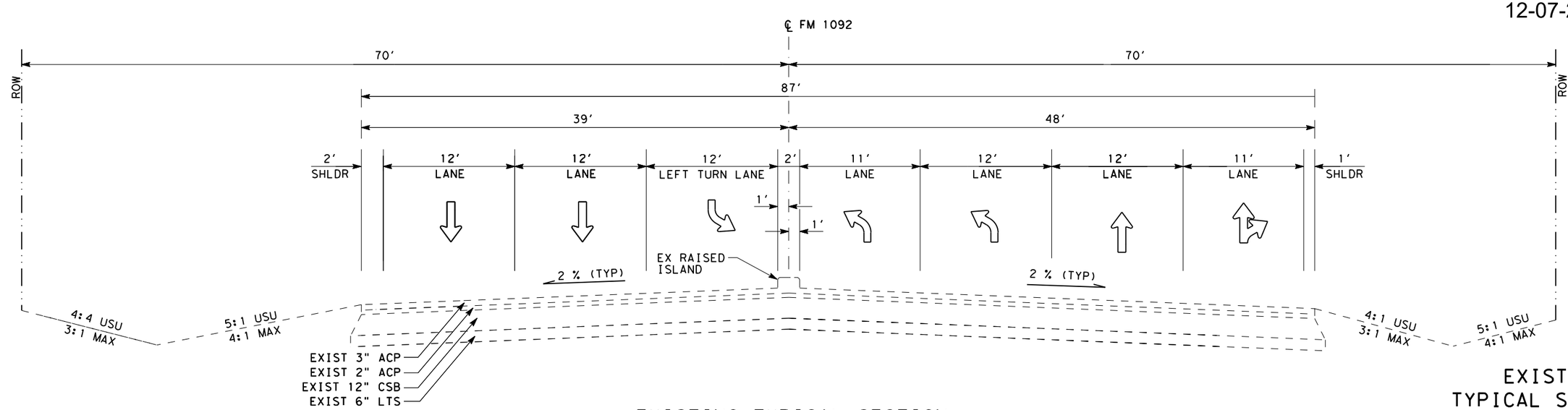
SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		8



EXISTING TYPICAL SECTION

STA 302+60.00 TO STA 305+75.00



EXISTING TYPICAL SECTION

STA 305+75.87 TO STA 307+91.00

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

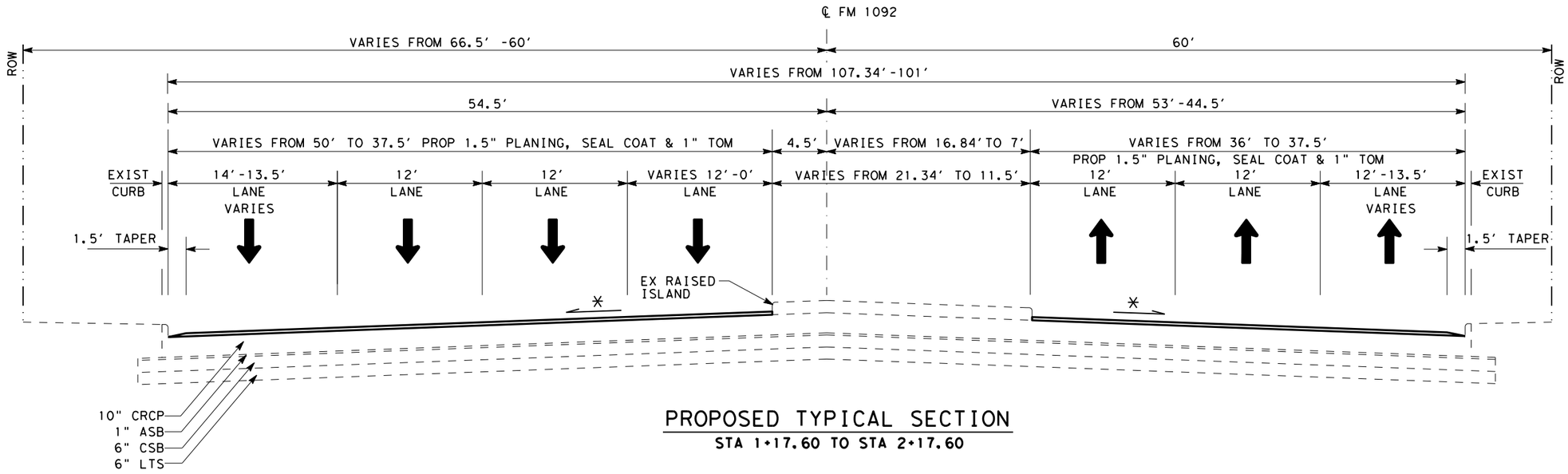
P.E

12-07-2021

EXISTING TYPICAL SECTIONS

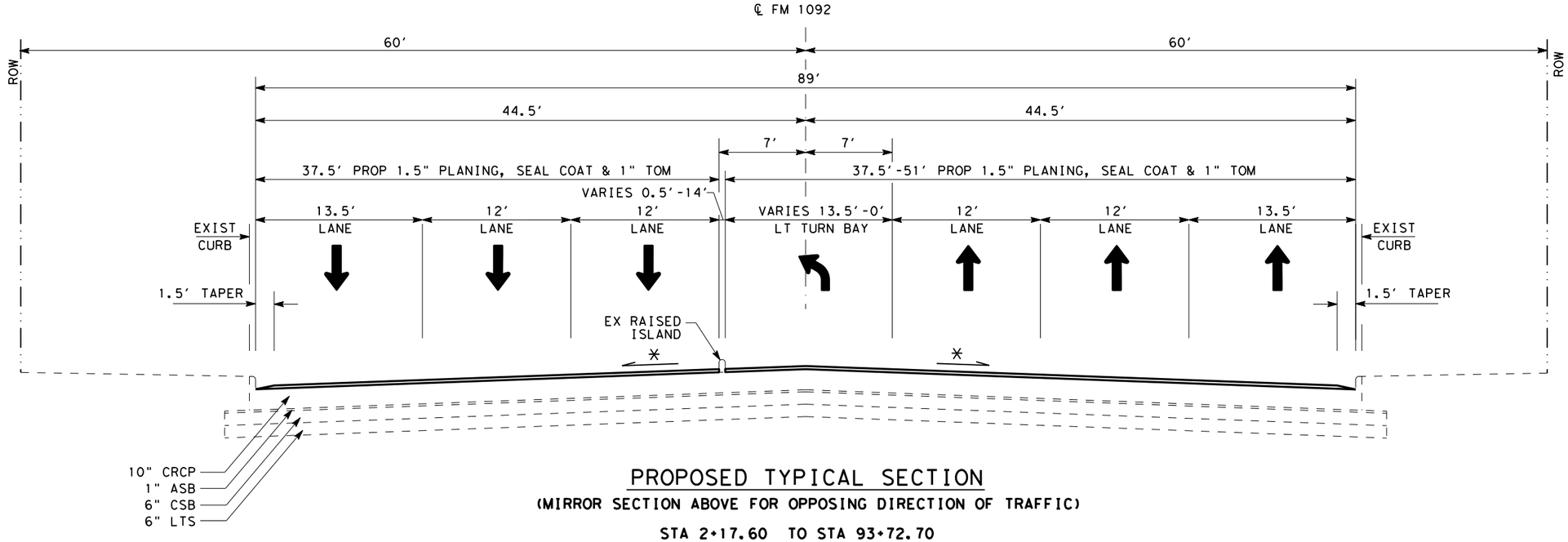
SCALE: 1"=10'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		9



PROPOSED TYPICAL SECTION

STA 1+17.60 TO STA 2+17.60



PROPOSED TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 2+17.60 TO STA 93+72.70

* MATCH EXIST SLOPE

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED
PROFESSIONAL ENGINEER

P.E

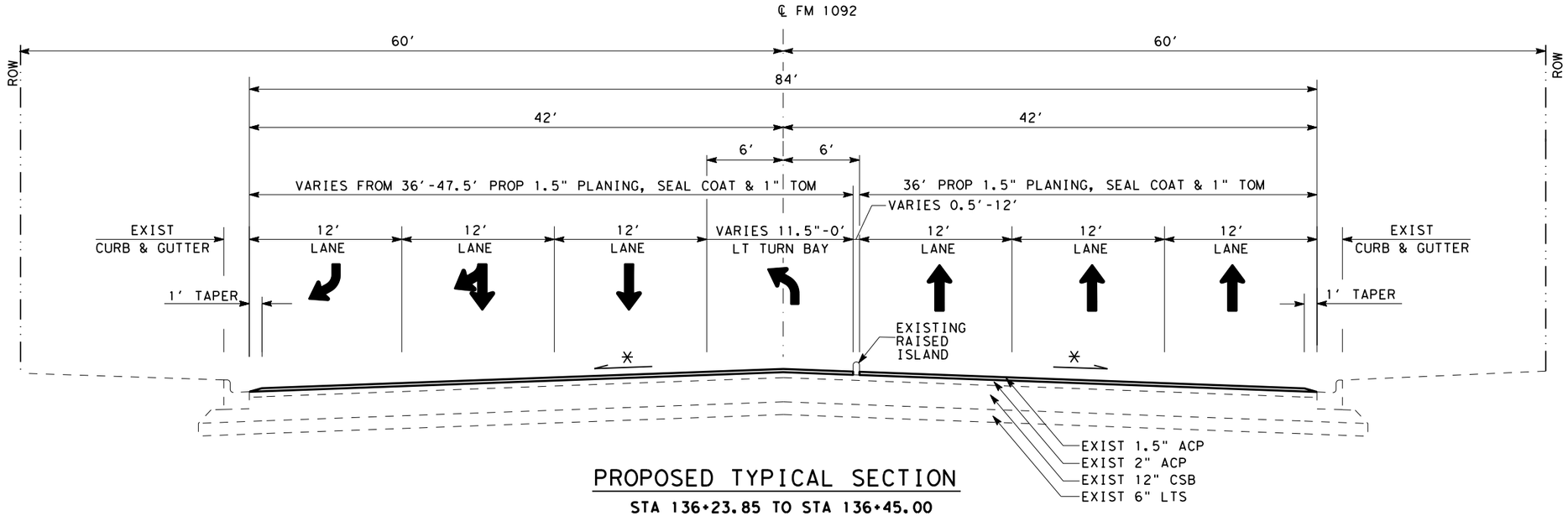
12-07-2021

PROPOSED TYPICAL SECTIONS

SCALE: 1"=10′

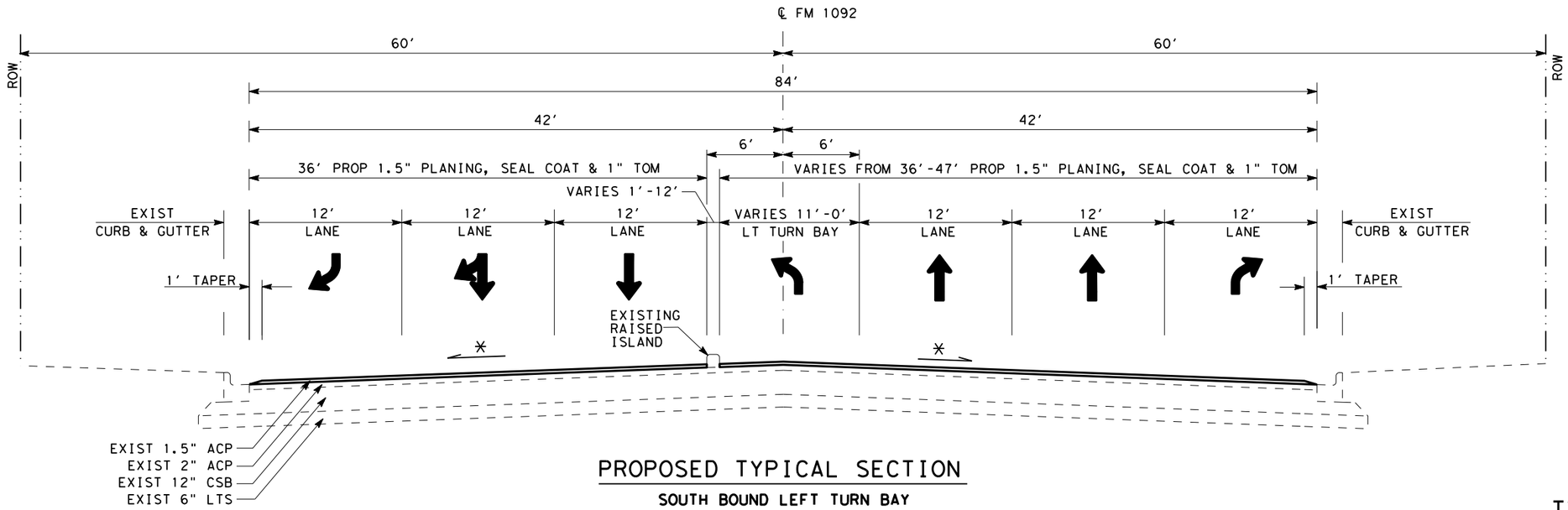
SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		10



PROPOSED TYPICAL SECTION

STA 136+23.85 TO STA 136+45.00



PROPOSED TYPICAL SECTION

SOUTH BOUND LEFT TURN BAY

STA 136+47.00 TO STA 139+59.00

* MATCH EXIST SLOPE

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

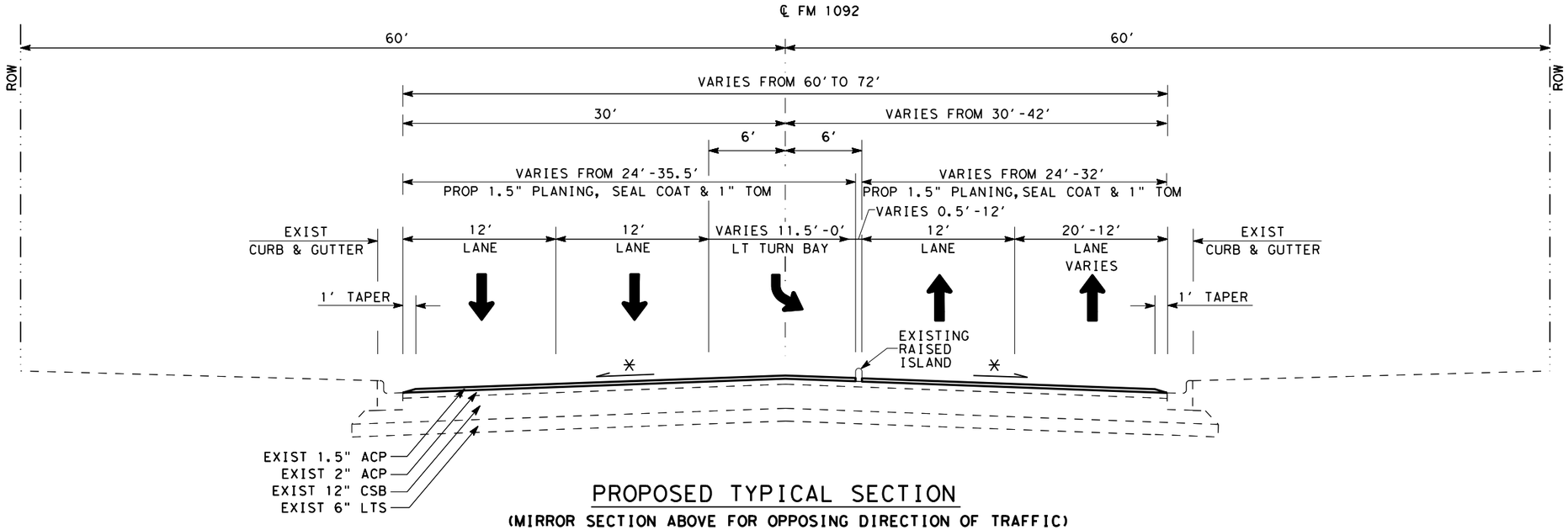
P.E

12-07-2021

PROPOSED TYPICAL SECTIONS

SCALE: 1"=10′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		11



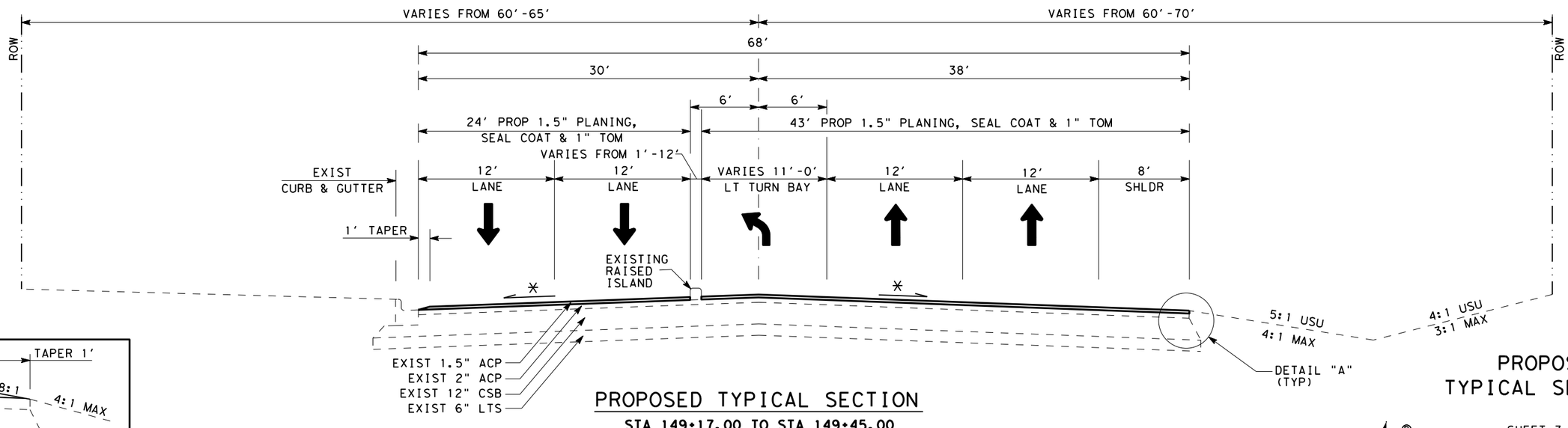
PROPOSED TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 140+75.00 TO STA 149+17.00

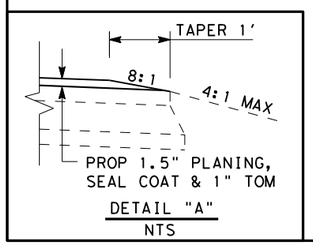
P.E

12-07-2021



PROPOSED TYPICAL SECTION

STA 149+17.00 TO STA 149+45.00



DETAIL "A"
NTS

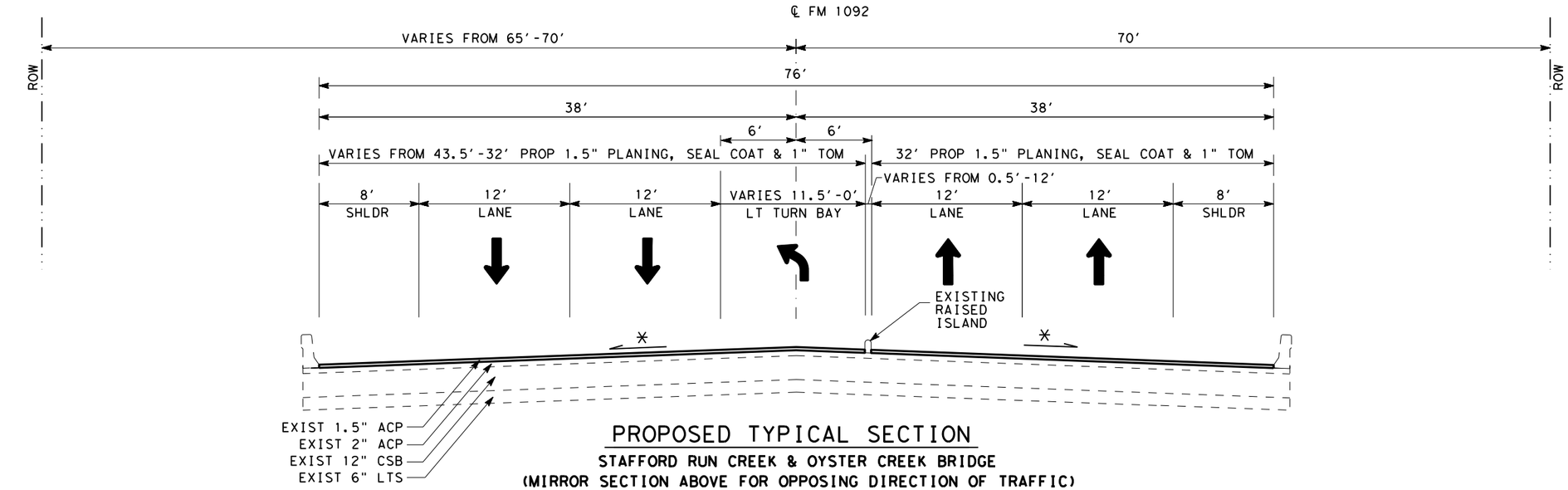
* MATCH EXIST SLOPE

PROPOSED TYPICAL SECTIONS

SCALE: 1"=10′

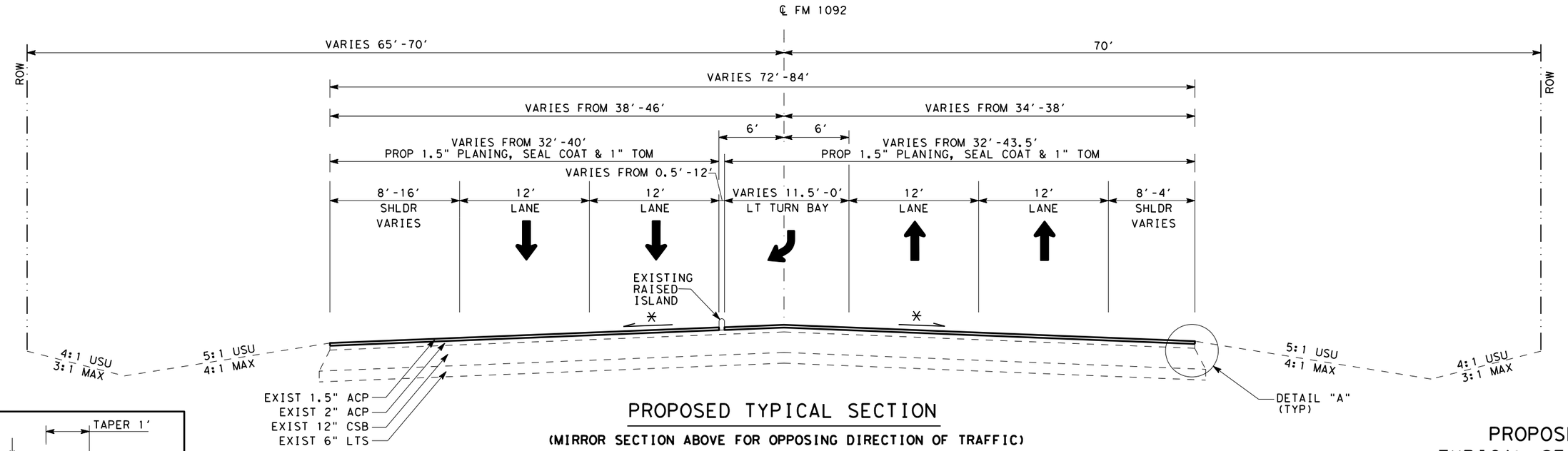
SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		12



PROPOSED TYPICAL SECTION

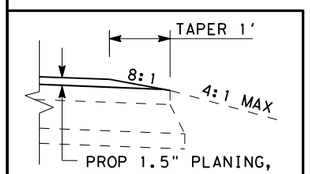
STAFFORD RUN CREEK & OYSTER CREEK BRIDGE
(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)
STA 149+48.00 TO STA 152+37.00
STA 281+62.32 TO STA 288+34.00



PROPOSED TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 152+37.00 TO STA 178+54.00
STA 181+80.00 TO STA 182+25.57
STA 190+16.50 TO STA 221+54.00
STA 227+20.00 TO STA 238+44.00
STA 259+50.00 TO STA 295+00.00
STA 299+71.00 TO STA 302+60.00



DETAIL "A"
NTS

* MATCH EXIST SLOPE

SCALE: 1"=10'

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

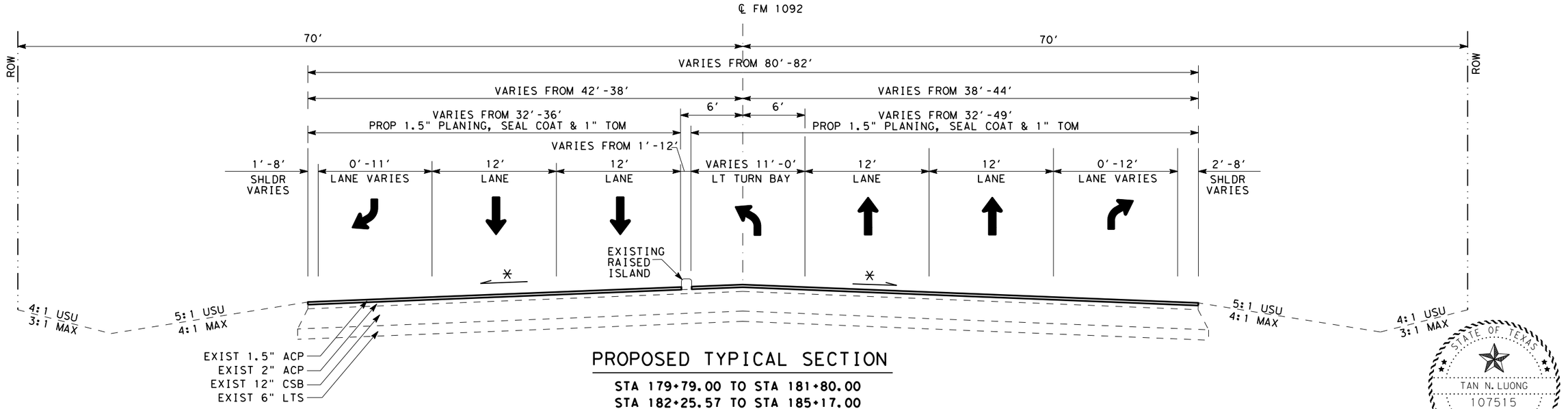
P.E

12-07-2021

PROPOSED TYPICAL SECTIONS

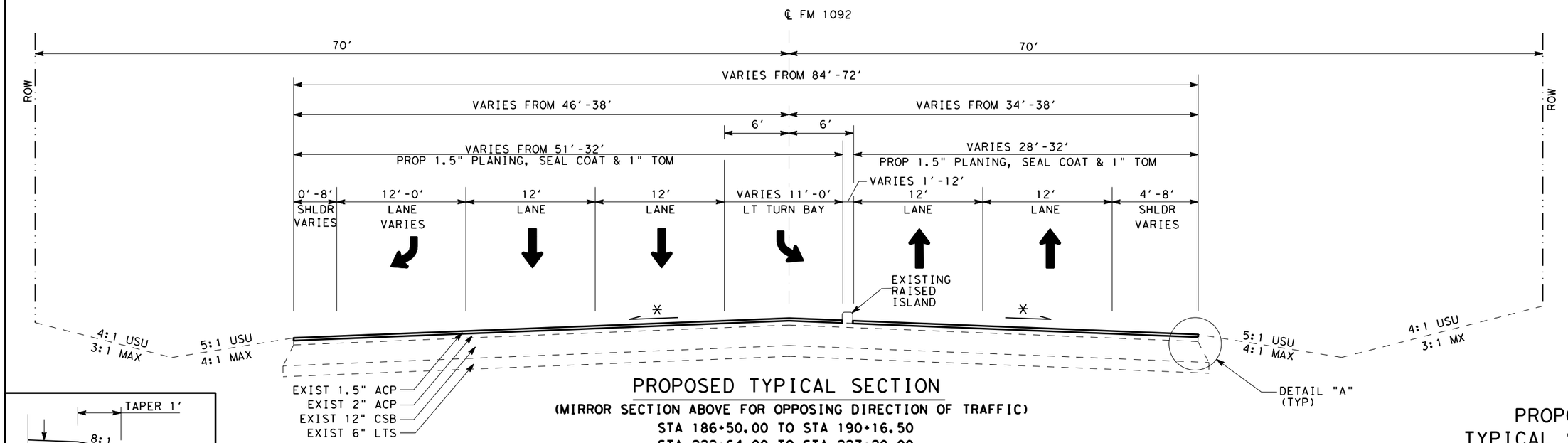
SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		13



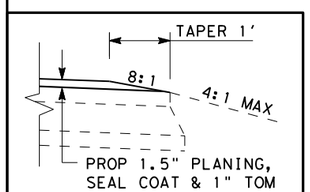
PROPOSED TYPICAL SECTION

STA 179+79.00 TO STA 181+80.00
STA 182+25.57 TO STA 185+17.00



PROPOSED TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)
STA 186+50.00 TO STA 190+16.50
STA 222+64.00 TO STA 227+20.00
STA 239+32.00 TO STA 243+93.42
STA 295+00.00 TO STA 298+55.00



DETAIL "A"
NTS

* MATCH EXIST SLOPE

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

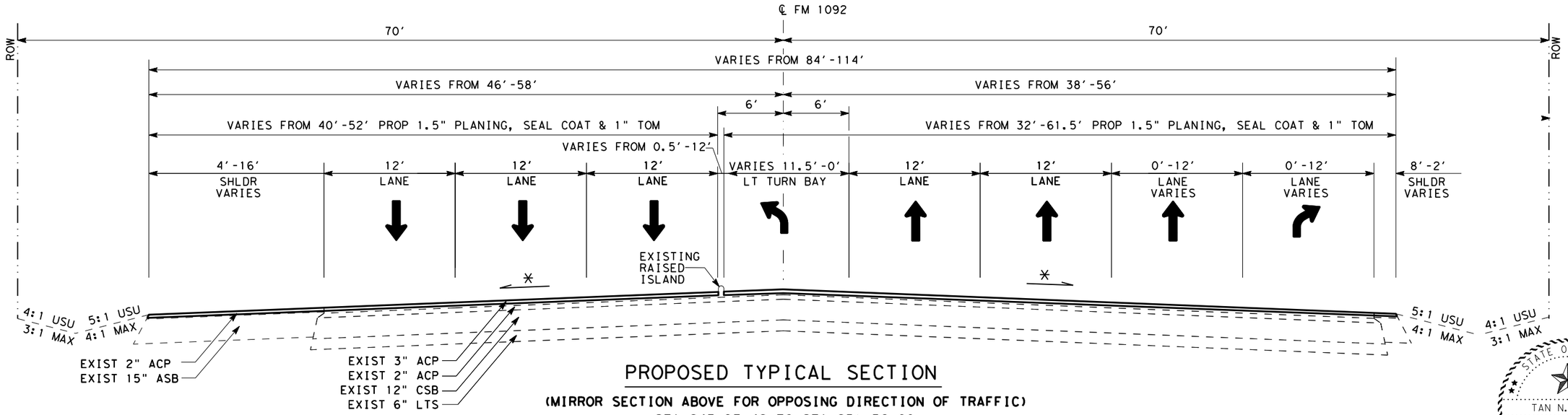
P.E

12-07-2021

PROPOSED TYPICAL SECTIONS

SCALE: 1"=10′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		14



PROPOSED TYPICAL SECTION

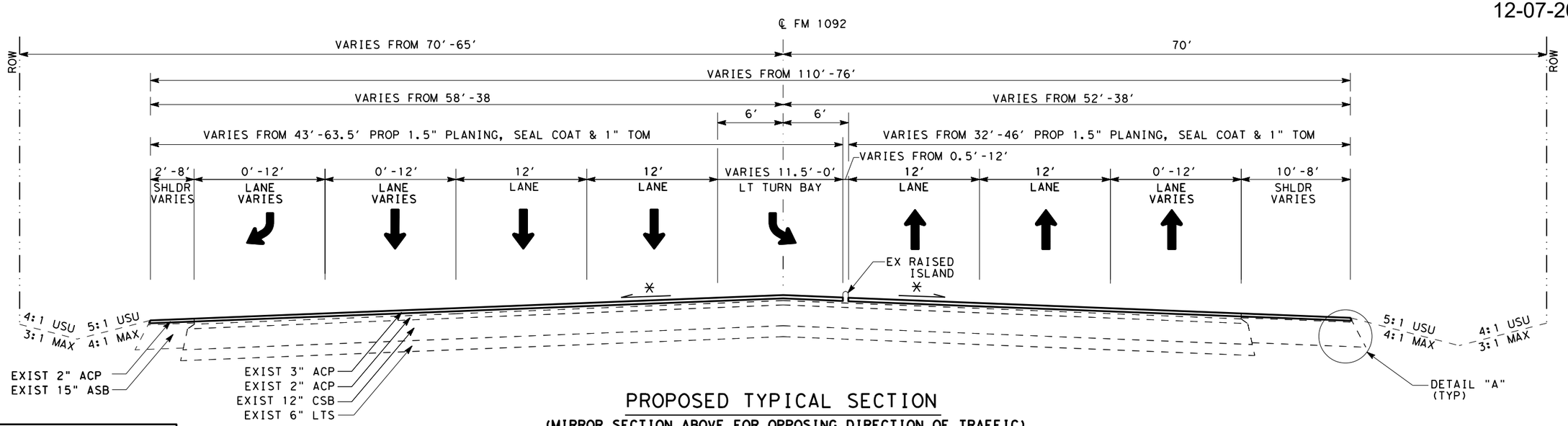
(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 243+93.42 TO STA 251+56.00

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

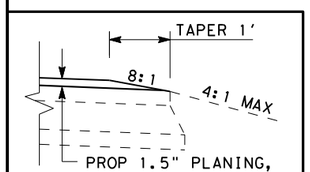
12-07-2021



PROPOSED TYPICAL SECTION

(MIRROR SECTION ABOVE FOR OPPOSING DIRECTION OF TRAFFIC)

STA 252+64.00 TO STA 259+50.00



DETAIL "A"
NTS

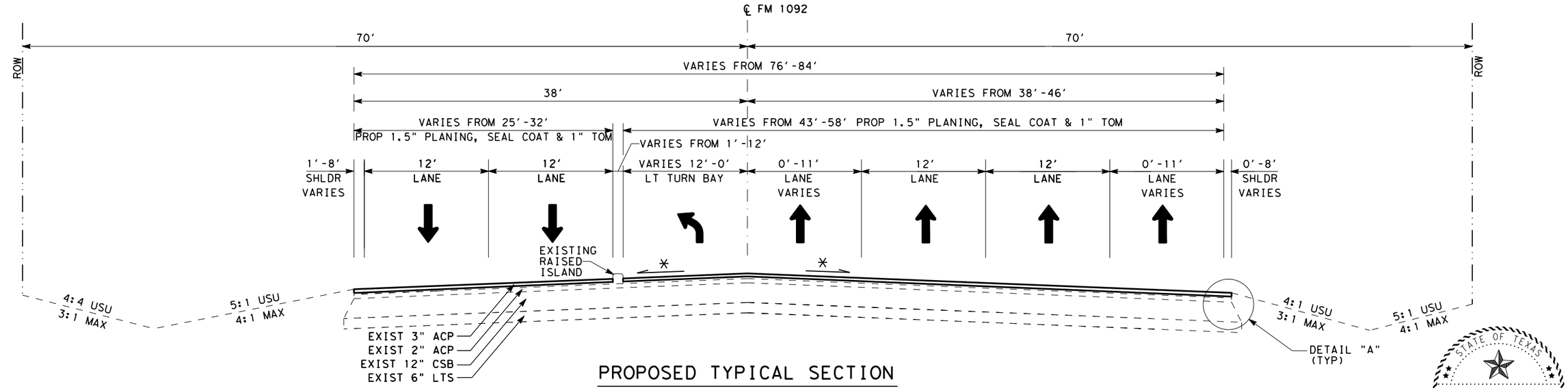
* MATCH EXIST SLOPE

PROPOSED TYPICAL SECTIONS

SCALE: 1"=10′

SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		15



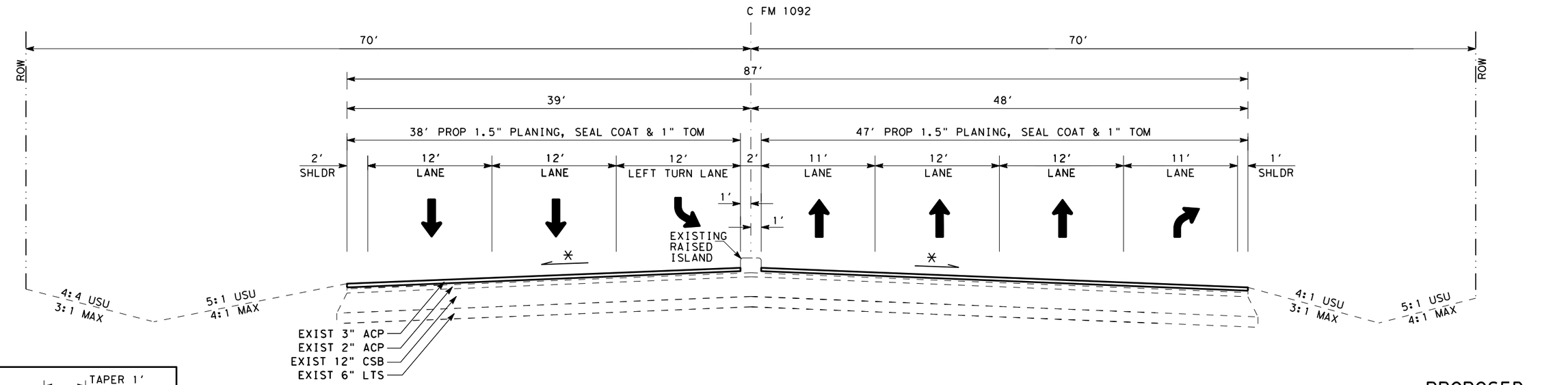
PROPOSED TYPICAL SECTION

STA 302+60.00 TO STA 305+75.00

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

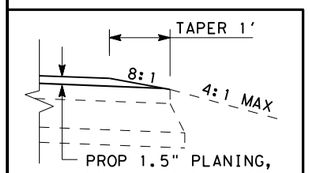
12-07-2021



PROPOSED TYPICAL SECTION

STA 305+75.87 TO STA 307+91.00

* MATCH EXIST SLOPE



DETAIL "A"
NTS

PROPOSED TYPICAL SECTIONS

SCALE: 1"=10′

SHEET 7 OF 7

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		16

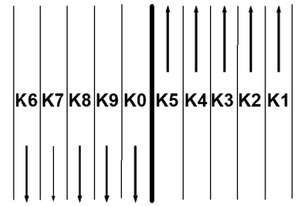
FY	MS	HIGHWAY	RD	REFERENCE MARKERS BEGIN	REFERENCE MARKERS END	LEN	PT	TEST MM/DD/YYYY	DIST TRAV	IRI(IN/MI) LEFT	IRI(IN/MI) RIGHT	SI	COMMENTS
2020	08	FM1092	K1	0000 + 0.000	0000 + 0.100		01	11/11/2019		173	265	2.0	
2020	08	FM1092	K1	0000 + 0.100	0000 + 0.106		01	11/11/2019		254	333	1.3	
2020	08	FM1092	K1	0476 + 0.000	0476 + 0.100		01	11/11/2019		185	169	2.5	
2020	08	FM1092	K1	0476 + 0.100	0476 + 0.200		01	11/11/2019		247	233	1.8	
2020	08	FM1092	K1	0476 + 0.200	0476 + 0.300		08	11/11/2019		165	162	2.7	
2020	08	FM1092	K1	0476 + 0.300	0476 + 0.344		08	11/11/2019		94	95	3.8	
2020	04	FM1092	K1	0476 + 0.344	0476 + 0.444		08	11/11/2019		89	90	3.9	
2020	04	FM1092	K1	0476 + 0.444	0476 + 0.452		08	11/11/2019		87	103	3.8	
2020	04	FM1092	K1	0478 + 0.000	0478 + 0.100		08	11/11/2019		68	76	4.2	
2020	04	FM1092	K1	0478 + 0.100	0478 + 0.200		08	11/11/2019		78	94	3.9	
2020	04	FM1092	K1	0478 + 0.200	0478 + 0.300		08	11/11/2019		103	214	2.8	
2020	04	FM1092	K1	0478 + 0.300	0478 + 0.400		08	11/11/2019		61	57	4.5	
2020	04	FM1092	K1	0478 + 0.400	0478 + 0.500		08	11/11/2019		67	61	4.4	
2020	04	FM1092	K1	0478 + 0.500	0478 + 0.600		08	11/11/2019		114	102	3.5	
2020	04	FM1092	K1	0478 + 0.600	0478 + 0.700		08	11/11/2019		97	83	3.8	
2020	04	FM1092	K1	0478 + 0.700	0478 + 0.800		08	11/11/2019		116	114	3.4	
2020	04	FM1092	K1	0478 + 0.800	0478 + 0.900		08	11/11/2019		116	120	3.4	
2020	04	FM1092	K1	0478 + 0.900	0478 + 1.000		08	11/11/2019		184	158	2.6	
2020	04	FM1092	K1	0478 + 1.000	0478 + 1.100		08	11/11/2019		132	133	3.1	
2020	04	FM1092	K1	0478 + 1.100	0478 + 1.200		08	11/11/2019		128	154	3.0	
2020	04	FM1092	K1	0478 + 1.200	0478 + 1.246		08	11/11/2019		85	109	3.7	
2020	04	FM1092	K1	0480 + 0.133	0480 + 0.233		05	11/11/2019		131	238	2.4	
2020	04	FM1092	K1	0480 + 0.233	0480 + 0.333		05	11/11/2019		129	187	2.8	
2020	04	FM1092	K1	0480 + 0.333	0480 + 0.433		05	11/11/2019		97	143	3.3	
2020	04	FM1092	K1	0480 + 0.433	0480 + 0.533		05	11/11/2019		90	71	4.0	
2020	04	FM1092	K1	0480 + 0.533	0480 + 0.633		05	11/11/2019		74	68	4.2	
2020	04	FM1092	K1	0480 + 0.633	0480 + 0.733		05	11/11/2019		63	64	4.4	
2020	04	FM1092	K1	0480 + 0.733	0480 + 0.833		05	11/11/2019		63	74	4.3	
2020	04	FM1092	K1	0480 + 0.833	0480 + 0.933		05	11/11/2019		70	76	4.2	
2020	04	FM1092	K1	0480 + 0.933	0480 + 1.033		05	11/11/2019		94	94	3.8	
2020	04	FM1092	K1	0480 + 1.033	0480 + 1.133		05	11/11/2019		110	108	3.5	
2020	04	FM1092	K1	0480 + 1.133	0480 + 1.233		05	11/11/2019		79	82	4.0	
2020	04	FM1092	K1	0480 + 1.233	0480 + 1.333		05	11/11/2019		67	69	4.3	
2020	04	FM1092	K1	0480 + 1.333	0480 + 1.433		05	11/11/2019		57	68	4.4	
2020	04	FM1092	K1	0480 + 1.433	0480 + 1.533		05	11/11/2019		66	68	4.3	
2020	04	FM1092	K1	0480 + 1.533	0480 + 1.633		05	11/11/2019		81	77	4.1	
2020	04	FM1092	K1	0480 + 1.633	0480 + 1.733		05	11/11/2019		69	79	4.2	
2020	04	FM1092	K1	0480 + 1.733	0480 + 1.833		05	11/11/2019		74	76	4.2	
2020	04	FM1092	K1	0480 + 1.833	0480 + 1.933		05	11/11/2019		80	76	4.1	
2020	04	FM1092	K1	0480 + 1.933	0480 + 2.033		05	11/11/2019		55	60	4.6	
2020	04	FM1092	K1	0480 + 2.033	0480 + 2.133		05	11/11/2019		87	104	3.7	
2020	04	FM1092	K1	0480 + 2.133	0480 + 2.233		05	11/11/2019		107	105	3.6	
2020	04	FM1092	K1	0480 + 2.233	0480 + 2.333		05	11/11/2019		135	205	2.6	
2020	04	FM1092	K1	0480 + 2.333	0480 + 2.433		05	11/11/2019		128	119	3.3	
2020	04	FM1092	K1	0480 + 2.433	0480 + 2.533		05	11/11/2019		149	145	2.9	
2020	04	FM1092	K1	0480 + 2.533	0480 + 2.633		05	11/11/2019		82	77	4.1	
2020	04	FM1092	K1	0480 + 2.633	0480 + 2.733		05	11/11/2019		69	65	4.3	
2020	04	FM1092	K1	0480 + 2.733	0480 + 2.833		05	11/11/2019		86	77	4.0	
2020	04	FM1092	K1	0480 + 2.833	0480 + 2.933		05	11/11/2019		91	79	3.9	
2020	04	FM1092	K1	0480 + 2.933	0480 + 3.033		05	11/11/2019		86	107	3.7	
2020	04	FM1092	K1	0480 + 3.033	0480 + 3.133		05	11/11/2019		80	83	4.0	
2020	04	FM1092	K1	0480 + 3.133	0480 + 3.233		05	11/11/2019		74	71	4.2	
2020	04	FM1092	K1	0480 + 3.233	0480 + 3.333		05	11/11/2019		106	92	3.7	
2020	04	FM1092	K1	0480 + 3.333	0480 + 3.433		01	11/11/2019		162	172	2.6	
2020	04	FM1092	K1	0480 + 3.433	0480 + 3.446		01	11/11/2019		152	163	2.8	
2020	04	FM1092	K1	0484 + 0.000	0484 + 0.033		01	11/11/2019		203	445	1.0	
2020	04	FM1092	L	0478 + 1.242	0478 + 1.340		01	11/11/2019		116	103	3.5	
2020	04	FM1092	L	0478 + 1.340	0478 + 1.440		01	11/11/2019		100	115	3.5	
2020	04	FM1092	L	0478 + 1.440	0478 + 1.540		01	11/11/2019		142	135	3.0	
2020	04	FM1092	L	0478 + 1.540	0478 + 1.640		01	11/11/2019		129	155	3.0	
2020	04	FM1092	L	0478 + 1.640	0478 + 1.740		01	11/11/2019		270	275	1.5	
2020	04	FM1092	L	0478 + 1.741	0478 + 1.771		01	11/11/2019		129	263	2.3	
2020	04	FM1092	L	0478 + 1.771	0478 + 1.871		01	11/11/2019		129	196	2.7	
2020	04	FM1092	L	0478 + 1.871	0480 + 0.033		01	11/11/2019		99	95	3.7	
2020	04	FM1092	L	0480 + 0.033	0480 + 0.133		01	11/11/2019		96	109	3.6	
2020	04	FM1092	R	0478 + 1.247	0478 + 1.347		01	11/11/2019		163	178	2.6	
2020	04	FM1092	R	0478 + 1.347	0478 + 1.447		01	11/11/2019		145	134	3.0	
2020	04	FM1092	R	0478 + 1.447	0478 + 1.547		01	11/11/2019		111	104	3.5	
2020	04	FM1092	R	0478 + 1.547	0478 + 1.647		01	11/11/2019		102	106	3.6	
2020	04	FM1092	R	0478 + 1.647	0478 + 1.747		01	11/11/2019		311	375	0.9	
2020	04	FM1092	R	0478 + 1.747	0478 + 1.847		01	11/11/2019		166	163	2.7	
2020	04	FM1092	R	0478 + 1.847	0480 + 0.009		01	11/11/2019		121	116	3.3	
2020	04	FM1092	R	0480 + 0.009	0480 + 0.109		01	11/11/2019		149	127	3.0	
2020	04	FM1092	R	0480 + 0.109	0480 + 0.141		01	11/11/2019		159	162	2.7	

Pavement Types

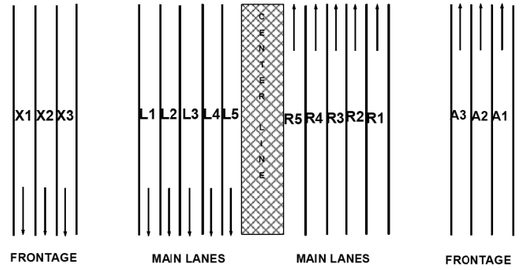
Code	Description
01	Continuously Reinforced Concrete Pavement
02	Jointed Reinforced Concrete Pavement
03	Jointed Plain Concrete Pavement
04	Thick Asphaltic Concrete Pavement (greater than 5-1/2")
05	Intermediate Thickness Asphaltic Concrete Pavement (2-1/2" to 5-1/2")
06	Thin Surfaced Flexible Base Pavement (less than 2-1/2")
07	Asphalt Surfacing with Heavily Stabilized Base
08	Overlaid and/or Widened Old Concrete Pavement
09	Overlaid and/or Widened Old Flexible Pavement
10	Thin Surfaced Flexible Base Pavement (Surface Treatment-Seal Coat Combination)

FOR CONTRACTOR INFORMATION ONLY

SINGLE ROADBED



MULTIPLE ROADBEDS



POINT ARROW IN DIRECTION OF INCREASING REFERENCE MARKERS

START FROM THE OUTSIDE LANE AND WORK IN

INTERNATIONAL ROUGHNESS INDEX DATA
(CSJ 1257-02-006)
(CSJ 1257-01-052)

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		17

General Notes:

General:

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

(Area Engineer Carlos.Zepeda@txdot.gov*)*
(Assistant Area Engineer Daniel.Dvorak@txdot.gov*)*

Contractor questions will be accepted through email, phone, and in person by the above individuals. Contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

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

All RAP generated from this project need to be delivered to:
Fort Bend-Waller Area Office
4235 SH 36 South
Rosenberg, TX 77471.

Please contact Mr. Juan Mata at (281) 238-7963 to arrange schedule of delivery.

If fixed features require, the governing slopes shown may vary between the limits shown and to the extent determined by the Engineer.

Superelevate the curves to match the existing surface.

Notify the Engineer immediately if discrepancies are discovered in the horizontal control or the benchmark data.

The following standard detail sheets are modified:

Modified Standards

List standards here

TCP (1-4)-18 (MOD)
TCP (2-4)-18 (MOD)

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Grade street intersections and median openings for surface drainage.

If a foundation is to be placed where a riprap surface or an asphalt concrete surface presently exists, use caution in breaking out the existing surface for placement. Break out no greater area than is required to place the foundation. After placing the foundation, wrap the periphery with 0.5 in. pre-molded mastic expansion joint. Then replace the remaining portion of the broken out surface with Class A or Class C concrete or cold mix asphalt concrete to the exact slope, pattern, and thickness of the existing riprap or asphalt. Payment for breaking out the existing surface, wrapping the foundation, and replacing the surface is subsidiary to the various bid items.

The lengths of the posts for ground mounted signs and the tower legs for the overhead sign supports are approximate. Verify the lengths before ordering these materials to meet the existing field conditions and to conform to the minimum sign mounting heights shown in the plans.

Furnish aluminum Type A signs instead of plywood signs for signs shown on the Summary of Small Signs sheet.

Stencil the National Bridge Inventory (NBI) number on each existing bridge shown on these plans. The NBI number is shown above the title block for each bridge layout.

Clearly mark or highlight on the shop drawings, the items being furnished for this project. Submit required shop drawings in accordance with the shop drawing distribution list shown in the note for Item 5 for review and distribution.

Right of way parcels or utility adjustments shown to be unclear on the plans but not listed on the special provisions will have no effect on construction.

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

General: Roadway Illumination and Electrical

For roadway illumination and electrical items, use materials from pre-qualified producers as shown on the Construction Division (CST) of the Department's material producers list. Check the latest link on the Department's website for this list. The category/item is "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials found on this list.

Perform electrical work in conformance with the National Electrical Code (NEC) and the Department's standard sheets.

General: Traffic Signals

For traffic signal items, use materials from the Pre-Qualified Producers List (located at http://www.dot.state.tx.us/GSD/purchasing/supps.htm) and the materials pre-qualified for illumination and electrical items (located at http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/riaes.pdf) as shown on the Department's Material Producers List and the Roadway Illumination and Electrical Supplies List. Check the latest links on the Department's website for these lists. No substitutions will be allowed for materials found on these lists.

General: Site Management

Mow the grass and weeds within the project limits a maximum of 3 times a year as directed. This work is subsidiary to the various bid items.

Mark stations every 100 ft. and maintain the markings for the project duration. Remove the station markings at the completion of the project. This work is subsidiary to the various bid items.

Record the beginning and ending stations of any no passing zones in the field before beginning the overlay. Restripe the no passing zones immediately after the overlay in the same locations, unless otherwise shown in the plans, or otherwise directed.

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor's office, equipment, and materials storage yard sites.

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the District Engineer.

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

Tricycle Type	**Truck Type - 4 Wheel**
Wayne Series 900	M-B Cruiser II
Elgin White Wing	Wayne Model 945
Elgin Pelican	Mobile TE-3
	Mobile TE-4
	Murphy 4042

General: Traffic Control and Construction

Schedule construction operations such that preparing individual items of work follows in close sequence to constructing storm drains in order to provide as little inconvenience as practical to the businesses and residents along the project.

Schedule work so that the base placement operations follow the subgrade work as closely as practical to reduce the hazard to the traveling public and to prevent undue delay caused by wet weather.

This project requires extensive grading operations in an environmentally sensitive area.

If relocating mailboxes, place them with the post firmly in the ground at nearby locations. Upon completing the project, the Engineer will locate the final mailbox placement. Perform this work in accordance with the requirements of the Item, "Mailbox Assemblies," except for measurement and payment. This work is subsidiary to the various bid items.

If fences cross construction easements shown on the plans and work is required beyond the fences, remove and replace the fences as directed. This work and the materials are subsidiary to the various bid items.

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662, or by e-mailing the Department's Houston District Traffic Signal Operations Office at **locaterequest@txdot.gov**, to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

Install or remove poles and luminaires located near overhead or underground electrical lines using established industry and utility safety practices. Consult the appropriate utility company before beginning such work.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department's standard sheets.

Before beginning any underground work, notify the City of Houston's Chief Inspector, Public Works and Engineering, to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

Item 5: Control of Work

.Submit shop drawings electronically for the fabrication of items as documented in Table 1 or Table 2 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf. References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

Table 1

2014 Construction Specification Required Shop/Working Drawing Submittals - TxDOT Generated Plans

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD

441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD
647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

Key to Reviewing Party

A - Area Office

Area Office	Email Address
Brazoria Area Office	HOU-BRZAShpDrwgs@txdot.gov
Fort Bend Area Office	HOU-FBAShpDrwgs@txdot.gov
Galveston Area Office	HOU-GALVAShpDrwgs@txdot.gov
Montgomery Area Office	HOU-MONTAShpDrwgs@txdot.gov
North Harris Area Office	HOU-NHAShpDrwgs@txdot.gov
Southeast Area Office	HOU-SEHAShpDrwgs@txdot.gov
Traffic Systems Construction Office	HOU-TSCShpDrwgs@txdot.gov
West/Central Harris Area Office	HOU-WWCHAOShpDrwgs@txdot.gov

B - Houston Bridge Engineer

Bridge Design (Houston TxDOT)	HOU-BrgShpDrwgs@txdot.gov

BRG - Austin Bridge Division

Bridge Design (Austin TxDOT)	BRG_ShopPlanReview@txdot.gov

C - Construction Office

Construction	HOU-ConstrShpDrwgs@txdot.gov
Laboratory	HOU-LabShpDrwgs@txdot.gov

T - Traffic Engineer

Traffic Operations	HOU-TrfShpDrwgs@txdot.gov

TMS – Traffic Management System

Computerized Traffic Management Systems (CTMS)	HOU-CTMSShpDrwgs@txdot.gov

Item 7: Legal Relations and Responsibilities

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

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

Document and coordinate with the USACE, if required, before hauling any excavation from or hauling any embankment to a USACE permit area by either 1 or 2 below:

1. **Restricted Use of Materials for the Previously Evaluated Permit Areas.**
   Document both the Project Specific Locations (PSL) and their authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in the Item, "Excavation" is used for permanent or temporary fill (under the Item, "Embankment") within a USACE permit area.
   b. Suitable embankment (under the Item, "Embankment") from within the USACE permit area is used as fill within a USACE evaluated area.
   c. Unsuitable excavation or excess excavation, "Waste" (under the Item, "Excavation"), that is disposed of at a location approved within a USACE evaluated area.

2. **Contractor Materials from Areas Other than Previously Evaluated Areas.**
   Provide the Department with a copy of USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
   a. The Item, "Embankment" used for temporary or permanent fill within a USACE permit area.
   b. Unsuitable excavation or excess excavation, "Waste" (under the Item, "Excavation"), that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 0 acres. The disturbed area in this project, the project locations in the Contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer (to the appropriate MS4 operator when on an off-state system route) and to the local government that operates a separate storm drain system.

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing the permit application. Submit the permit application to the Department's District Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

The Department will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Working days will be computed and charged based on a *standard* workweek in accordance with Section 8.3.3.2.2.

The maximum number of days the time charges on this contract may be suspended due to contractor mobilization, and material fabrication/accumulation or processing delays is *60* days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

The Lane Closure Assessment Fee is $ 1,000. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, “Barricades, Signs, and Traffic Handling.”

Item 104: Removing Concrete

Removing concrete curb is paid as a separate bid item if the existing pavement on which it rests is not removed at the same time.

Item 204: Sprinkling

Perform subsidiary sprinkling as required under various other items in accordance with the Item, “Sprinkling.”

Sprinkling for dust control is subsidiary to the various bid items.

Item 210: Rolling

Use a medium pneumatic roller meeting the requirements of Item 210 as directed. This work is subsidiary to the various bid items. On every asphalt shot, use a minimum of 3 pneumatic rollers or as directed. Use approved rolling patterns. Successive asphalt shots will not be allowed until acceptable rolling has been accomplished on the preceding asphalt shot.

Item 247: Flexible Base

Place the flexible base in courses a maximum of 8 in. thick (loose measurement). Mix flexible base that requires 2 or more mixtures of material, in an approved stationary pugmill type mixer. Material passing the No. 40 sieve is known as soil binder.

Tolerances relating to a specified gradation and to a plasticity index under this specification are permitted.

Furnish one type of the base material unless otherwise authorized.

Compact the courses to a minimum density of 95 percent of the maximum density as determined using test method TEX-113-E.

Sandstone aggregate is not permitted.

Item 305: Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement

Unless otherwise shown on the plans, 9356 CY RAP generated by this project will become the property of the TXDOT, and this amount is delivered to:

Texas Department of Transportation
Fort Bend Area Office
4235 SH36
Rosenberg, TX 77471

Item 316: Seal Coat

Place only the amount of seal coat that can be covered by the Thin Overlay Mixture (TOM) in the same working day.

The asphalt application rate shown on the “Basis of Estimate” is an average rate for calculating asphalt quantities. Vary the rate based on the pavement conditions and other factors such as the type and grade of aggregate used, weather, and traffic.

The Department will furnish the material under this Item at locations shown on the plans.

Allowable Asphalt Cements based on Average Daily Traffic (ADT) are shown below:

For ADT greater than 5000	ADT 1000 to 5000	ADT less than 1000
AC-20 XP	AC-15P	AC-10-2TR
AC-20-5TR	AC-20-5TR	AC-10 w/2% SBR
	AC-20-XP	AC-15P
	AC-10-2TR	

Item 347: Thin Overlay Mixtures (TOM)

Provide an asphalt binder PG 76-22. Substitution of the PG binder is not allowed.

Provide 100% SAC “A” aggregate. Blending is not allowed.

Do not use RAP and RAS in the mixture.

Place mixtures only when the air temperature is above 70°F and the roadway is dry.

A Pave-IR system or Thermal camera system is mandatory for this project. The Contractor must demonstrate that the mixture is being placed with minimum thermal segregation.

Provide a mix which lasts more than 500 cycles in the Overlay Tester.

For breakdown rolling use two steel-wheel rollers working in tandem without excessive breakage of the aggregate and provide a smooth surface and uniform texture, keeping the rollers as close

as possible to the lay-down machine. Do not use pneumatic-tire rollers. Use a steel wheel as the finish roller.

Water flow measurements as per TEX-246-F, "Permeability or Water Flow of Hot Mix Asphalt", is mandatory for setting rolling patterns. For TOM-C the water flow should be at least 4 minutes. Adjust the rolling patterns if less than 4 minutes. The Contractor must report the selected patterns to TxDOT and show that it meets the water flow requirements.
ftp://ftp.dot.state.tx.us/pub/txdot-info/cst/TMS/200-F_series/pdfs/bit246.pdf

Avoid excessive compaction. Water flows of greater than 10 minutes are not allowed. The final surface must have acceptable macro-texture.

All construction joints must be placed immediately to the side of the paint stripes between the lanes. (No joints near wheel paths.)

Sweep the completed seal coat prior to placement of TOM

Milled surfaces prior to placement of TOM must be very clean. Acquire engineer approval for cleanliness of milled surfaces prior to placement of TOM.

For sweeping the existing roadway in preparation for laying TOM, furnish equipment and tools capable of removing and collecting remaining residue. Furnish equipment with a water tank and adequate spray assemblies for dust control, and a dirt hopper with enough capacity to allow progress with minimum interference to traffic. Ensure debris is not swept or blown onto adjacent lanes, sidewalks or parking lots. Acquire engineer approval of equipment and removal methods prior to beginning work.

If milling of the existing Hot Mix Asphalt surface is required, only micro-milling is permitted as described in Special Provision 354---003.

Item 351: Flexible Pavement Structure Repair

Use asphalt stabilized base for the base material.

For base repair, place the asphalt stabilized base in compacted lifts of 4 in. maximum, unless otherwise directed.

Item 354: Planning and Texturing Pavement

Concrete Pavement Planning generated from this project will become the property of the contractor.

Item 361: Repair of Concrete Pavement

For full depth repair, remove only the quantity of pavement replaceable during the daily allowable work schedule.

Remove loose sub-base material and replace it with concrete. Use a bondbreaker, such as a polyethylene sheet, at the interface between the replaced sub-base material and the new concrete pavement.

Supply polyethylene fabric on the job site sufficient to cover the area of repair.

Do not place concrete if impending weather may result in rainfall or low temperatures that may impair the quality of the finished work.

Repair portions of the concrete pavement surfaces that are damaged while in a plastic state before those areas receive permanent pavement markings and open to traffic. Perform repairs that are structurally equivalent to and cosmetically uniform with adjacent undamaged areas. Do not repair by grouting onto the surface.

Ready mix concrete will be permitted if the equipment and construction methods can produce the desired results. Hand finishing will be permitted.

Perform saw cutting as shown on the plans in accordance with Section 360.4.10, "Sawing Joints." This saw cutting is subsidiary to this bid Item.

Item 420: Concrete Substructures

Unless otherwise noted, use Class C concrete with an ordinary surface finish for signal, lighting, or sign structure foundations.

Item 421: Hydraulic Cement Concrete

Entrained air is required in all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.), but is not required for other structural concrete. Adjust the dosage of air entraining agent for low air content as directed or allowed by the Engineer. If entrained air is provided where not required, do not exceed the manufacturer's recommended dosage.

Item 432: Riprap

Class B concrete is used for riprap mow strips at all Metal Beam Guard Fence locations.

Item 479: Adjusting Manholes

Location of manholes show in plan at approximate station. Contractor need a field verification before making adjustment.

Item 502: Barricades, Signs, and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets. The latest versions of Work Zone Standard Sheets WZ (BTS-1) and WZ (BTS-2) are the traffic control plan for the signal installations.

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

If a section is not complete before the end of the workday, pull back the base material to the existing pavement edge on a 6H: 1V slope. Edge drop-offs during the hours of darkness are not permitted.

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase.

Replace the overhead signs, informational signs, and exit signs to be removed, with temporary signs providing the correct information to the traveling public. Size the replacement signs and include them in the traffic control plan.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Place positive barriers to protect drop-off conditions greater than 2 ft. within the clear zone that remain overnight.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 7:00 PM – 11:59 PM	5:00 AM – 9:00 AM 3:00 PM – 7:00 PM
Tuesday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 7:00 PM – 11:59 PM	5:00 AM – 9:00 AM 3:00 PM – 7:00 PM

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Wednesday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 7:00 PM – 11:59 PM	5:00 AM – 9:00 AM 3:00 PM – 7:00 PM
Thursday	9:00 AM - 3:00 PM	12:00 AM – 5:00 AM 7:00 PM – 11:59 PM	5:00 AM – 9:00 AM 3:00 PM – 7:00 PM
Friday	9:00 AM - 3:00 PM	Not Allowed	3:00 P.M – 11:59 P.M.
Saturday	Not Allowed *	Not Allowed	N/A
Sunday	Not Allowed	7:00 P.M - 11:59 PM	N/A

* Saturday work will be allowed only with prior approval from the Area Engineer.

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Office of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened again to traffic.

A minimum of 7 days in advance of any total closure, place a portable changeable message (PCM) sign at the location of each total closure which informs the traveling public of the details of the closure. Alternately, if the Traffic Control Plan provides a positive barrier at the location, a non-trailer mounted static message board sign behind the positive barrier may be used in place of a PCM.

Use Uneven Lane Signs (CW 8-11) during resurfacing operations for elevation differences between adjacent lanes of greater than 1 in.

Before closing any City of Houston sidewalk, one or more city street lanes, or entire city streets during construction, obtain a permit to do so from the City. Obtain the required permit in person at the City of Houston Permit Office, or apply online at http://www.gims.houstontx.gov.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic

Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures.

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7. Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

Use appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. Remove and dispose of materials in compliance with State and Federal laws.

Before starting construction, review with the Engineer the SWP3 used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SWP3.

Implement temporary and permanent erosion control measures to comply with the National Pollution Discharge Elimination System (NPDES) general permit under the Clean Water Act.

Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way

Item 529: Concrete Curb, Gutter, and Combined Curb and Gutter
Item 531: Sidewalks

An air-entraining admixture is not required.

For concrete curbs, use Grade 7 aggregate conforming to Section 421.2.6 of the Item, "Hydraulic Cement Concrete."

For driveways and turnouts, coarse aggregate Grade No. 3 through No. 8 conforming to the gradation requirements specified in the Item, "Hydraulic Cement Concrete" will be permitted.

For reinforcing steel in sidewalks and pedestrian ramps, use No. 4 bars at a maximum 18 in. spacing center-to-center in both directions.

Item 540: Metal Beam Guard Fence

Painting the timber posts is not required.

Use timber posts for galvanized steel metal beam guard fence, except for anchorage at turned down ends.

Furnish and install wood blocks between the rail elements and the timber posts as detailed on the plans. These block-outs are subsidiary to this bid Item.

The quantity of the metal beam guard fence is subject to change.

Provide a mow strip as shown on the plans, at metal beam guard fence locations, including any guardrail end treatments.

Galvanize the rail elements supplied for this project by using a Type II Zinc Coating.

At locations requiring attachment of Metal Beam Guard Fence (MBGF) to concrete railing or concrete traffic barrier, repair and fill any existing holes in the railing or barrier that are not in the correct location for attaching the new MBGF. Perform this work in accordance with the Item, "Concrete Structure Repair." Existing anchor bolt holes that cannot be utilized must be filled with an epoxy grout before drilling new holes. Then core-drill new holes in the correct locations and repair any resulting spalls at no expense to the Department. This work is considered subsidiary to the MBGF transition section (Item 540).

Item 542: Removing Metal Beam Guard Fence

Remove and assume ownership of unsalvageable metal beam guard fence rail elements and posts.

Replace removed wood posts which are unusable because of damage by the Contractor, at no expense to the Department.

Item 544: Guardrail End Treatment

Existing guardrail end treatment removal will become the property of contractor.

Item 560: Mailbox Assemblies

Removing existing mailboxes will not be paid directly but will be subsidiary to pertinent items.

Item 585: Ride Quality for Pavement Surfaces

To eliminate the need for corrective action due to excessive deviations in the final surface layers, exercise caution to ensure satisfactory profile results in the intermediate paving layers (mixture).

Milling will not be allowed as a corrective action for excessive deviations in the final surface layer of hot-mix asphalt.

For this project, use Surface Test Type B and Pay Adjustment Schedule 3.

Item 618: Conduit

When backfilling bore pits, ensure that the conduit is not damaged during installation or due to settling backfill material. Compact select backfill in 3 equal lifts to the bottom of the conduit; or

if using sand, place it 2 in. above the conduit. Ensure backfill density is equal to that of the existing soil. Prevent material from entering the conduit.

Construct bore pits a minimum of 5 ft. from the edge of the base or pavement. Close the bore pit holes overnight.

Unless otherwise shown on the plans, install underground conduit a minimum of 24 in. deep. Install the conduit in accordance with the latest National Electrical Code (NEC) and applicable Department standard sheets. Place conduit under driveways or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, the casing is subsidiary to the conduit.

If placing the conduit under existing pavement to reach the service poles, bore the conduit in place and extend it a minimum distance of 5 ft. beyond the edge of shoulder or the back of curb.

Item 620: Electrical Conductors

Test each wire of each cable or conductor after installation. Incomplete circuits or damage to the wire or the cable are cause for immediate rejection of the entire cable being tested. Remove and replace the entire cable at no expense to the Department. Also test the replacement cable after installation.

When pulling cables or conductors through the conduit, do not exceed the manufacturer's recommended pulling tensions. Lubricate the cables or conductors with a lubricant recommended by the cable manufacturer.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holders as shown on the Department's Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Items 610 and 620. Provide 10 Amp time delay fuses.

Ensure that circuits test clear of faults, grounds, and open circuits.

Split bolt connectors are allowed only for splices on the grounding conductors.

For Roadside Flashing Beacon Assemblies (Item 685) and Pedestal Pole Assemblies (Item 687) within the project, provide single-pole breakaway disconnects as shown on the Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Item 685. For underground (hot) conductors, install a breakaway connector with a dummy fuse (slug). Provide dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

For electrical licensing and electrical certification requirements for this project, see Item 7 of the Standard Specifications and any applicable special provisions to Item 7.

Item 624: Ground Boxes

The ground box locations are approximate. Alternate ground box locations may be used as directed, to avoid placing in sidewalks or driveways.

Ground metal ground box covers. Bond the ground box cover and ground conductors to a ground rod located in the ground box and to the system ground.

Ground the existing metal ground box covers as shown on the latest standard sheet ED (4)-14.

During construction and until project completion, provide personnel and equipment necessary to remove ground box lids for inspection. Provide this assistance within 24 hours of notification.

Construct concrete aprons in accordance with the latest standard sheet ED (4)-14. Make the depth of the concrete apron the same as the depth of the ground box, except for Type 1 and Type 2 ground boxes. For Type 1 or Type 2 ground boxes, construct the concrete apron in accordance with details shown on the "Ground Box Details Installations" standard.

Item 636: Signs

For design details not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Item 644: Small Roadside Sign Assemblies

Sign locations shown on the plans are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Use the Texas Universal Triangular Slip Base with the concrete foundation for small ground mounted signs, unless otherwise shown in the plans.

Remove existing street name signs from existing stop signs and re-install them above the new stop signs. Removing and re-installing existing street name signs is subsidiary to the Item, "Small Roadside Sign Assemblies."

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Use Type E Super High Specific Intensity (Fluorescent Prismatic) yellow green reflective sheeting background to fabricate school signs (S1-1, S3-1, S4-3, S5-1, W16-2, SW16-9p, and SW16-7pL(R)).

Assume ownership of the removed existing signs.

Locations of the relocated signs are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Replace existing signs that become damaged during relocation at no expense to the Department.

Item 658: Delineator and Object Marker Assemblies

Unless otherwise shown on the plans, removal of existing delineator and object markers will not be paid directly but is subsidiary to bid items of the contract.

Item 662: Work Zone Pavement Markings

At the end of each workday, mark roadways that remain open to traffic during construction operations with standard pavement markings, in accordance with the latest "Texas Manual on Uniform Traffic Control Devices."

Do not use raised pavement markers as optional work zone pavement markings on final asphalt surfaces.

For transition lane lines and detour lane lines, use raised pavement markers as shown for solid lines on the latest Barricade and Construction standard sheet for "Work Zone Pavement Marking Details."

Item 662: Work Zone Pavement Markings
Item 666: Reflectorized Pavement Markings

Use Type III glass beads for thermoplastic and multipolymer pavement markings.

Use a 0.100 in. (100 mil) thickness for thermoplastic pavement markings, measured to the top of the thermoplastic, not including the exposed glass beads.

Use a 0.022 in. (22 mil) thickness for multipolymer pavement markings, measured to the top of the multipolymer, not including the exposed glass beads.

For roadways with asphalt surfaces to be striped with work zone or permanent thermoplastic markings, the Contractor has the option to apply paint and beads markings for a maximum 30-day period until placing the thermoplastic markings, or until starting the succeeding phase of work on the striped area. Maintain the paint and beads markings, at no expense to the Department, until placing the thermoplastic markings or starting the succeeding phase of work on the striped area. The work zone markings, whether paint and beads or thermoplastic, are paid under the Item, "Work Zone Pavement Markings" and the markings are paid for only once for the given phase of construction.

If using paint and bead markings as described above, purchase the traffic paint from the open market.

If the Type II markings become dirty and require cleaning by washing, brushing, compressed air, or other approved methods before applying the Type I thermoplastic markings, this additional cleaning is subsidiary to the Item, "Reflectorized Pavement Markings."

Establish the alignment and layout for work zone striping and permanent striping.

Stripe all roadways before opening them to traffic.

Place pavement markings under these items in accordance with details shown on the plans, the latest "Texas Manual on Uniform Traffic Control Devices," or as directed.

When design details are not shown on the plans, provide pavement markings for arrows, words, and symbols conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Place the pedestrian crosswalk pavement markings only after the pedestrian signals and push buttons are installed and operating.

Item 672: Raised Pavement Markers

If other operations are complete on the project and if the curing time period is not yet elapsed, the contract time will be suspended until the curing is done.

Before placing the raised pavement markers on concrete pavement, blast clean the surface using an abrasive-blasting medium. This work is subsidiary to the Item, "Raised Pavement Markers."

Provide epoxy adhesive that is machine-mixed or nozzle-mixed and dispensed. Equip the machine or nozzle with a mechanism to ensure positive mix measurement control.

Item 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed.

Item 678: Pavement Surface Preparation for Markings

Do not blast clean asphalt concrete pavement. Clean asphalt concrete pavement as required under the applicable specifications or as directed.

On new concrete pavement or on existing concrete pavement when placing a new stripe on a new location, remove the curing compounds and contamination from the pavement surface by flail milling or as directed. In addition, air-blast the surface with compressed air just before placing the new stripe.

On existing concrete pavement when placing a new stripe on an existing location, after removing the existing stripe under the Item, "Eliminating Existing Pavement Markings and Markers," air-blast the surface with compressed air just before placing the new stripe.

Do not clean concrete pavement by grinding.

Item 682: Vehicle and Pedestrian Signal Heads

Install two set screws on vehicle signal head mounting hardware fittings.

Furnish black housings for vehicle and pedestrian signals. Furnish black vehicle signal head back plates with 2 in. retroreflective yellow borders.

Item 687: Pedestal Pole Assemblies

Furnish black powder coated traffic signal poles. Apply powder coated finish over the galvanized surface. Prepare galvanized surfaces for powder coating in accordance with the powder coating manufacturer's recommendations. Do not water-quench or chromate-quench galvanized surfaces to be powder coated. After preparing galvanized surfaces, powder coat with a minimum of 2.0 mils dry film thickness (DFT) of urethane powder or triglycidyl isocyanurate (TGIC) polyester powder. Provide powder coat adhesion meeting the 5A or 5B classifications of ASTM D3359. Ensure powder coating is uniform in appearance and free of scratches.

Item 688: Pedestrian Detectors and Vehicle Loop Detectors

Provide pedestrian push buttons a minimum of 2 in. diameter in the smallest dimension.

Install a rubber grommet or bushing between the push button assembly and the signal pole to protect the conductors.

Provide a black tube loop detector wire as specified in the "International Municipal Signal Association, Inc." (IMSA) Specifications.

At intersections where a minimum of 10 ft. spacing between adjacent accessible pedestrian signal units is not possible, provide each accessible pedestrian pushbutton with the following features: a pushbutton locator tone, a tactile arrow, a speech walk message for the walking person indication and a speech pushbutton information message.

Provide pedestrian push buttons a minimum of 2 in. diameter in the smallest dimension.

Install a rubber grommet or bushing between the push button assembly and the signal pole to protect the conductors.

Item 6001: Portable Changeable Message Sign

All portable changeable message sign units must be set up on a work area and operational before a calendar day can be considered measurable.

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

A shadow vehicle with Truck Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

Level 3 Compliant TMAs/TAs are required for this project.

A total of one (1) shadow vehicle with a TMA/TA is required for the work with the exception of Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

A total of three (3) shadow vehicles with a TMA/TA are required for Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

Basis of Estimate

Item	Description	Limit and Rate	Unit
316	Seal Coat • Asphalt • Aggregate	 0.18 Gal./ Sq. Yd. 1/135 Cu. Yd./Sq Yd.	 GAL CY
347	Thin Overlay Mixtures (TOM-F) • Asphalt • Aggregate	113 Lb. / Sq. Yd.-In. 7 % by weight 93% by weight	TON

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1257-01-052 **DISTRICT** Houston **COUNTY** Fort Bend, Harris
HIGHWAY FM 1092

			CONTROL SECTION JOB		**1257-01-052**		**1257-02-006**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00125797**		**A00124592**			
			COUNTY		**Fort Bend**		**Harris**			
			HIGHWAY		**FM 1092**		**FM 1092**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	80.000				80.000	
	305-6015	SALV, HAUL & STKPL RCL APH PV (1 1/2")	SY	218,612.000		5,926.000		224,538.000	
	316-6017	ASPH (AC-20-5TR)	GAL	39,350.000		3,498.000		42,848.000	
	316-6444	AGGR (TY-PB OR PL GR 5 SAC-B)	CY	1,619.000		144.000		1,763.000	
	347-6001	TOM (ASPHALT) PG 76-22	TON	864.000		77.000		941.000	
	347-6007	TOM - F (AGGREGATE) SAC - A	TON	11,487.000		1,021.000		12,508.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	1,000.000				1,000.000	
	354-6036	PLANE CONC PAV(0" TO 1-1/2")	SY			13,507.000		13,507.000	
	361-6002	FULL - DEPTH REPAIR CRCP (8")	SY	500.000				500.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	38.000				38.000	
	479-6001	ADJUSTING MANHOLES	EA	23.000				23.000	
	500-6001	MOBILIZATION	LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7.000				7.000	
	529-6011	CONC CURB (DOWEL)	LF	100.000				100.000	
	529-6012	CONC CURB (SLOTTED)	LF	225.000				225.000	
	531-6001	CONC SIDEWALKS (4")	SY	140.000				140.000	
	531-6004	CURB RAMPS (TY 1)	EA	5.000				5.000	
	531-6005	CURB RAMPS (TY 2)	EA	1.000				1.000	
	531-6008	CURB RAMPS (TY 5)	EA	2.000				2.000	
	531-6010	CURB RAMPS (TY 7)	EA	4.000				4.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	325.000				325.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	7.000				7.000	
	540-6014	SHORT RADIUS	LF	69.000				69.000	
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA	3.000				3.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	4.000				4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	325.000				325.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	7.000				7.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	5.000				5.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	5.000				5.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	3.000				3.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA	3.000				3.000	
	560-6012	MAILBOX INSTALL-D (TWW-POST) TY 4	EA	1.000				1.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	1,425.000		230.000		1,655.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	255.000		170.000		425.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	80.000				80.000	
	618-6070	CONDT (RM) (2")	LF	280.000				280.000	
	618-6074	CONDT (RM) (3")	LF	50.000				50.000	

Estimate & Quantity Sheet

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HIGHWAY FM 1092

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			PROJECT ID		**A00125797**		**A00124592**			
			COUNTY		**Fort Bend**		**Harris**			
			HIGHWAY		**FM 1092**		**FM 1092**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	620-6009	ELEC CONDR (NO.6) BARE	LF	2,065.000		395.000		2,460.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	13.000		3.000		16.000	
	625-6004	ZINC-COAT STL WIRE STRAND (5/16")	LF	1,280.000				1,280.000	
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	22.000				22.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	58.000		2.000		60.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	24.000				24.000	
	644-6005	IN SM RD SN SUP&AM TY10BWG(1)SA(T-2EXT)	EA	1.000				1.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	2.000				2.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	15.000				15.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	4.000				4.000	
	644-6036	IN SM RD SN SUP&AM TYS80(1)SA(U-BM)	EA	9.000				9.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	114.000		2.000		116.000	
	658-6010	INSTL DEL ASSM (D-SW)SZ 2(WC)GND	EA	10.000				10.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	16.000				16.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	6.000				6.000	
	658-6053	INSTL OM ASSM (OM-3L)(TWT)GND	EA	5.000				5.000	
	658-6057	INSTL OM ASSM (OM-3R)(TWT)GND	EA	5.000				5.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	14.000				14.000	
	658-6097	INSTL DEL ASSM (D-SY)SZ 1(YFLX)SRF(BI)	EA	14.000				14.000	
	662-6005	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	LF	45,064.000		5,401.000		50,465.000	
	662-6006	WK ZN PAV MRK NON-REMOV (W)6"(DOT)	LF	654.000				654.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	100,533.000		600.000		101,133.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	40,623.000		3,237.000		43,860.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	6,054.000		480.000		6,534.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	375.000		21.000		396.000	
	662-6018	WK ZN PAV MRK NON-REMOV (W)(DBL ARW)	EA	9.000				9.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	354.000		21.000		375.000	
	662-6030	WK ZN PAV MRK NON-REMOV(W)18"(YLD TRI)	EA	87.000				87.000	
	662-6036	WK ZN PAV MRK NON-REMOV (Y)6"(DOT)	LF	129.000				129.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	1,347.000				1,347.000	
	662-6041	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)	LF	75.000				75.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	327.000				327.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	13,541.000		1,079.000		14,620.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	7,010.000		380.000		7,390.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	5,448.000		315.000		5,763.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	125.000		7.000		132.000	
	666-6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	3.000				3.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1257-01-052 **DISTRICT** Houston **COUNTY** Fort Bend, Harris
HIGHWAY FM 1092

			CONTROL SECTION JOB		**1257-01-052**		**1257-02-006**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00125797**		**A00124592**			
			COUNTY		**Fort Bend**		**Harris**			
			HIGHWAY		**FM 1092**		**FM 1092**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	118.000		7.000		125.000	
	666-6099	REF PAV MRK TY I(W)18"(YLD TRI)(100MIL)	EA	29.000				29.000	
	666-6132	REFL PAV MRK TY I (Y)6"(DOT)(100MIL)	LF	43.000				43.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	25.000				25.000	
	666-6228	PAVEMENT SEALER 12"	LF	7,010.000		380.000		7,390.000	
	666-6230	PAVEMENT SEALER 24"	LF	3,430.000		155.000		3,585.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	15,021.000		1,800.000		16,821.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	33,511.000		200.000		33,711.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	449.000				449.000	
	672-6007	REFL PAV MRKR TY I-C	EA	1,428.000		144.000		1,572.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	36.000				36.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	840.000				840.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	1,150.000		176.000		1,326.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	7,010.000		380.000		7,390.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	3,430.000		155.000		3,585.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	22.000				22.000	
	684-6007	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	LF	4,695.000				4,695.000	
	684-6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	4,785.000				4,785.000	
	684-6080	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF	7,100.000		1,545.000		8,645.000	
	687-6001	PED POLE ASSEMBLY	EA	17.000				17.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	22.000				22.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	5.000				5.000	
	688-6004	VEH LP DETECT (SAWCUT)	LF	2,660.000		510.000		3,170.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	35.000		7.000		42.000	
	6185-6002	TMA (STATIONARY)	DAY	63.000		2.000		65.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	36.000		2.000		38.000	
	08	EROSION CONTROL MAINTENANCE (NON-PART)	LS	1.000				1.000	
		LAW ENFORCEMENT	LS	1.000				1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000				1.000	

Item_Code			305-6015	316-6017	316-6444	347-6001	347-6007	351-6002	354-6036	361-6002	432-6045	479-6001	500-6001	502-6001	540-6001	540-6006
Description			SALV, HAUL & STKPL RCL APH PV (1.5")	ASPH (AC-20-5TR)	AGGR (TY-PB OR PL GR-5 SAC-B)	TOM (ASPHALT) (PG76-22)	TOM-F (AGGEGATE) (SAC-A)	FLEX PAV STRUCT REPAIR (6")	PLANE (CONC PAV) (0 TO 1.5")	FULL DEPTH REPAIR CRCP (8")	RIPRAP (MOWSTRIP) (4")	ADJUSTING MANHOLES	Mobilization	Barricades, Signs & Traffic Handling	MBGF (TIM POST) (INSTALL)	MBGF TRANS (THRIE-BM)
Unit			SY	GAL	CY	TON	TON	SY	SY	SY	CY	EA	LS	MO	LF	EA
Roadway Sheets	From Sta.	To Sta.														
1 of 14	1+17.70	22+00.00	6,406	3,584	148	79	1,046		13,507							
2 of 14	22+00.00	44+00.00	21,021	3,784	156	83	1,105				13	1			175	
3 of 14	44+00.00	66+00.00	20,621	3,712	153	82	1,084					3				
4 of 14	66+00.00	88+00.00	20,989	3,778	155	83	1,103					12				
5 of 14	88+00.00	110+00.00	5,445	980	40	22	286					3				
6 of 14	110+00.00	132+00.00	0	0	0	0	0									
7 of 14	132+00.00	154+00.00	13,738	2,473	102	54	722				11	2			25	3
8 of 14	154+00.00	176+00.00	18,427	3,317	136	73	968									
9 of 14	176+00.00	198+00.00	19,305	3,475	143	76	1,014					1				
10 of 14	198+00.00	220+00.00	17,142	3,086	127	68	901									
11 of 14	220+00.00	242+00.00	19,964	3,594	148	79	1,049					1				
12 of 14	242+00.00	264+00.00	23,634	4,254	175	93	1,242									
13 of 14	264+00.00	286+00.00	18,132	3,264	134	72	953				7				62.50	2
14 of 14	286+00.00	307+91.00	19,714	3,549	146	78	1,036				7				62.50	2
TOTAL			224,538	42,848	1,763	941	12,508	1,000*	13,507	500*	38	23	1	7	325	7

* LOCATIONS OF BASE REPAIR AND CONCRETE FULL DEPTH REPAIR HAVE NOT BEEN SHOWN IN THE LAYOUTS
THESE LOCATIONS WILL BE DIDRECTED BY THE ENGINEER IN THE FIELD.

SUMMARY OF ROADWAY QUANTITIES

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		20

Item_Code			540-6014	540-6015	540-6016	542-6001	542-6002	542-6004	544-6001	544-6003	560-6011	560-6012	6001-6001	6185-6002	6185-6005
			MBGF SHORT RADIUS	DRIVEWAY ANCHOR TERMINAL SECTION	D/S ANCHOR TERMINAL SECTION	REMOVE MBGF	REMOVE TERMINAL ANCHOR SECTION	REMOVE MBGF TRANS (Thrie-Beam)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	MAILBOX INSTALL-S (TWW-POST) (TY 4)	MAILBOX INSTALL-D (TWW-POST) (TY 4)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
Unit			LF	EA	EA	LF	EA	EA	EA	EA	EA	EA	DAY	DAY	DAY
Roadway Sheets	From Sta.	To Sta.													
1 of 14	1+17.70	22+00.00													
2 of 14	22+00.00	44+00.00			2	175	2		2						
3 of 14	44+00.00	66+00.00									2	1			
4 of 14	66+00.00	88+00.00									1				
5 of 14	88+00.00	110+00.00													
6 of 14	110+00.00	132+00.00													
7 of 14	132+00.00	154+00.00	69	3		25	3	1	1	1					
8 of 14	154+00.00	176+00.00													
9 of 14	176+00.00	198+00.00													
10 of 14	198+00.00	220+00.00													
11 of 14	220+00.00	242+00.00													
12 of 14	242+00.00	264+00.00													
13 of 14	264+00.00	286+00.00			1	62.5	1	2	1	1					
14 of 14	286+00.00	307+91.00			1	62.5	1	2	1	1					
			69	3	4	325	7	5	5	3	3	1	42	65	38

SUMMARY OF ROADWAY QUANTITIES

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		20A

Item_Code			662-6005	0662-6006	662-6008	662-6012	662-6016	662-6017	662-6018	662-6029	662-6030	662-6036	662-6037	662-6041
Description			WK ZN PAV MRK NON-REMOV (W)(6") (BRK)	WK ZN PAV MRK NON-REMOV (W)(6") (DOT)	WK ZN PAV MRK NON-REMOV (W)(6") (SLD)	WK ZN PAV MRK NON-REMOV (W)(8") (SLD)	WK ZN PAV MRK NON-REMOV (W)(24") (SLD)	WK ZN PAV MRK NON-REMOV (W) (ARROW)	WK ZN PAV MRK NON-REMOV (W)(DBL ARW)	WK ZN PAV MRK NON-REMOV (W) (WORD)	WK ZN PAV MRK NON-REMOV (W)18" (YLD TRI)	WK ZN PAV MRK NON-REMOV (Y)6"(DOT)	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)
Unit			LF	LF	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF
Pavement Marking Sheets	From Sta.	To Sta.												
2 of 14	22+00.00	44+00.00	6,000		480	3,690	618	27		27				
3 of 14	44+00.00	66+00.00	6,600			3,021		24		24				
4 of 14	66+00.00	88+00.00	6,159		480	3,459		30		33				
5 of 14	88+00.00	110+00.00	1,268		480	744	156	9		6				
6 of 14	110+00.00	132+00.00												
7 of 14	132+00.00	154+00.00	2,514		3,480	3,744	579	36	6	30	45			
8 of 14	154+00.00	176+00.00	2,985		13,440	2,505	402	27		24				
9 of 14	176+00.00	198+00.00	2,993	218	13,539	4,569	717	39		39				
10 of 14	198+00.00	220+00.00	3,263		13,320	1,593		18		15				
11 of 14	220+00.00	242+00.00	2,963	98	14,016	4,890	522	48		48		129	1,275	75
12 of 14	242+00.00	264+00.00	4,304	234	13,920	5,637	1,623	48		45				
13 of 14	264+00.00	286+00.00	3,023		13,440	2,487	510	21		21			72	
14 of 14	286+00.00	307+91.00	2,994	104	13,938	4,284	927	48	3	42	42			
CSJ 1257-01-052		TOTAL	45,064	654	100,533	40,623	6,054	375	9	354	87	129	1,347	75

Item_Code			662-6005	0662-6006	662-6008	662-6012	662-6016	662-6017	662-6018	662-6029	662-6030	662-6036	662-6037	662-6041
Description			WK ZN PAV MRK NON-REMOV (W)(6") (BRK)	WK ZN PAV MRK NON-REMOV (W)(6") (DOT)	WK ZN PAV MRK NON-REMOV (W)(6") (SLD)	WK ZN PAV MRK NON-REMOV (W)(8") (SLD)	WK ZN PAV MRK NON-REMOV (W)(24") (SLD)	WK ZN PAV MRK NON-REMOV (W) (ARROW)	WK ZN PAV MRK NON-REMOV (W)(DBL ARW)	WK ZN PAV MRK NON-REMOV (W) (WORD)	WK ZN PAV MRK NON-REMOV (W)18" (YLD TRI)	WK ZN PAV MRK NON-REMOV (Y)6"(DOT)	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)
Unit			LF	LF	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF
Pavement Marking Sheets	From Sta.	To Sta.												
1 of 14	1+17.70	22+00.00	5,401		600	3,237	480	21		21				
CSJ 1257-01-006		TOTAL	5,401		600	3,237	480	21		21				

SUMMARY OF SIGNING & PAVEMENT MARKING QUANTITIES

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		21

Item_Code			666-6018	666-6036	666-6048	666-6054	666-6057	666-6078	666-6099	666-6132	666-6147	666-6306	666-6309	666-6321
Description			REFL PAV MRK TY I (W)6"(DOT)(100MIL)	REFL PAV MRK TY I (W)(8") (SLD) (100 MIL)	REFL PAV MRK TY I (W)(24") (SLD) (100 MIL)	REFL PAV MRK TY I (W) (ARROW) (100 MIL)	REFL PAV MRK TY I (W) (DBL ARROW) (100 MIL)	REFL PAV MRK TY I (W) (WORD) (100 MIL)	REFL PAV MRK TY I (W)18" (YLD TRI) (100 MIL)	REFL PAV MRK TY I (Y)6"(DOT) (100MIL)	REFL PAV MRK Tyl (Y)24"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)(6") (BRK) (100 MIL)	RE PM W/RET REQ TY I (W)(6") (SLD) (100 MIL)	RE PM W/RET REQ TY I (Y)(6") (SLD) (100 MIL)
Unit			LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF
Pavement Marking Sheets	From Sta.	To Sta.												
2 of 14	22+00.00	44+00.00		1230	206	9		9				2000	160	
3 of 14	44+00.00	66+00.00		1007		8		8				2200		
4 of 14	66+00.00	88+00.00		1153		10		11				2053	160	
5 of 14	88+00.00	093+72.70		248	52	3		2				423	160	
6 of 14	110+00.00	132+00.00												
7 of 14	136+23.85	154+00.00		1248	193	12	2	10	15			838	1160	
8 of 14	154+00.00	176+00.00		835	134	9		8				995	4480	
9 of 14	176+00.00	198+00.00	109	1523	239	13		13				998	4513	
10 of 14	198+00.00	220+00.00		531		6		5				1088	4440	
11 of 14	220+00.00	242+00.00	49	1630	174	16		16		43	25	988	4672	425
12 of 14	242+00.00	264+00.00	117	1879	541	16		15				1435	4640	
13 of 14	264+00.00	286+00.00		829	170	7		7				1008	4480	24
14 of 14	286+00.00	307+91.00	52	1428	309	16	1	14	14			998	4646	
CSJ 1257-01-052		TOTAL	327	13541	2018	125	3	118	29	43	25	15021	33511	449

Item_Code			666-6018	666-6036	666-6048	666-6054	666-6057	666-6078	666-6099	666-6132	666-6147	666-6306	666-6309	666-6321
Description			REFL PAV MRK TY I (W)6"(DOT)(100MIL)	REFL PAV MRK TY I (W)(8") (SLD) (100 MIL)	REFL PAV MRK TY I (W)(24") (SLD) (100 MIL)	REFL PAV MRK TY I (W) (ARROW) (100 MIL)	REFL PAV MRK TY I (W) (DBL ARROW) (100 MIL)	REFL PAV MRK TY I (W) (WORD) (100 MIL)	REFL PAV MRK TY I (W)18" (YLD TRI) (100 MIL)	REFL PAV MRK TY I (Y)6"(DOT) (100MIL)	REFL PAV MRK Tyl (Y)24"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)(6") (BRK) (100 MIL)	RE PM W/RET REQ TY I (W)(6") (SLD) (100 MIL)	RE PM W/RET REQ TY I (Y)(6") (SLD) (100 MIL)
Unit			LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF
Pavement Marking	From Sta.	To Sta.												
1 of 14	1+17.70	22+00.00		1079	160	7		7				1800	200	
CSJ 1257-01-006		TOTAL		1079	160	7		7				1800	200	

SUMMARY OF SIGNING & PAVEMENT MARKING QUANTITIES

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		21A

Item_Code			658-6010	658-6013	658-6047	658-6053	658-6057	658-6061	658-6097	672-6007	672-6009	677-6007
Description			INSTL DEL ASSM (D-SW)SZ 2(WC) GND	INSTL DEL ASSM (D-SW)SZ (BRF) CTB	INSTL OM ASSM (OM-2Y) (WC)GND	INSTL OM ASSM (OM-3L) (TWT)GND	INSTL OM ASSM (OM-3R) (TWT)GND	INSTL DEL ASSM (D-SW) SZ1 (BRF)GF2	INSTL DEL ASSM (D-DY) SZ1 (YFLX) SRF(BI)	REFL PAV MRKR TY1-C	REFL PAV MRKR TY-II A-A	ELIM EXT PAV MRK & MRKS (24")
Unit			EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
Pavement Marking	From Sta.	To Sta.										
2 of 14	22+00.00	44+00.00					1	6		162		408
3 of 14	44+00.00	66+00.00				2	1			160		
4 of 14	66+00.00	88+00.00								160		
5 of 14	88+00.00	093+72.70								34		
6 of 14	110+00.00	132+00.00										
7 of 14	136+23.85	154+00.00		6				4		104		233
8 of 14	154+00.00	176+00.00			2					92		
9 of 14	176+00.00	198+00.00				3	3			126		
10 of 14	198+00.00	220+00.00								81		
11 of 14	220+00.00	242+00.00								131	36	
12 of 14	242+00.00	264+00.00								166		129
13 of 14	264+00.00	286+00.00	10	10	4			2		92		
14 of 14	286+00.00	307+91.00						2	14	121		
CSJ 1257-01-052		TOTAL	10	16	6	5	5	14	14	1428	36	770

Item_Code			658-6011	658-6013	658-6047	658-6053	658-6057	658-6061	658-6097	672-6007	672-6009	677-6007
Description			INSTL DEL ASSM (D-SW)SZ2 (WC) GND(BI)	INSTL DEL ASSM (D-SW)SZ (BRF) CTB	INSTL OM ASSM (OM-2Y) (WC)GND	INSTL OM ASSM (OM-3L) (TWT)GND	INSTL OM ASSM (OM-3R) (TWT)GND	INSTL DEL ASSM (D-SW) SZ1 (BRF)GF2	INSTL DEL ASSM (D-DY) SZ1 (YFLX) SRF(BI)	REFL PAV MRKR TY1-C	REFL PAV MRKR TY-II A-A	ELIM EXT PAV MRK & MRKS (24")
Unit			EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
Pavement Marking	From Sta.	To Sta.										
1 of 14	1+17.70	22+00.00								144		176
CSJ 1257-01-006		TOTAL								144		176

SUMMARY OF SIGNING & PAVEMENT MARKING QUANTITIES

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		21B

SUMMARY OF SMALL SIGNS

LAYOUT SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	644 - INS SM RD SN SUP & AM — TYPE OF MOUNT: 6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6007 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6028 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6076 REMV SM RD SN SUP&AM EA	636 — 6007 REPLACE EXT ALUM SIGNS (TY A) SF
1	1	M3-3	SOUTH	24x12		X	X																	X	
		M1-6F	FM 1092	24x24		X																			
		D10-7aT	REFERENCE MRKR 476	10x3		X	FRONT & BACK																		
	2	M2-1	JUNCTION	30x36		X	X																	X	
		M1-4	US 59	21x15		X																			
	3	M3-3	SOUTH	24x12		X	X																	X	
		M1-6F	FM 1092	24x24		X																			
		D10-7aT	REFERENCE MARKR 478	10x3		X	FRONT & BACK																		
2	1	R1-1	STOP	36x36		X	X																	X	
	2	R1-1	STOP	36x36		X	X																	X	
	3	R14-3	NO HAZARDOUS MATERIAL (SYMBOL)	24x24		X	X																	X	
		M3-3	SOUTH	24x12		X																			
		M1-6F	FM 1092	24x24		X																			
		D10-7aT	REFERENCE MARKR 478	10x3		X																			
	4	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	5	R1-1	STOP	36x36		X	X																	X	
	6	D3-2(1)	W. Airport Blvd NEXT SIGNAL	78x30		X															X			X	
	7	R3-1	NO RIGHT TURN (SYMBOL)	24x24		X	X																	X	
		R5-2a	NO TRUCKS	24x24		X																			
	8	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	9	D3-2(1)	W. Airport Blvd NEXT SIGNAL	78x30		X															X			X	
3																									
	1	R8-3aTDBL	NO PARKING ⇦⇨	24x30		X	X																	X	
	2	R1-1	STOP	36x36		X	X																	X	
	3	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	4	R2-1	SPEED LIMIT 45	36x48		X			X															X	
4	1	D3-2(2)	⇦ Mula Rd Greenbriar Dr ⇨ NEXT SIGNAL	64x42		X															X			X	
	2	M3-1	NORTH	24x12		X	X																	X	
		M1-6F	FM 1092	24x24		X																			
	3	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	4	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	5	D3-2(2)	⇦ Greenbriar Dr Mula Rd ⇨ NEXT SIGNAL	84x42		X															X			X	
	6	D3-2(1)	Cash Rd NEXT SIGNAL	54x30		X			X															X	
	7	D1-1(3)	Stafford Centre Houston Community College ⇦	96x48		X															X			X	
5	1	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	2	D3-2(1)	Cash Rd NEXT SIGNAL	54x30		X			X															X	
6																									
				SUB TOTAL			11		9												5			25	

GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKS(TY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		22

SUMMARY OF SMALL SIGNS

LAYOUT SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	644 - INS SM RD SN SUP & AM — TYPE OF MOUNT: 6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6007 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6028 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6076 REMV SM RD SN SUP&AM EA	636 6007 REPLACE EXT ALUM SIGNS (TY A) SF
7	1	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	2	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	3	R3-33TL	RIGHT LANE MUST EXIT	48x48		X			X															X	
	4	R1-5aL	YIELD HERE TO PEDESTRIANS (SYMB)	36x48		X			X															X	
	5	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	6	I-2aT	Stafford CITY LIMIT POP 17,666	48x24		X			X															X	
	7	D3-2(1)	Ave E NEXT SIGNAL	54x30		X			X															X	
	8	R1-1	STOP	36x36		X	X																	X	
8	1	R1-1	STOP	36x36		X	X																	X	
	2	R1-1	STOP	36x36		X	X																	X	
	3	D3-2(1)	Dove Country Dr NEXT SIGNAL	84x30		X															X			X	
	4	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	5	W1-7	TWO-DIRECTION LARGE ARROW	48x24		X			X															X	
	6	D3-2(1)	Dove Country Dr NEXT SIGNAL	84x30		X															X			X	
	7	R1-1	STOP	36x36		X	X																	X	
	8	R2-1	SPEED LIMIT 45	36x48		X			X															X	
	9	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	10	R1-1	STOP	36x36		X	X																	X	
9																									
	1	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	2	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	3	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	4	R3-8 SSR	ADVANCE INTER LANE CONTROL SSR	48x30		X			X															X	
	5	R1-1	STOP	36x36		X	X																	X	
	6	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	7	R2-1	SPEED LIMIT 50	48x60		X										X								X	
10	1	R1-1	STOP	36x48		X	X																	X	
	2	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES MISSOURI CITY GREEN A KEEP TEXAS BEAUTIFUL AFFILIATE	48x48		X	2 SEPARATE SIGNS											X						X	
		CW21-1aT	WORKERS AHEAD (SYMBOL)	48x48		X	HINGED																		
	3	R2-1	SPEED LIMIT 50	48x60		X										X								X	
11	1	R5-1-5aL	YIELD HERE TO PEDESTRIANS (SYMB)	36x48		X			X															X	
	2	R5-1	DO NOT ENTER	36x36		X	X																	X	
	3	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	4	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	5	R1-1	STOP	36x36		X	X																	X	
	6	M3-3	SOUTH	24x12		X	X																	X	
		M1-6F	FM 1092	24x24		X																			
	7	R1-1	STOP	36x36		X	X																	X	
	8	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
				SUB TOTAL			16		10							7		1			2			36	

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GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKS(TY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		23

SUMMARY OF SMALL SIGNS

LAYOUT SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	644 - INS SM RD SN SUP & AM																			636
							TYPE OF MOUNT																			
							6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6007 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6028 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6076 REMV SM RD SN SUP&AM EA	REPLACE EXT ALUM SIGNS (1) 6009 SF
12	1	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	2	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	3	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	4	W3-3	SIGNAL AHEAD (SYMBOL)	36x36		X	X																	X	
	5	W9-2TL	LANE ENDS MERGE LEFT	36x36		X	X																	X	
	6	M2-1	JCT	21x15		X	X																	X	
		M1-6F	FM 3345	24x24		X																			
	7	D3-2(1)	Cartwright Rd NEXT SIGNAL	72x30		X					X													X	
	8	W9-2TL	LANE ENDS MERGE LEFT	36x36		X	X																	X	
	9	M3-1	NORTH	24x12		X	X																	X	
		M1-6F	FM 1092	24x24		X																			
	10	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	11	W9-1R	RIGHT LANE ENDS	36x36		X	X																	X	
	12	M3-2	EAST	24x12		X													X					X	
		M1-6F	FM 3345	24x24		X																			
		M6-1	⇦	21x15		X																			
		M3-3	SOUTH	24x12		X																			
		M1-6F	FM 1092	24x24		X																			
		M6-3	⇧	21x15		X																			
	13	M3-1	NORTH	24x12		X													X					X	
		M1-6F	FM 1092	24x24		X																			
		M6-3	⇧	21x15		X																			
		M3-2	EAST	24x12		X																			
		M1-6F	FM 3345	24x24		X																			
		M6-1	⇨	21x15		X																			
	14	W9-1R	RIGHT LANE ENDS	36x36		X	X																	X	
	15	W9-2TL	LANE ENDS MERGE LEFT	36x36		X	X																	X	
	16	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																	X	
	17	D3-2(1)	Cartwright Rd NEXT SIGNAL	72x30		X					X													X	
	18	M3-3	SOUTH	24x12		X	X																	X	
		M1-6F	FM 1092	24x24		X																			
	19	M2-1	JCT	21x15		X	X																	X	
		M1-6F	FM 3345	24x24		X																			
	20	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	21	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	22	W3-3	SIGNAL AHEAD (SYMBOL)	36x36		X	X																	X	
	23	D3-2(2)	⇦ El Dorado Blvd Plantation Ridge Blvd NEXT SIGNAL	120x42		X																X		X	
13	1	D3-2(2)	Plantation Ridge Blvd El Dorado Blvd NEXT SIGNAL	120x42		X																X		X	
	2	S1-1	SCHOOL CROSSING (SYMBOL)	36x36		X	X																	X	
		SW16-9P	AHEAD	30x18		X																			
	3	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	4	S5-1	SCHOOL SPEED LIMIT 35 WHEN FLASHING	24x48		X	SOLAR POWERED REPLACE SIGN PANEL ONLY																			11
		S7-1T	CELL PHONE USE PROHIBITED UP TO $200 FINE	24x18		X																			
	5	R2-1	SPEED LIMIT 50	48x60		X										X								X	
	6	S5-2	END SCHOOL ZONE	24x30		X	X																	X	
	7	R1-1	STOP	36x36		X	X																	X	
	8	S1-1	SCHOOL CROSSING (SYMBOL)	36x36		X	X																	X	
	9	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36		X	X																	X	
	10	S1-1	SCHOOL CROSSING (SYMBOL)	36x36		X	X																	X	
		SW16-7PR	DIAGONAL ARROW (RIGHT)	30x18		X																			
	11	S1-1	SCHOOL CROSSING (SYMBOL)	36x36		X	X																	X	
		SW16-7PL	DIAGONAL ARROW (LEFT)	30x18		X																			
	12	S1-1	SCHOOL CROSSING (SYMBOL)	36x36		X	X																	X	
		SW16-7PL	DIAGONAL ARROW (LEFT)	30x18		X																			
				SUB TOTAL			22				2					6		2			2			35	11

GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKS(TY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

SHEET 3 OF 4

DIST	COUNTY	SHEET NO.
HOU	FORT BEND	24

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092

SUMMARY OF SMALL SIGNS

LAYOUT SHEET NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	644 - INS SM RD SN SUP & AM																			636
							TYPE OF MOUNT																			
							6001 10BWG (1) SA (P) EA	6002 10BWG (1) SA (P-BM) EA	6004 10BWG (1) SA (T) EA	6005 10BWG (1) SA (T-2EXT) EA	6007 10BWG (1) SA (U) EA	6017 10BWG (2) SA (P) EA	6019 10BWG (2) SA (T-2EXT) EA	6027 S80 (1) SA (P) EA	6028 S80 (1) SA (P-BM) EA	6030 S80 (1) SA (T) EA	6031 S80 (1) SA (T-2EXT) EA	6033 S80 (1) SA (U) EA	6034 S80 (1) SA (U-1EXT) EA	6035 S80 (1) SA (U-2EXT) EA	6036 S80 (1) SA (U-BM) EA	6037 S80 (1) SA (U-WC) EA	6050 S80 (2) SA (P) EA	6076 REMV SM RD SN SUP&AM EA	REPLACE EXT ALUM SIGNS (1) SF 6009
	13	D1-1	Quail Valley ⇨ Middle School	78x24		X				X															X	
	14	R1-1	STOP	36x36		X	X																		X	
	15	I-3	Oyster Creek	36X18		X			X																X	
	16	R10-7	DO NOT BLOCK INTERSECTION	24x30		X	X																		X	
14	1	S5-1	SCHOOL SPEED LIMT 35 WHEN FLASHING	24x48		X	SOLAR POWERED REPLACE SIGN PANEL ONLY																			11
		S7-1T	CELL PHONE USE PROHIBITED UP TO $200 FINE	24x18		X																				
	2	S5-2	END SCHOOL ZONE	24x30		X	X																		X	
	3	I-3	Oyster Creek	36X18		X			X																X	
	4	R1-1	STOP	36x36		X	X																		X	
	5	R2-1	SPEED LIMIT 50	48x60		X										X									X	
	6	R2-1	SPEED LIMIT 50	48x60		X										X									X	
	7	S1-1	SCHOOL CROSSING (SYMBOL)	36x36		X	X																		X	
		SW16-9P	AHEAD	30x18		X																				
	8	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36		X	X																		X	
	9	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36		X	X																		X	
	10	W3-3	SIGNAL AHEAD (SYMBOL)	36x36		X	X																		X	
	11	D3-2(1)	Township Ln NEXT SIGNAL	66x30		X			X																X	
	12	D3-2(1)	Hampton Dr NEXT SIGNAL	66x30		X			X																X	
	13	W1-2R	CURVE AHEAD	36x36		X	X																		X	
	14	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES	48x48		X	2 SEPARATE SIGNS											X							X	
			MISSOURI CITY GREEN A KEEP TEXAS BEAUTIFUL AFFILIATE																							
		CW21-1aT	WORKERS AHEAD (SYMBOL)	48x48		X	HINGED																			
	15	R3-5R	RIGHT TURN ONLY	36x36		X	X																		X	
	16	W3-3	SIGNAL AHEAD (SYMBOL)	48x48		X	X																		X	
	17	D1-2	⇦Arcola Richmond⇨	66x24		X			X																X	
				SUB TOTAL			11		5	1						2		1						20	11

GENERAL NOTES:

ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANK(SIY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

SUMMARY OF SMALL SIGNS

SHEET 4 OF 4

DIST	COUNTY	SECT	JOB	HIGHWAY
HOU	FORT BEND	01	052, ETC.	FM 1092
		CONT		SHEET NO.
		1257		25

DATE: 08/28/2021 09:13 AM
FILE: T:\FBEND-AO\DESIGN\PROJECTS\FM 1092 (1257-01-052)\STANDARDS\TRAFFIC CONTROL • BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS BC(1)-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

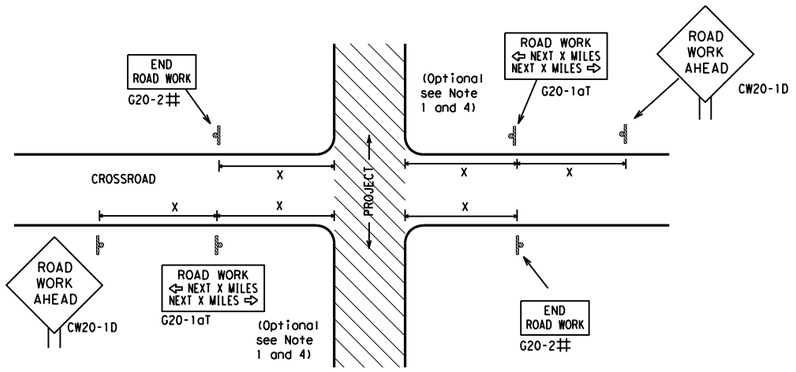
Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		26

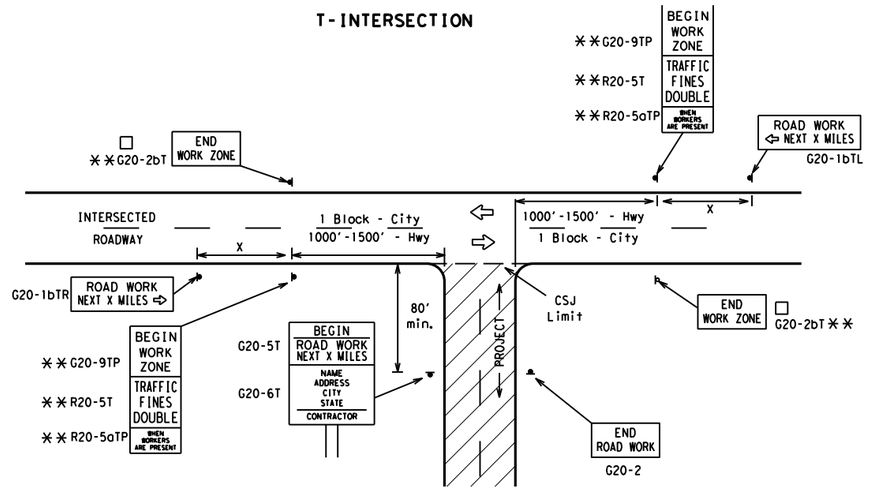
DATE: 08/09/2021 03:17 PM
FILE: T:\FBEND-AO\DESIGN\PROJECTS\FM 1092 (1257-01-052)\STANDARDS\TRAFFIC CONTROL\BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS BC(1)-21.dgn



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

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]

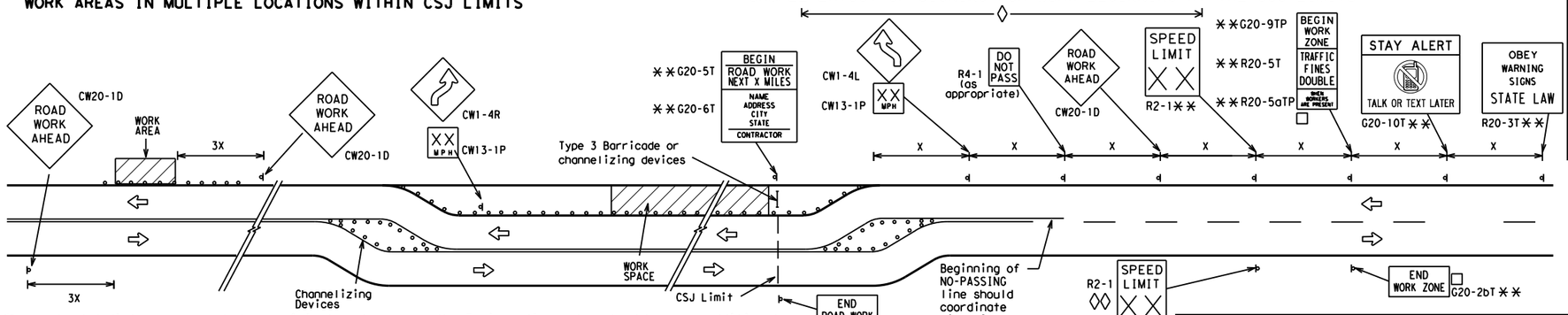
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

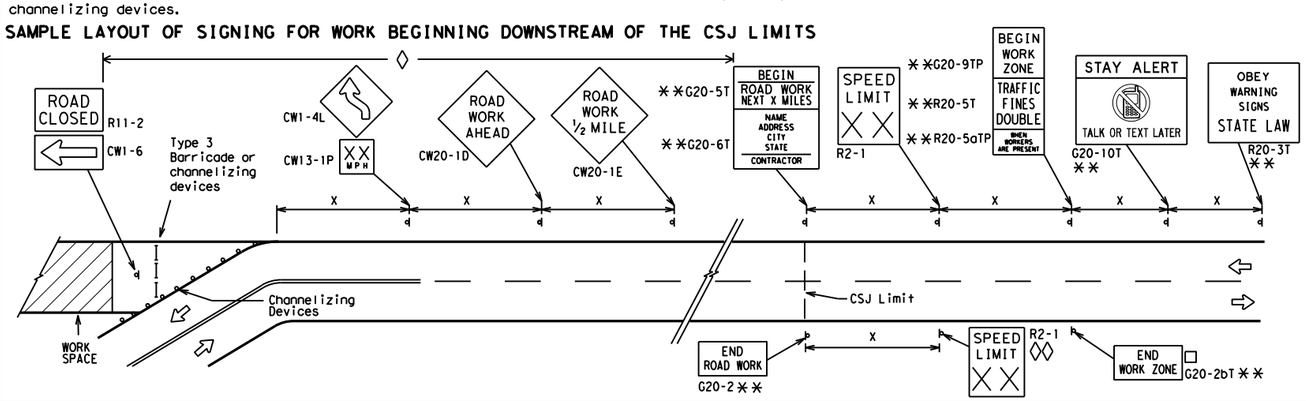
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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 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
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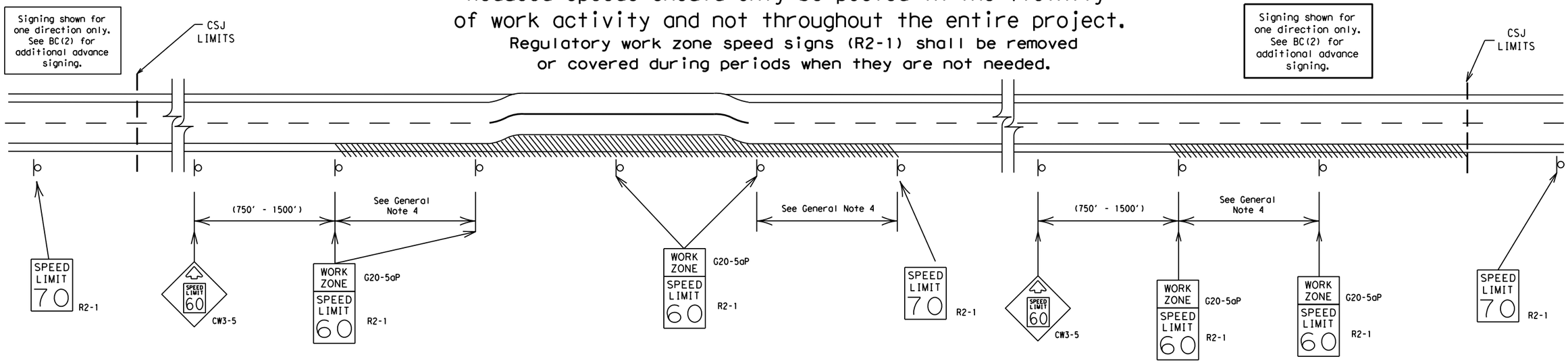
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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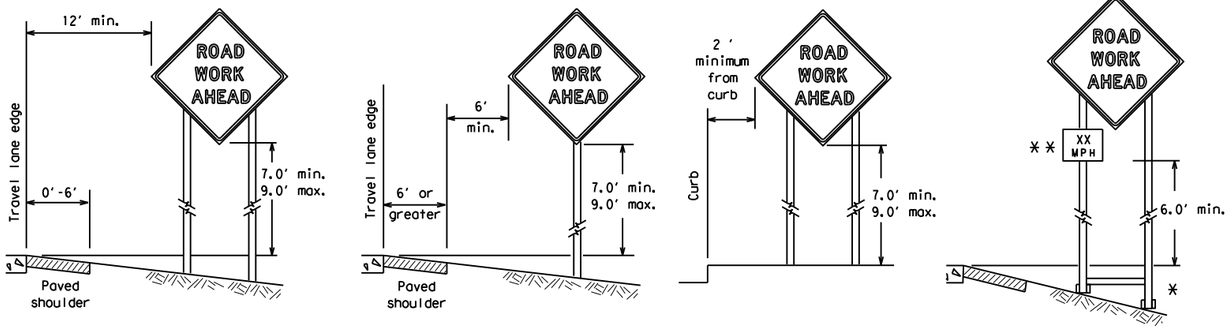
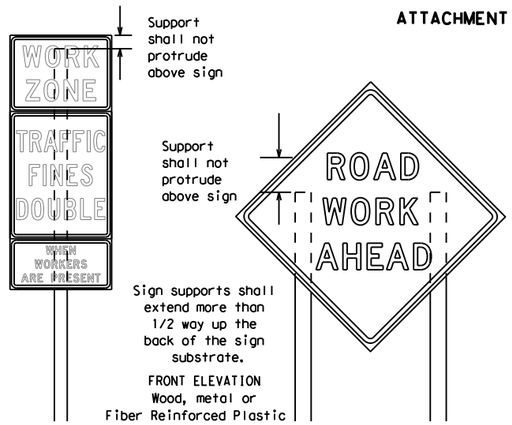
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

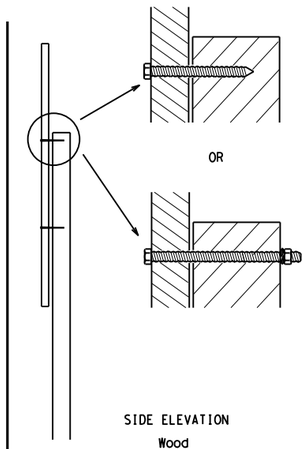


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





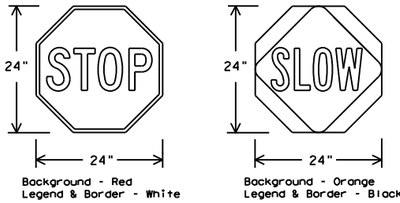
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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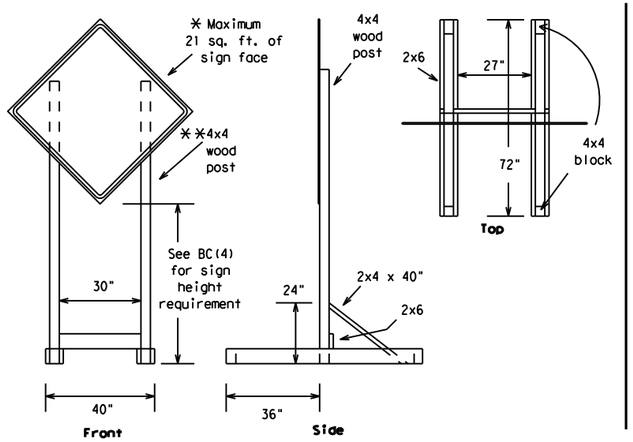
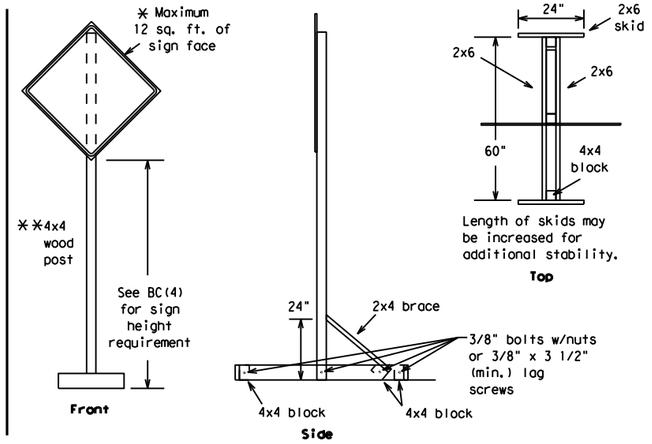
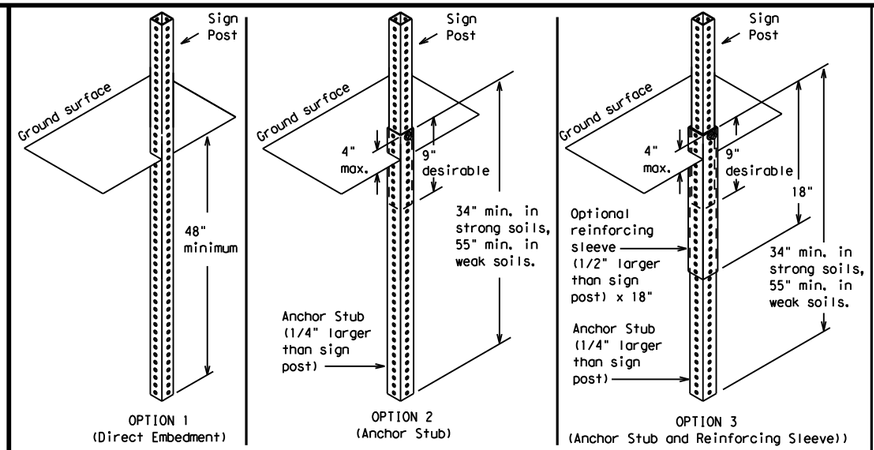




SKID MOUNTED WOOD SIGN SUPPORTS

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



PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		1257	01	052, ETC.	FM 1092
9-07 8-14		DIST	COUNTY		SHEET NO.
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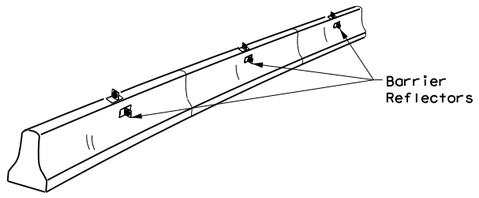
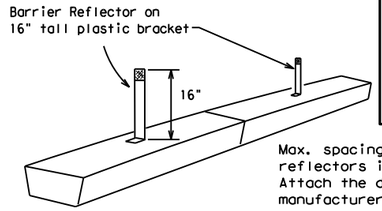
DATE: 08/09/2021 03:19 PM
FILE: T:\FBEND-AO\DESIGN\PROJECTS\FM 1092 (1257-01-052)\STANDARDS\TRAFFIC CONTROL• BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS BC(1)-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

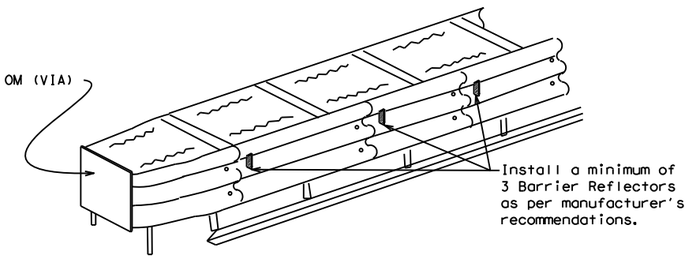


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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)

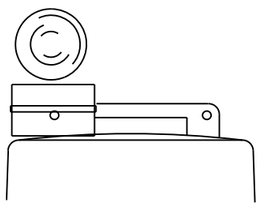


DELINEATION OF END TREATMENTS

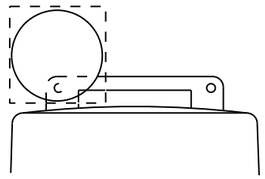
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

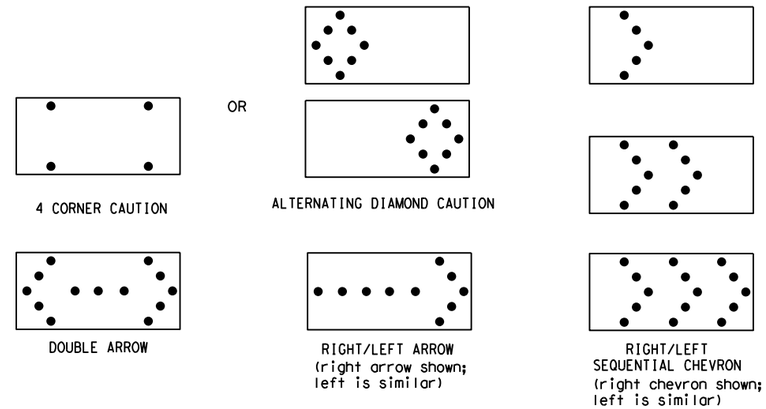
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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	1257	01	052, ETC.	FM 1092
9-07 8-14	DIST	COUNTY		SHEET NO.
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FILE: T:\FBEND-AO\DESIGN\PROJECTS\FM 1092 (1257-01-052)\STANDARDS\TRAFFIC CONTROL • BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS BC(11)-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

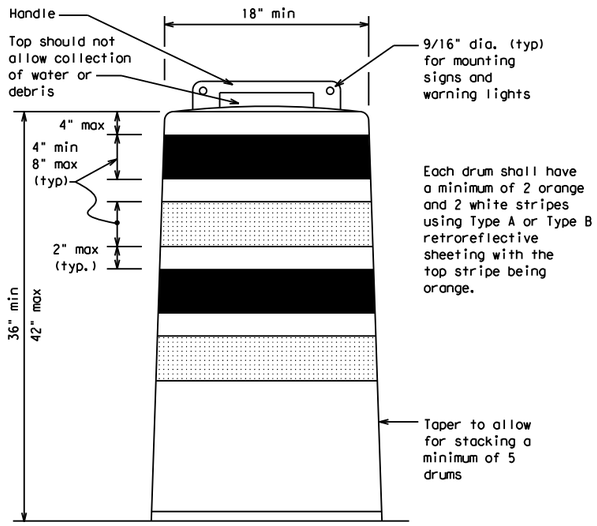
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

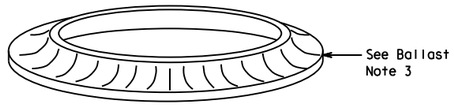
RETROREFLECTIVE SHEETING

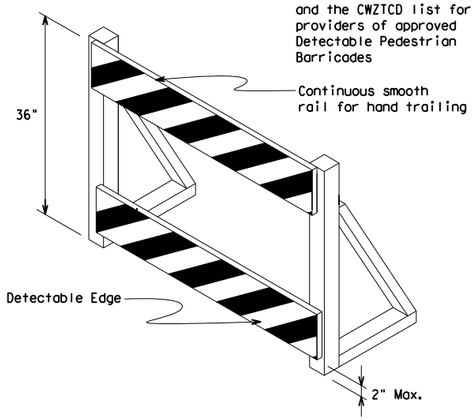
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

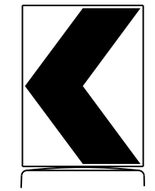




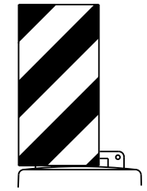


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	HOU	FORT BEND		33
7-13				

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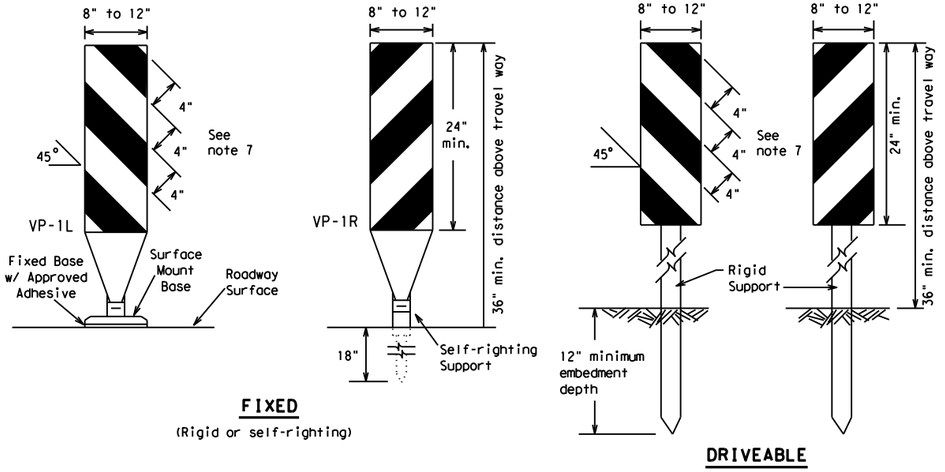
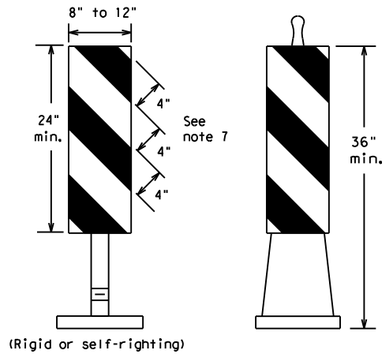


FIXED
(Rigid or self-righting)

DRIVEABLE

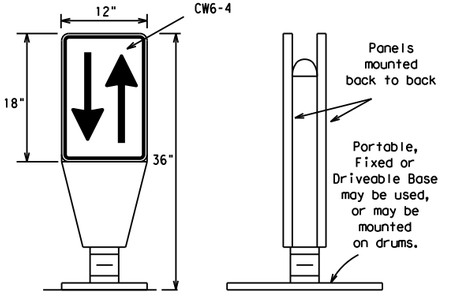


(Rigid or self-righting)

PORTABLE

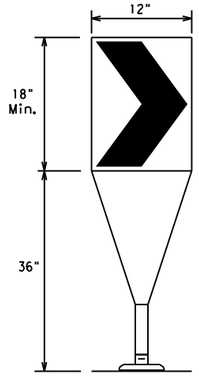
VERTICAL PANELS (VPs)

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)



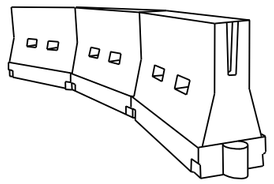
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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
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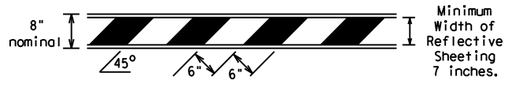
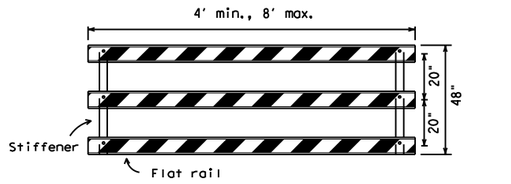
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



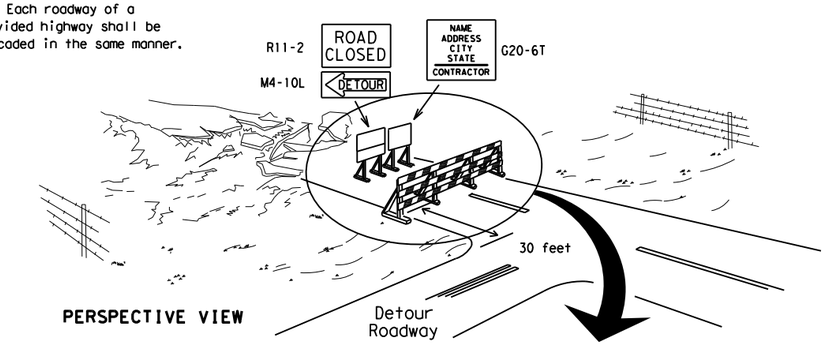
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

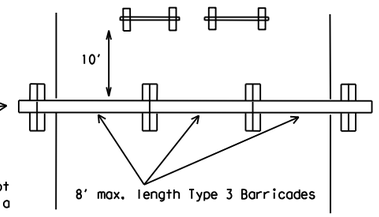
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

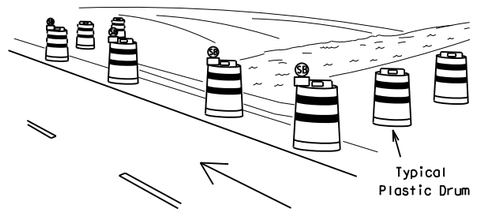
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

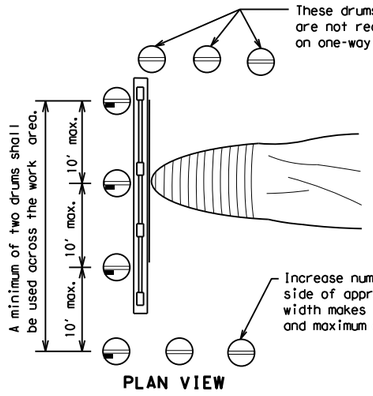
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

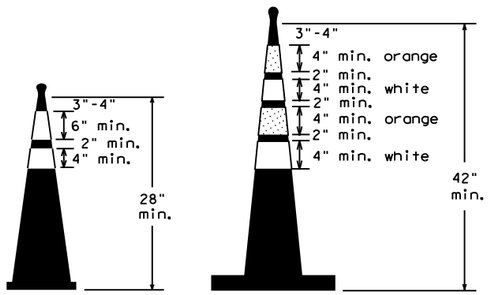
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

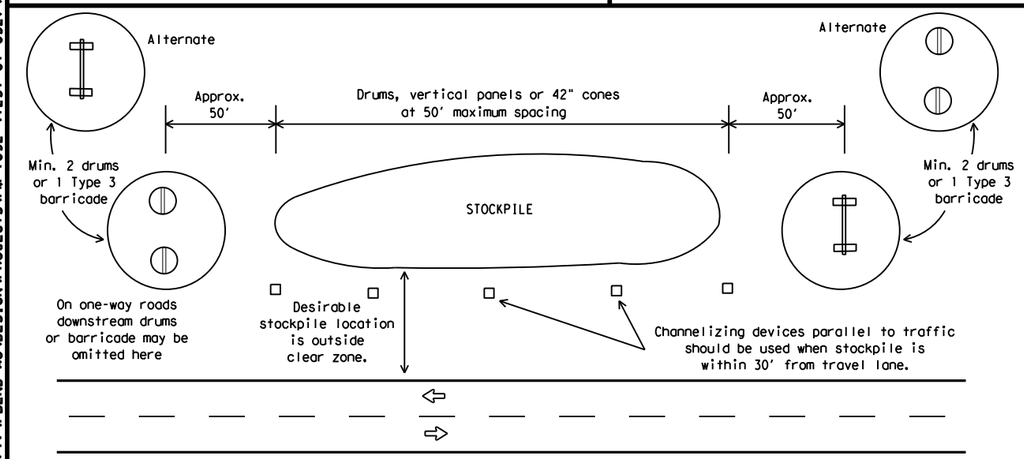
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

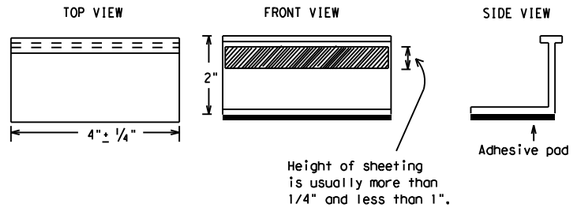
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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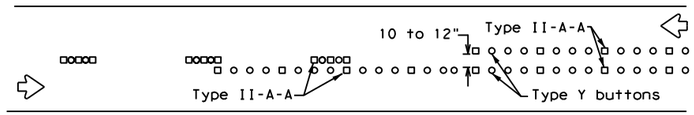
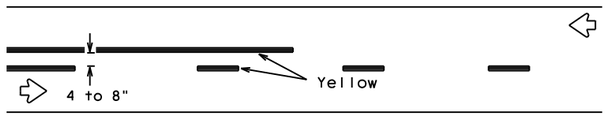
PAVEMENT MARKING PATTERNS

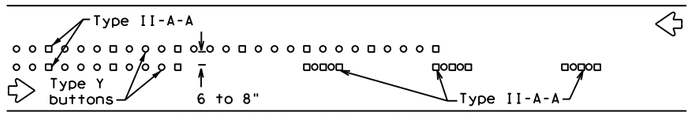
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



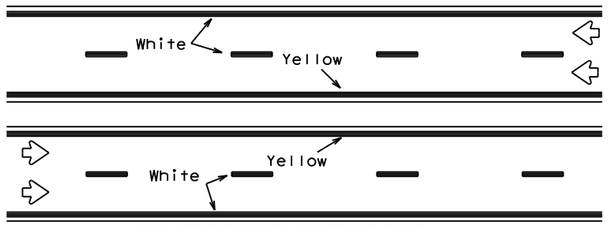
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



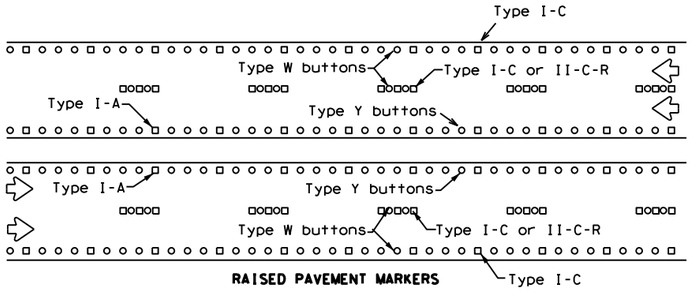
RAISED PAVEMENT MARKERS - PATTERN B

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

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



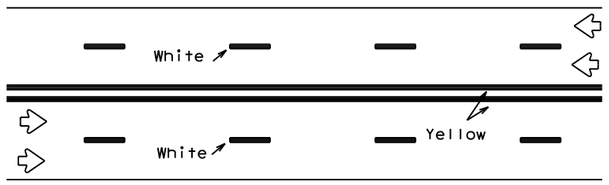
REFLECTORIZED PAVEMENT MARKINGS



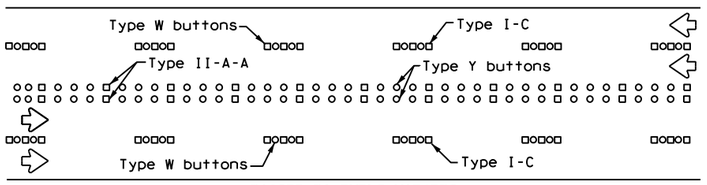
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



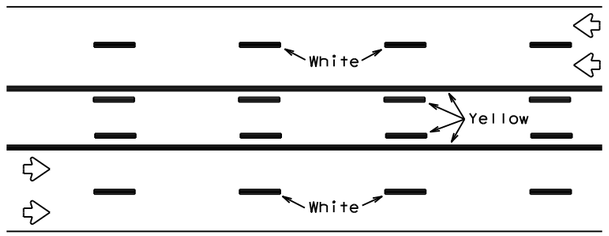
REFLECTORIZED PAVEMENT MARKINGS



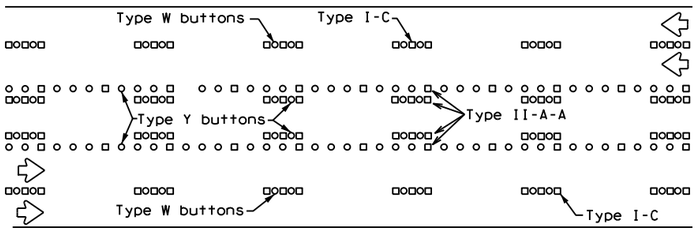
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

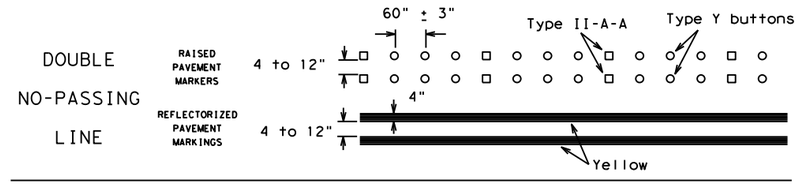
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

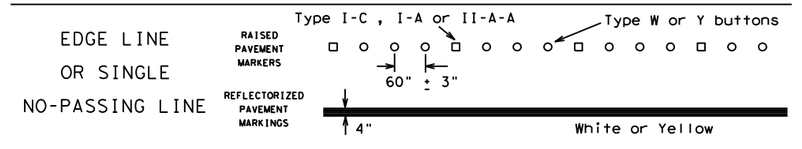
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

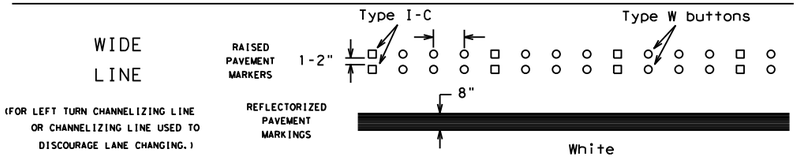


EDGE LINE OR SINGLE NO-PASSING LINE



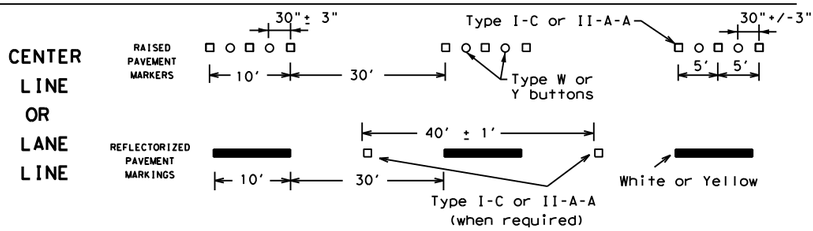
WIDE LINE

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

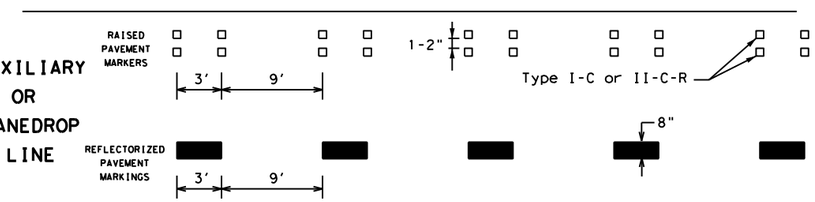


BROKEN LINES

CENTER LINE OR LANE LINE

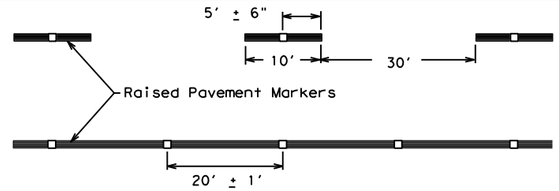


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

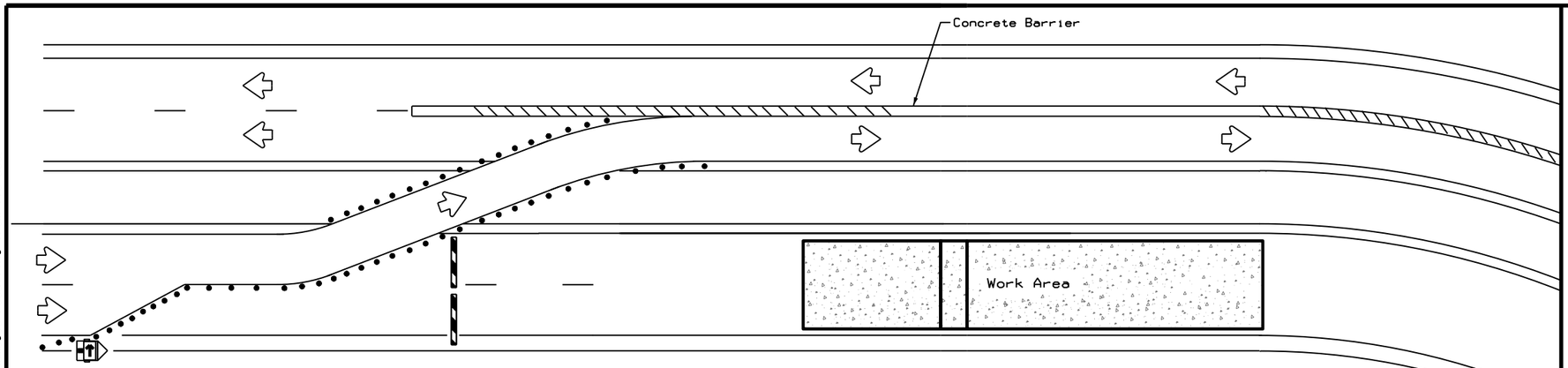
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		37



NOTES:

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

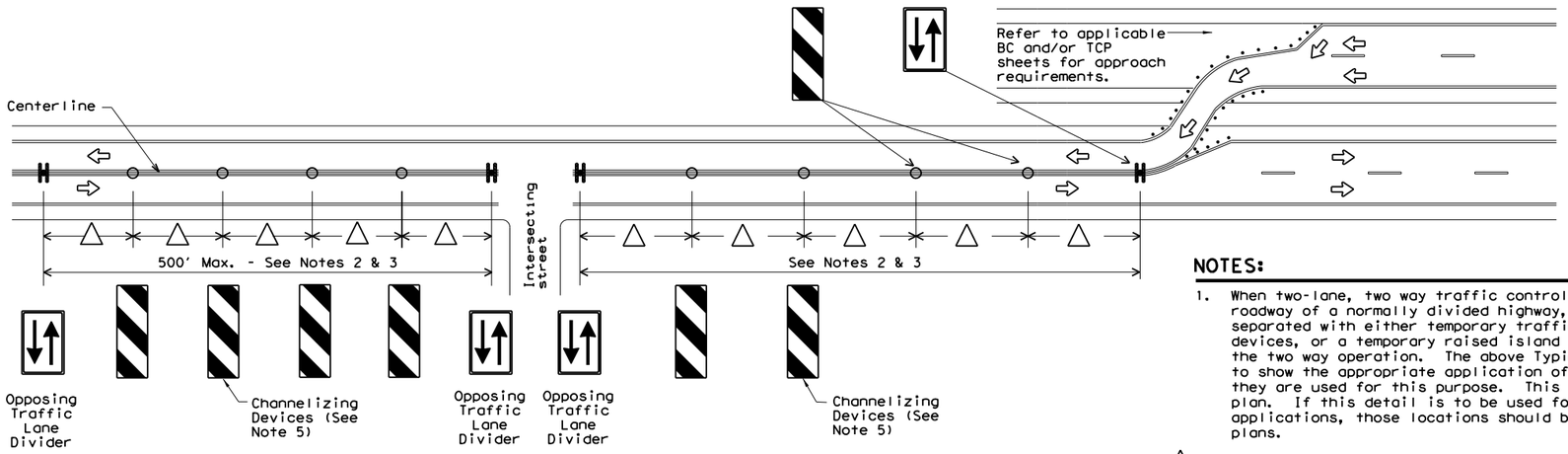
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

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

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

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

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



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

NOTES:

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

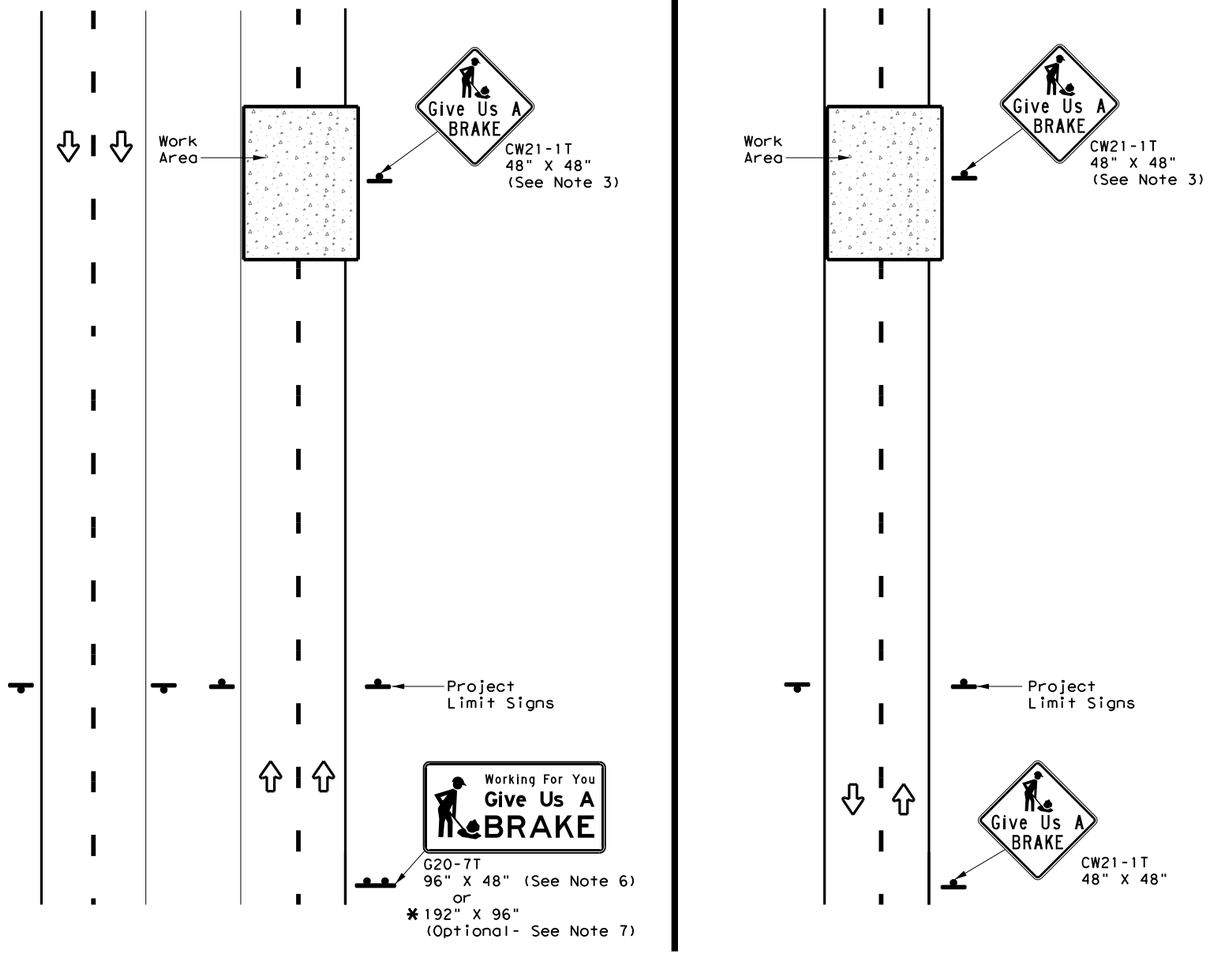
TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		38

110

DATE: 08/09/2021 04:04 PM
FILE: DOCUMENT NAME



DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

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

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	HOU	FORT BEND		39

116

DATE: 08/09/2021 03:23 PM
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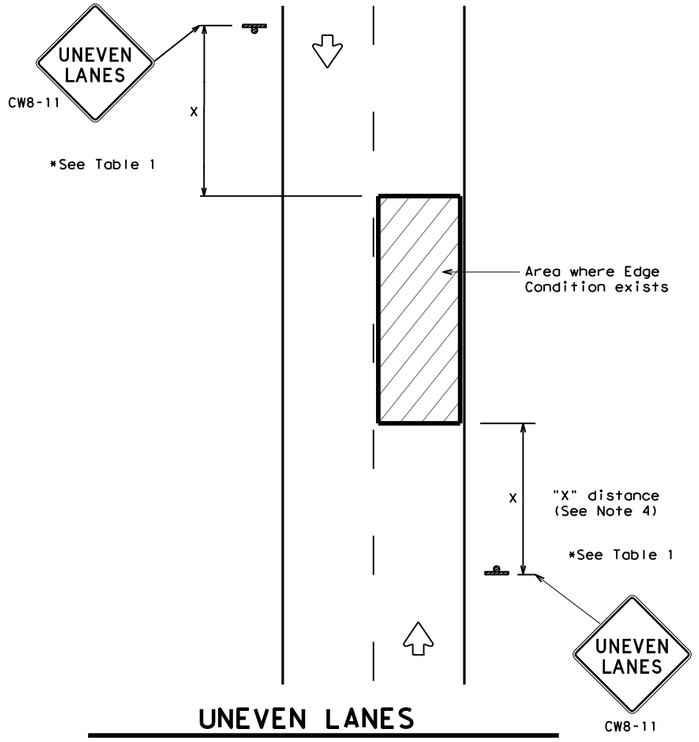
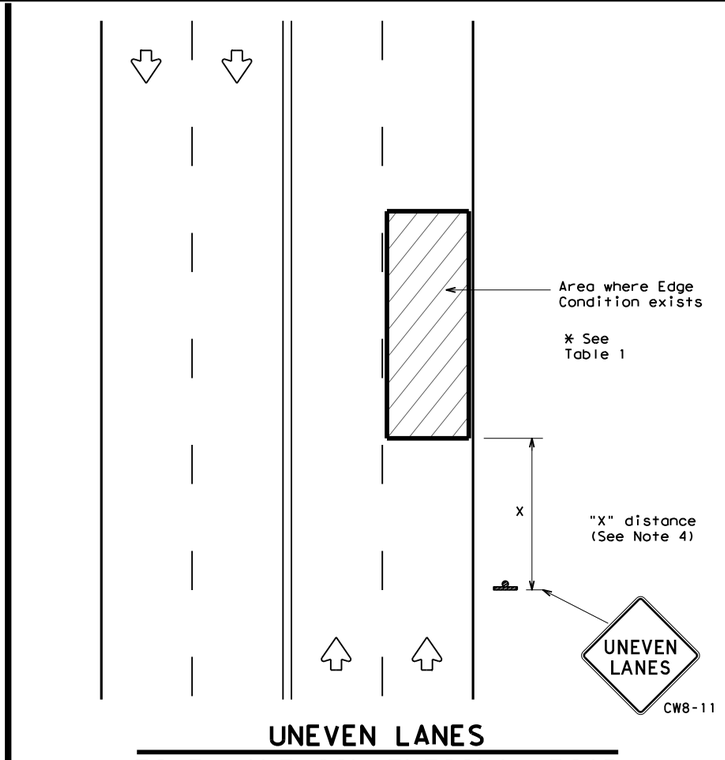
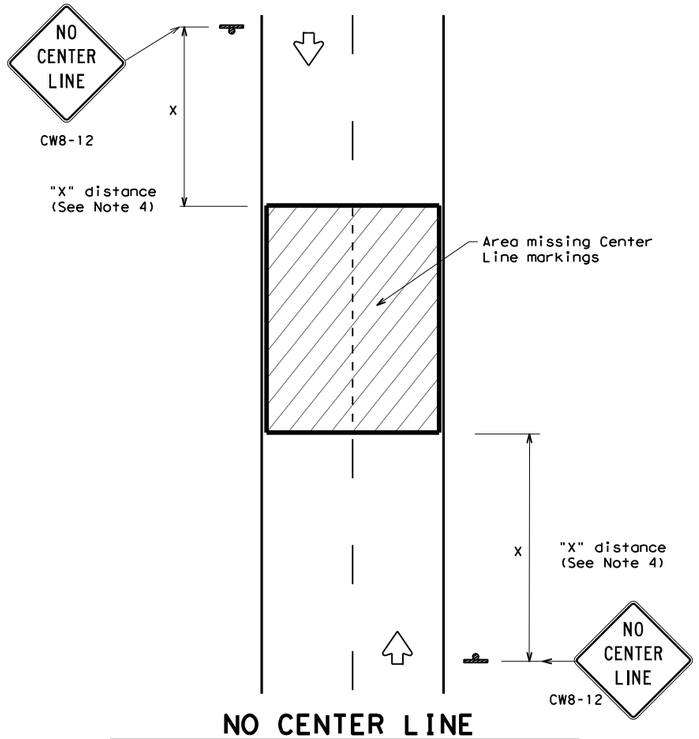


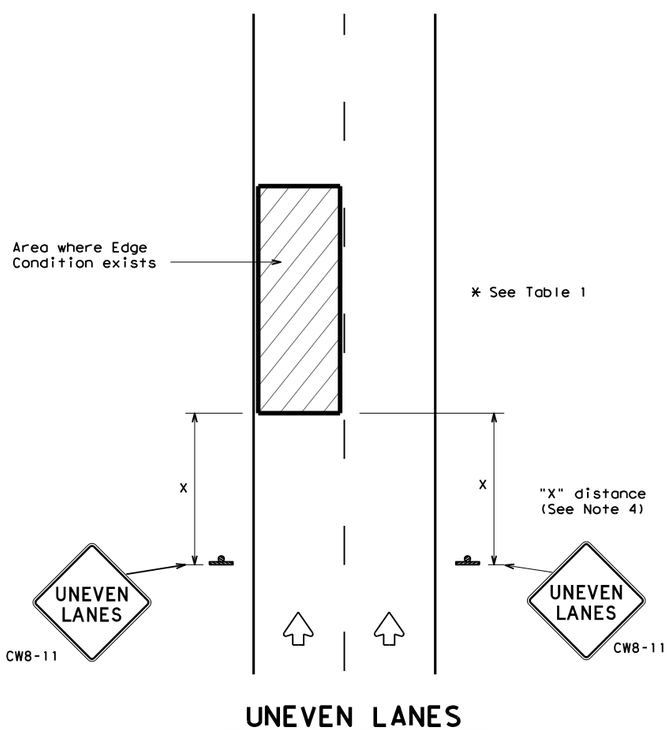
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

DATE: 08/09/2021 03:23 PM
FILE: DOCUMENT NAME

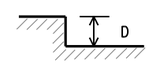
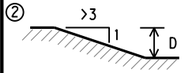
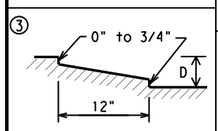
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

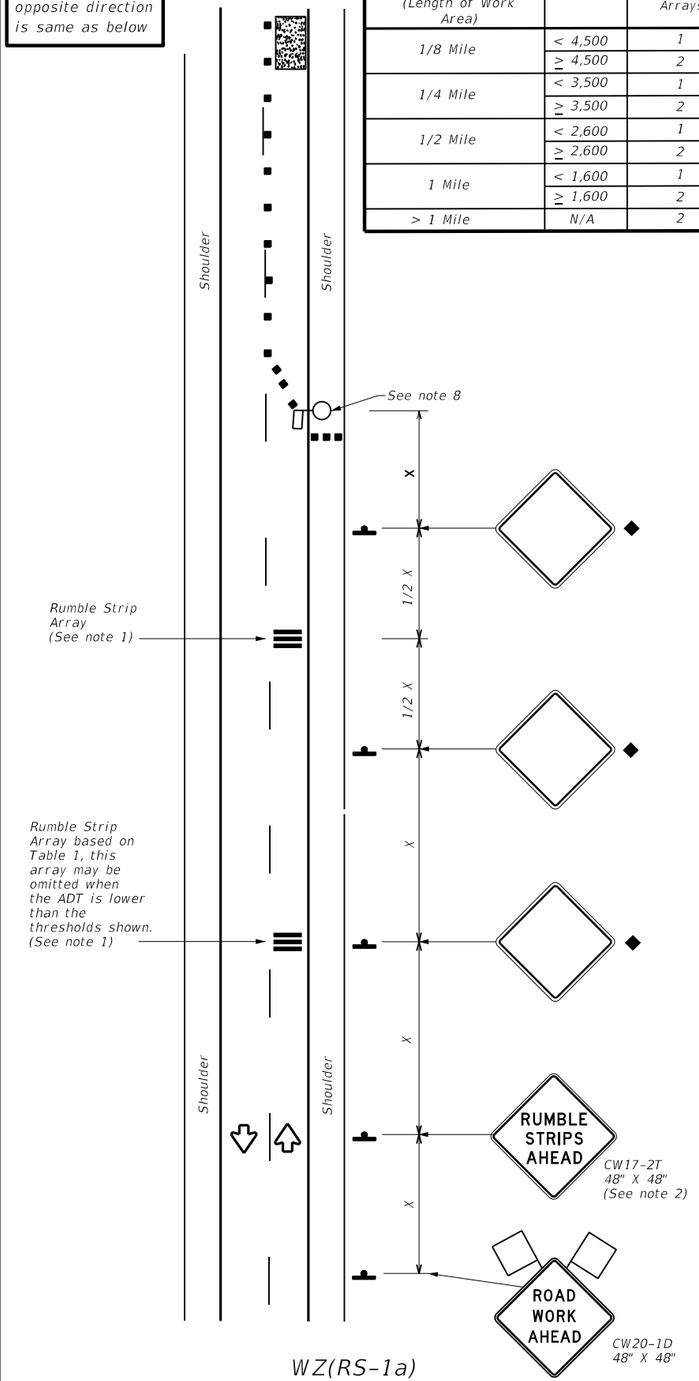
SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	HOU	FORT BEND		40

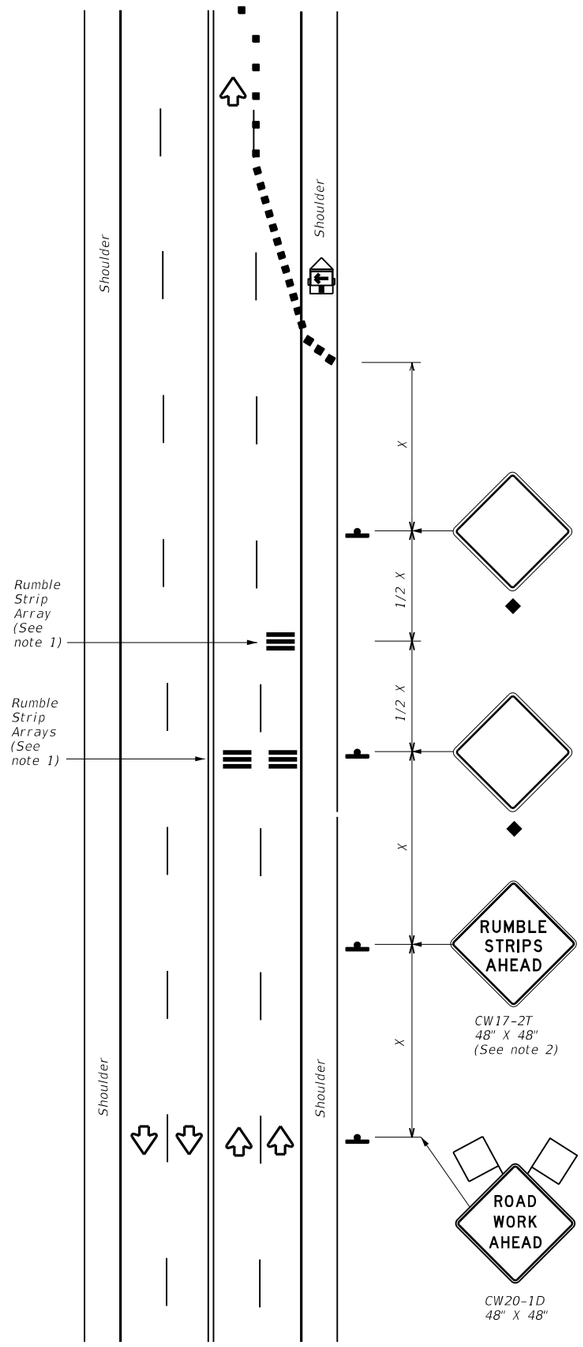
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

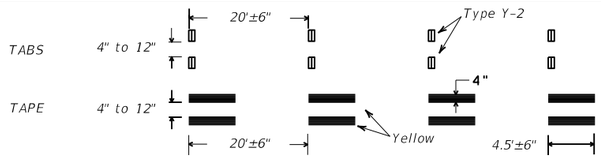
WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
2-14 4-16	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		41

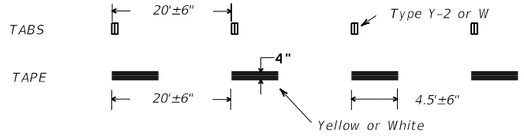
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

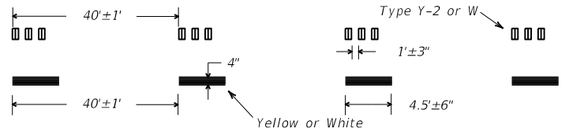


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



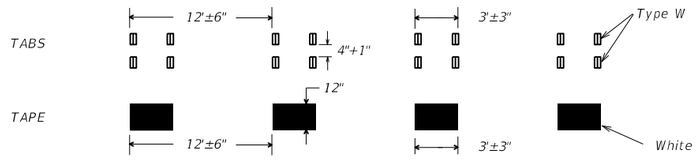
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

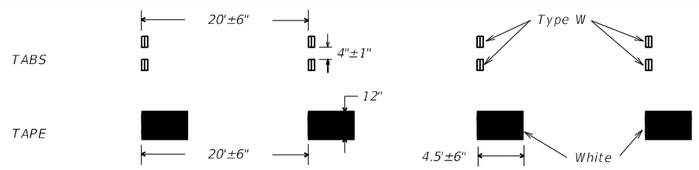


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



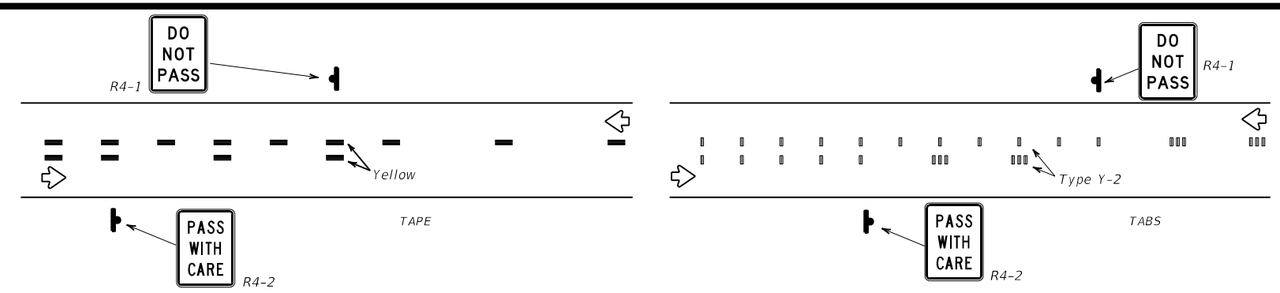
NOTES:

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

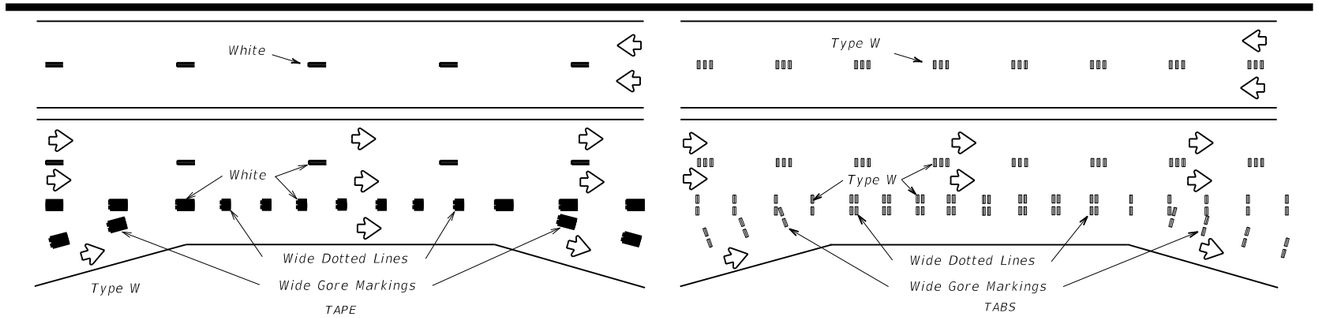
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

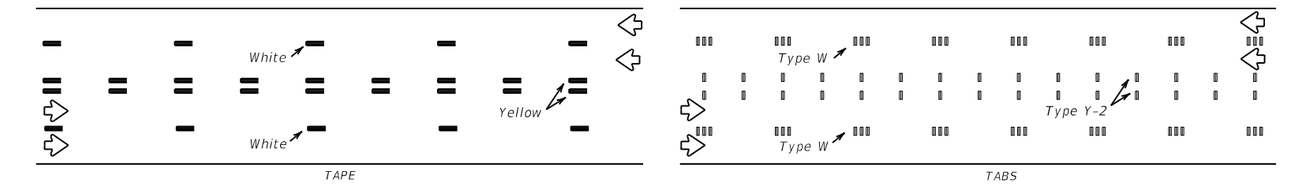
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



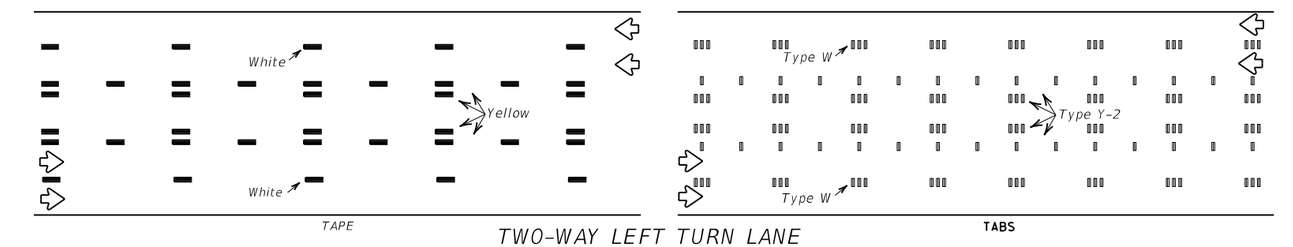
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



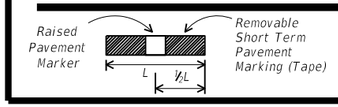
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
1-97	DIST	COUNTY		SHEET NO.
3-03	HOU	FORT BEND		42
7-13				

111

DATE: 09/27/2021 04:12 PM
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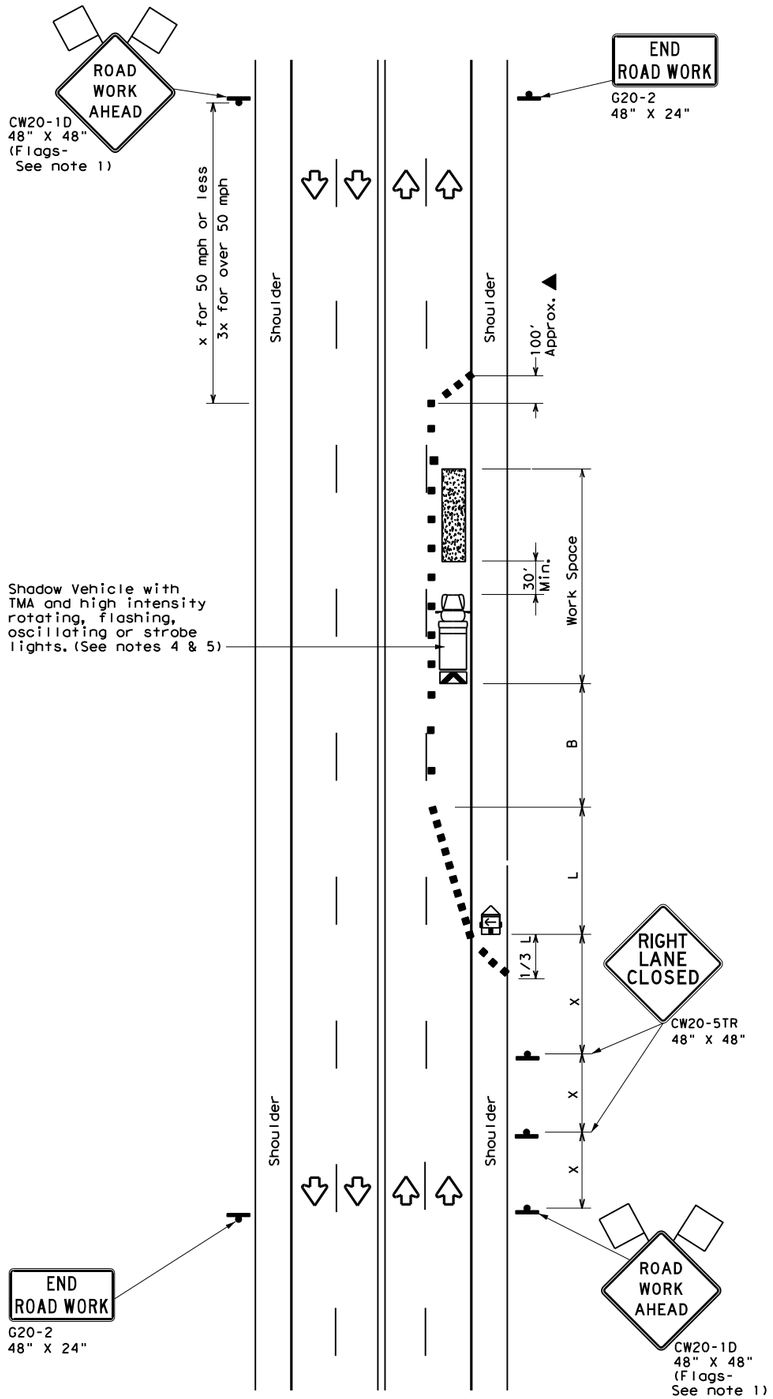
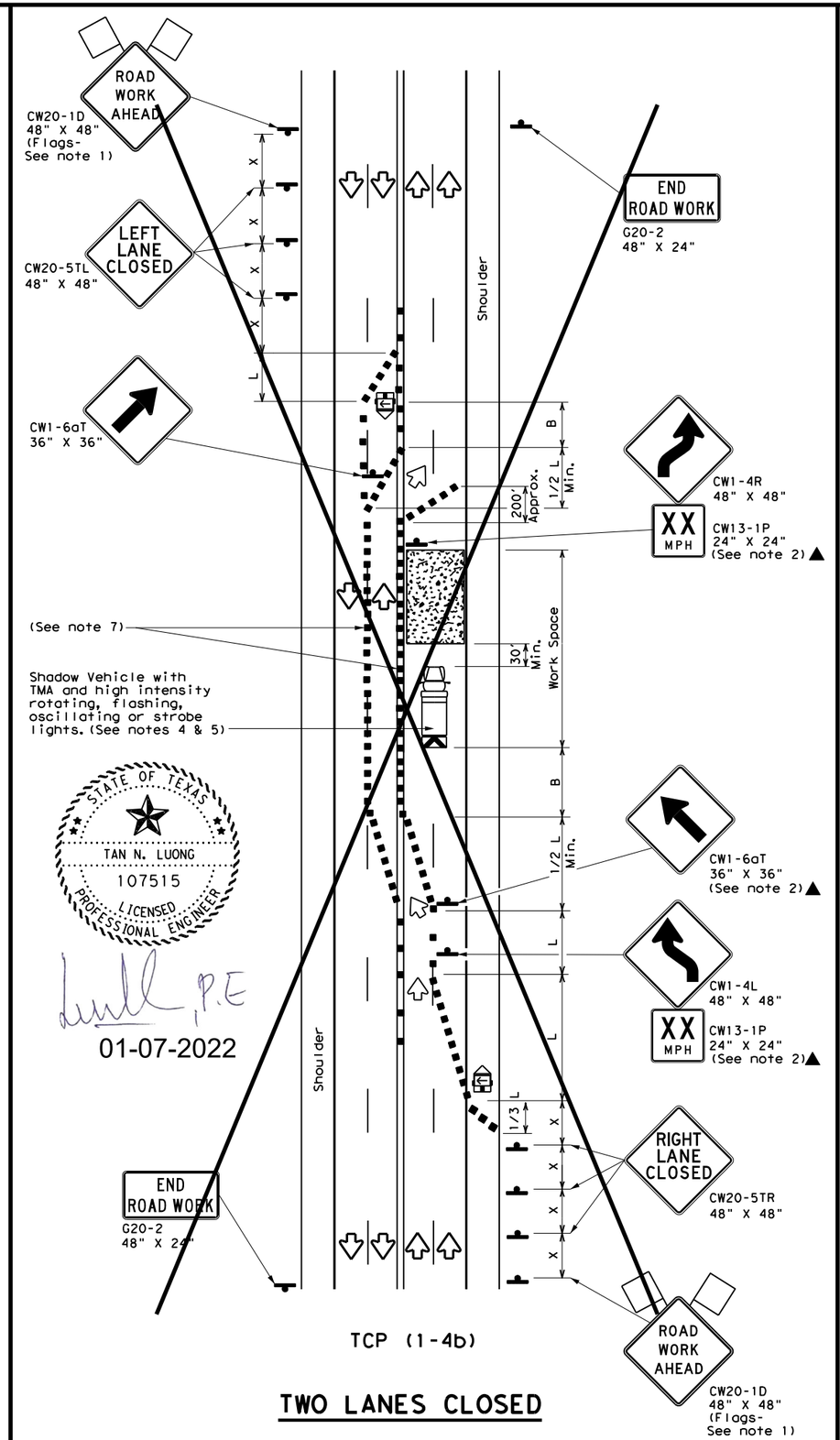


TCP (1-4a)

ONE LANE CLOSED



STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER
P.E
01-07-2022

TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. 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 wider work spaces.

TCP (1-4a)

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

TCP (1-4b)

7. 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 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18 (MOD)

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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	HOU	FORT BEND		43

DATE: 09/27/2021 04:17 PM
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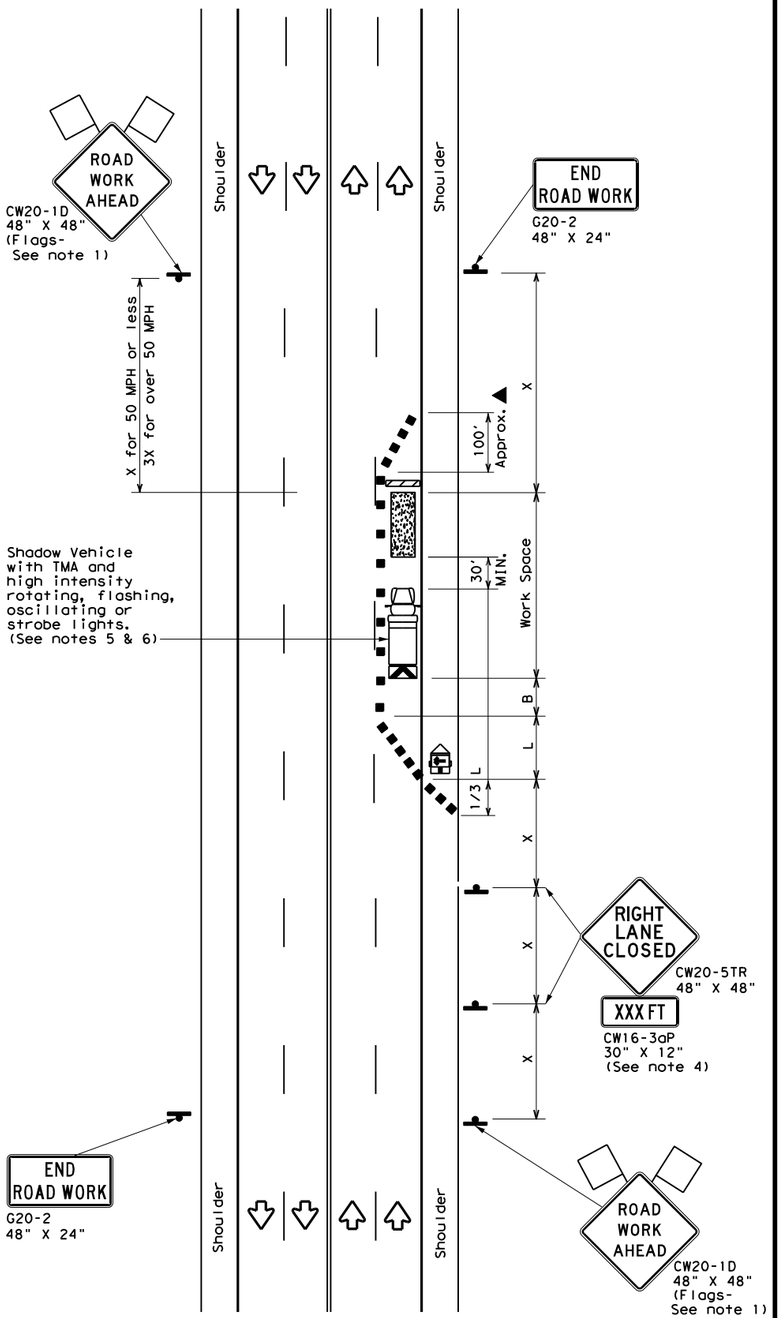
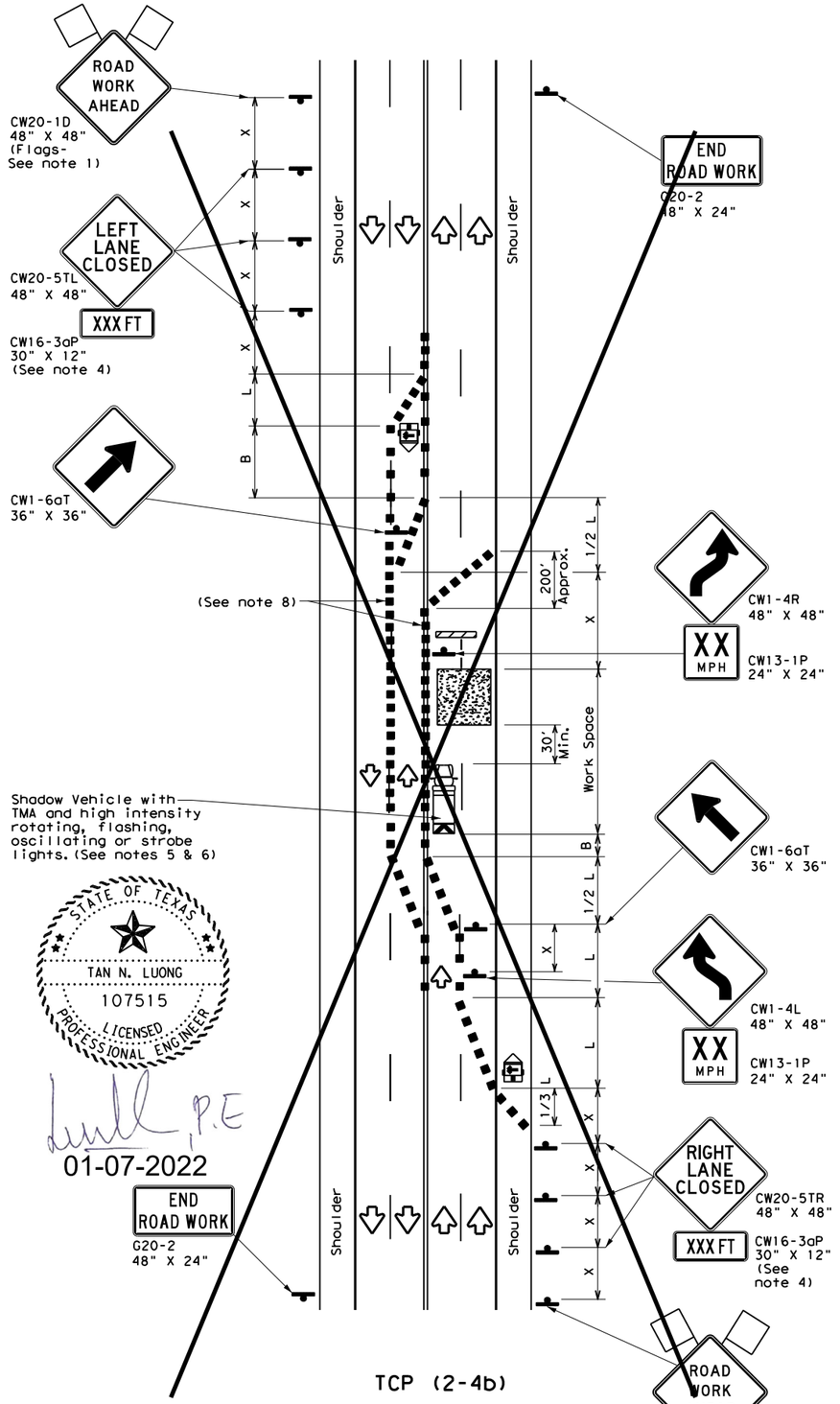


TCP (2-4a)

ONE LANE CLOSED



STATE OF TEXAS
TAN N. LUONG
107515
LICENSED
PROFESSIONAL ENGINEER
P.E
01-07-2022

TCP (2-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

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

TCP (2-4b)

8. 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 devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18 (MOD)

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REVISIONS 8-95 3-03	1257	01	052, ETC.	FM 1092
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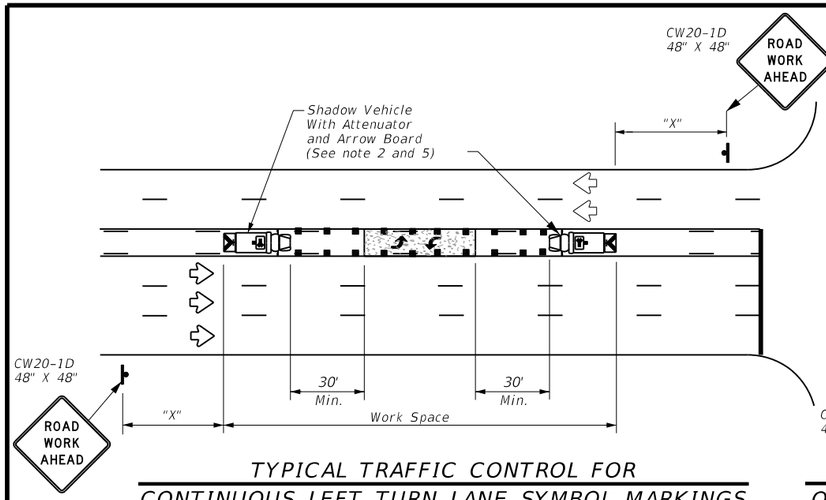
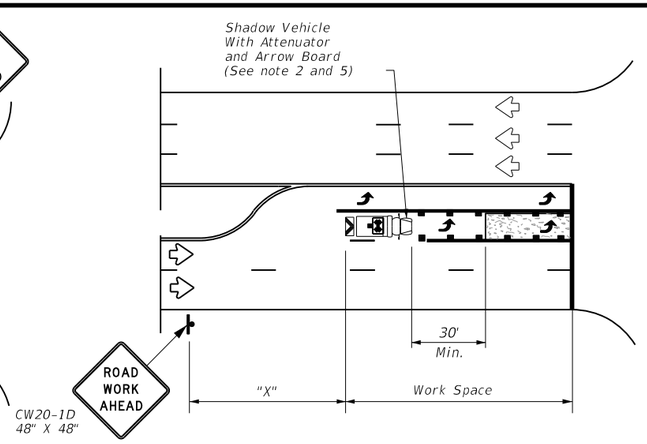
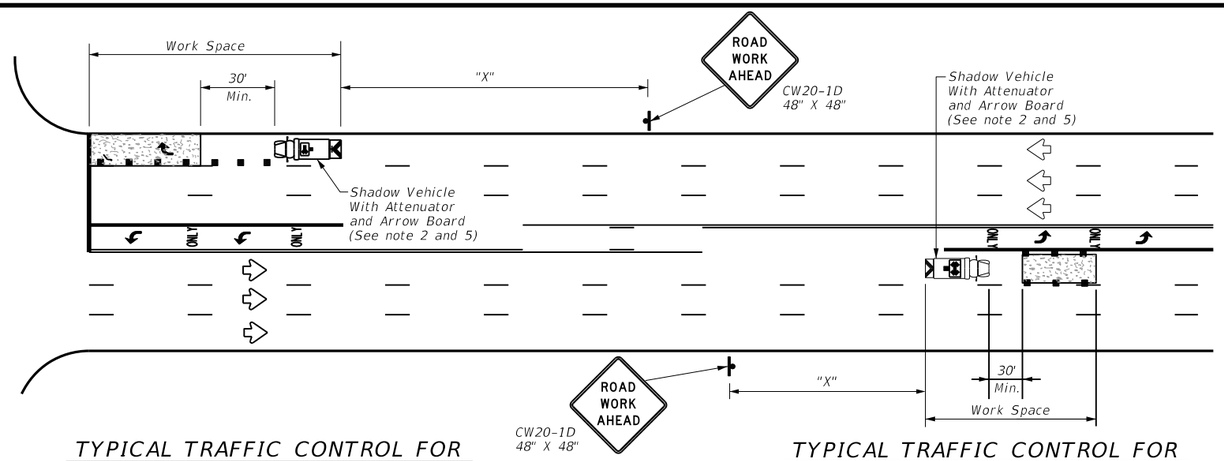


TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

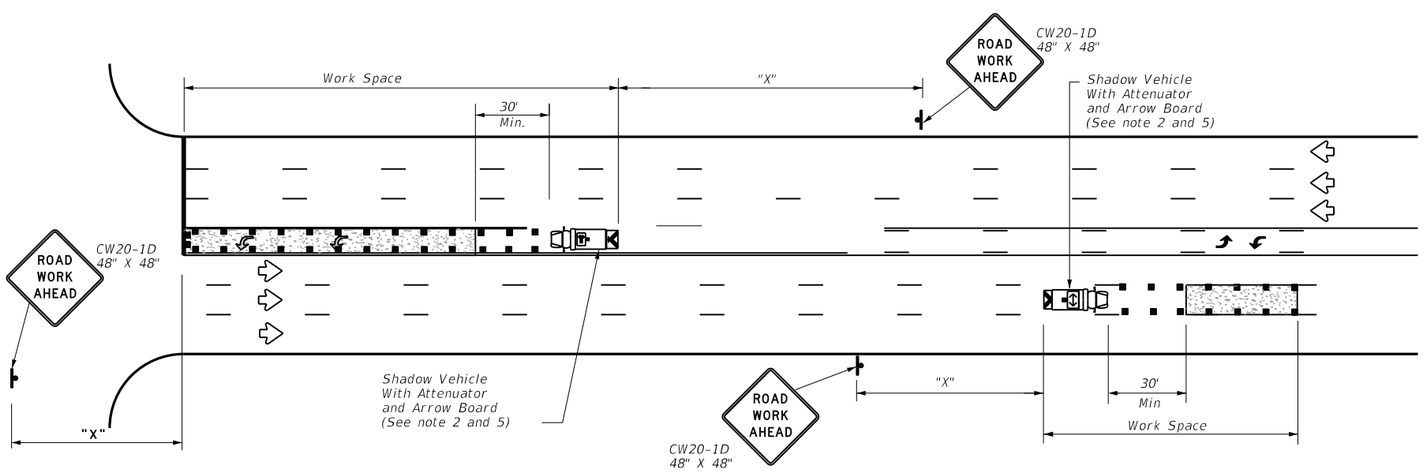


TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR
OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
CENTER LANE MARKINGS

LEGEND

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

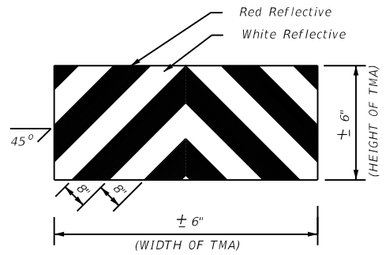
1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take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

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

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

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

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT.	SECT.	JOB	HIGHWAY
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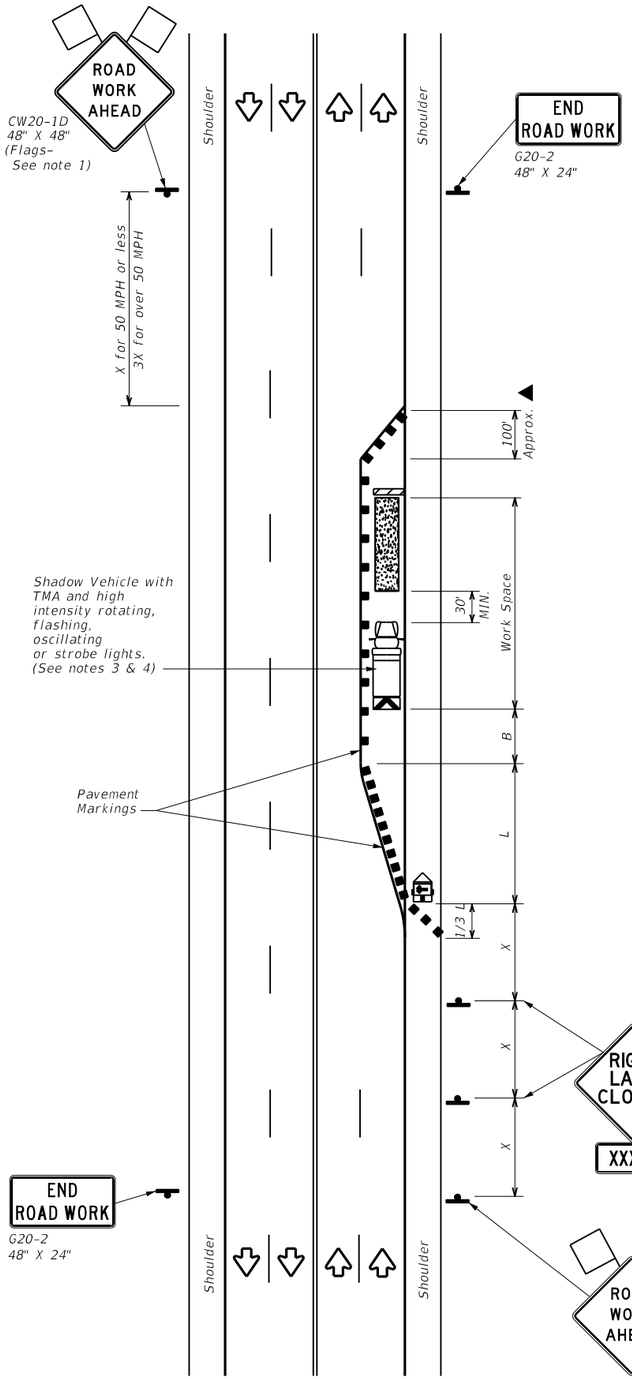
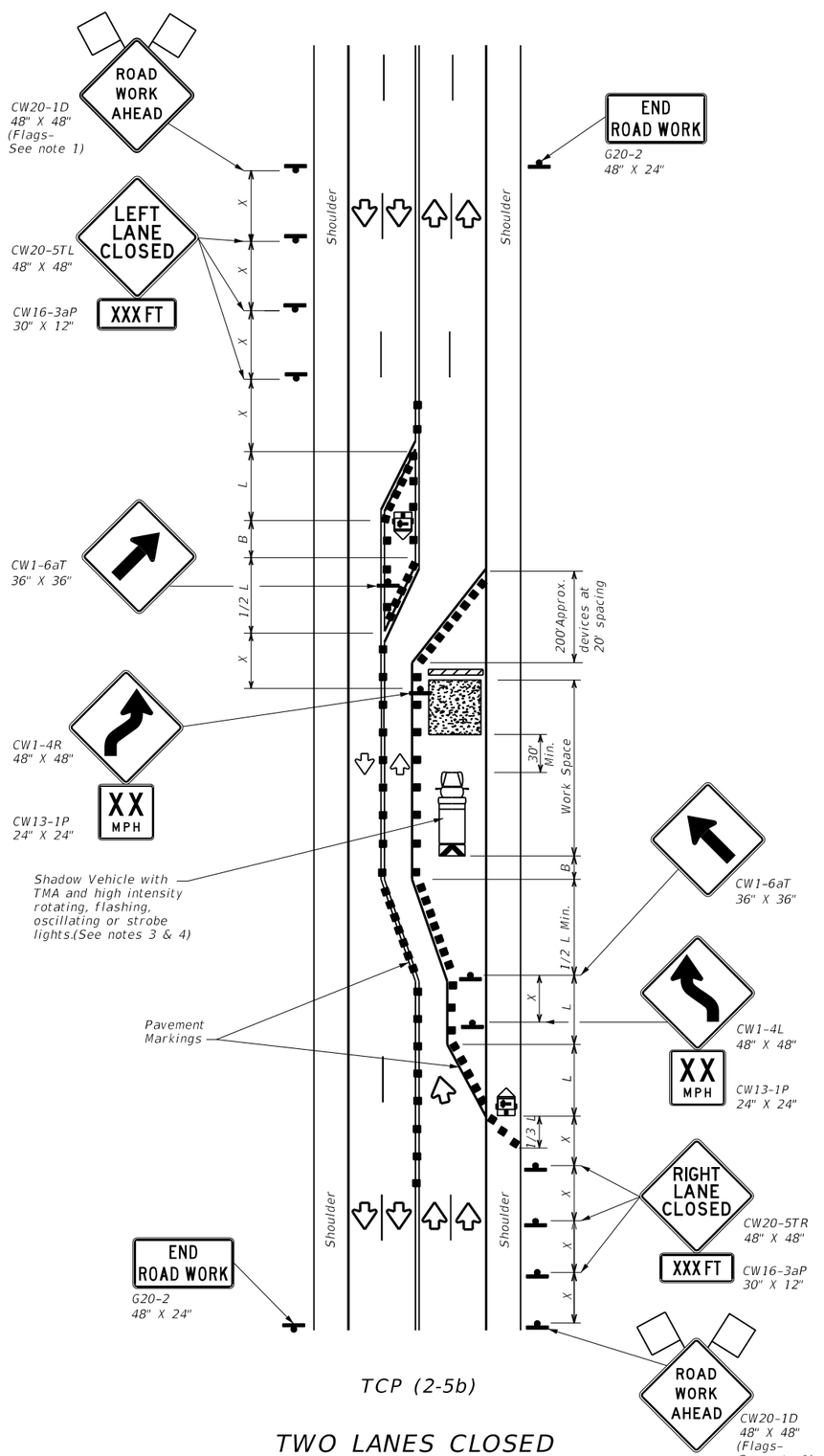
178



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

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

TCP (2-5b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 3-03	HOU	FORT BEND		46
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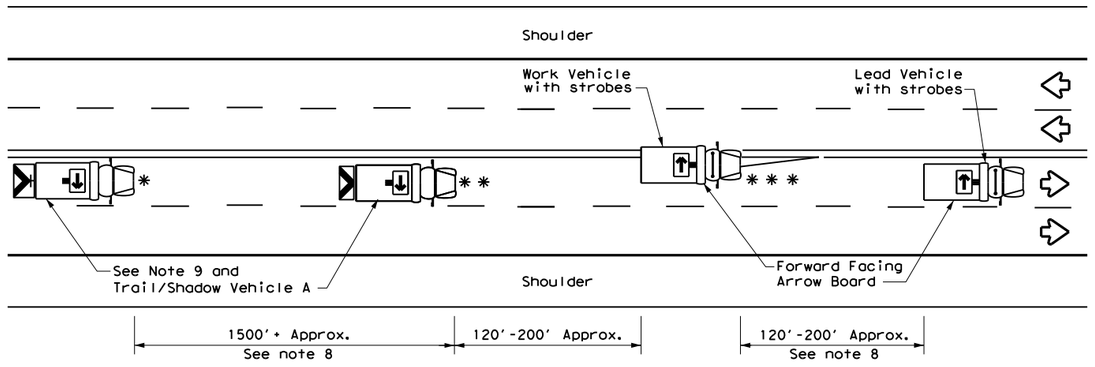
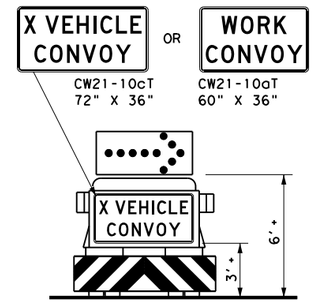


TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

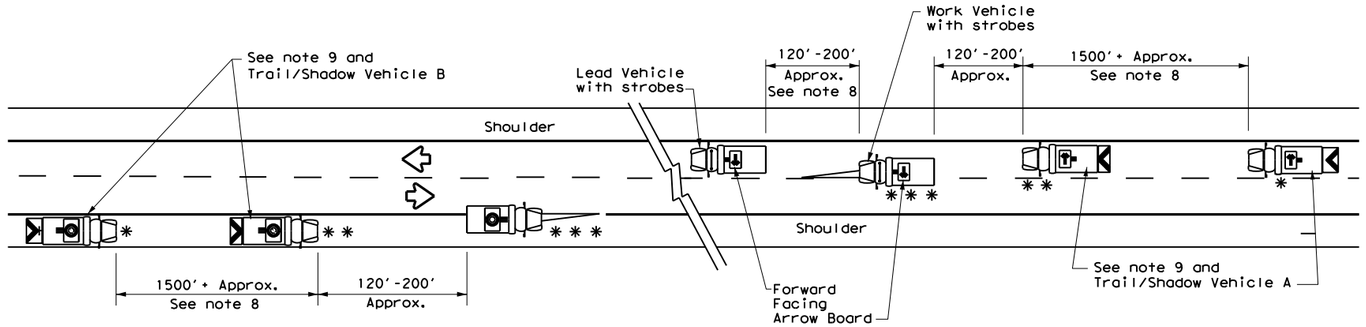
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.

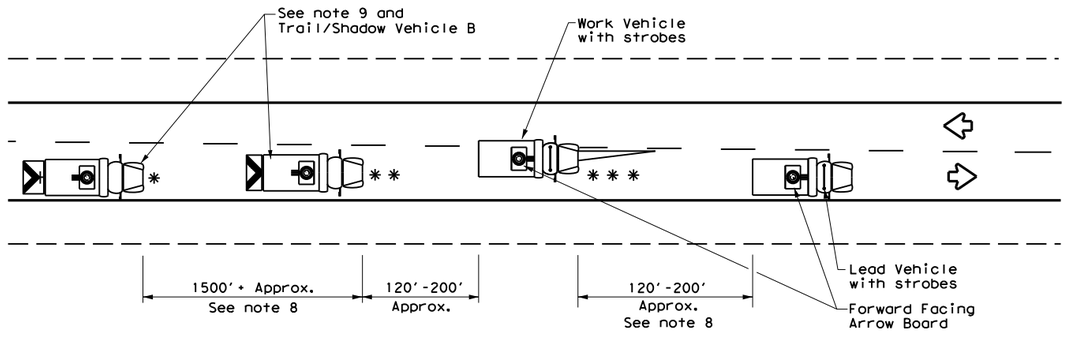


WORK ON SHOULDER

WORK ON TRAVEL LANE

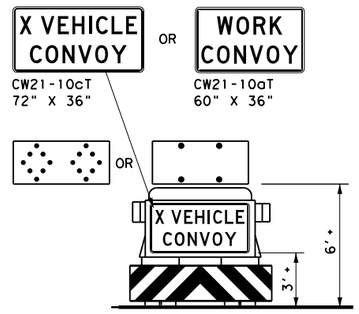
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



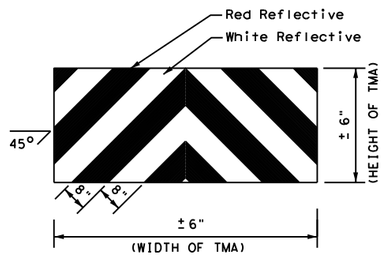
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1257	01	052, ETC.	FM 1092
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	HOU	FORT BEND		47

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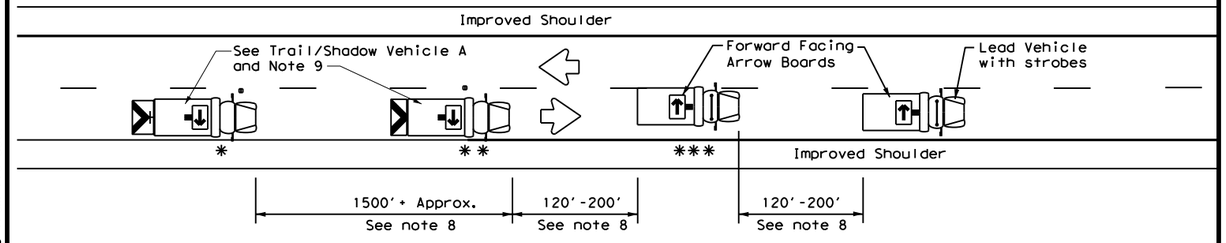
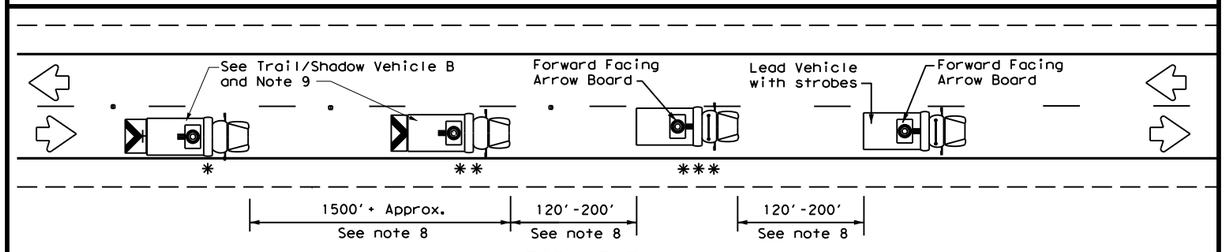


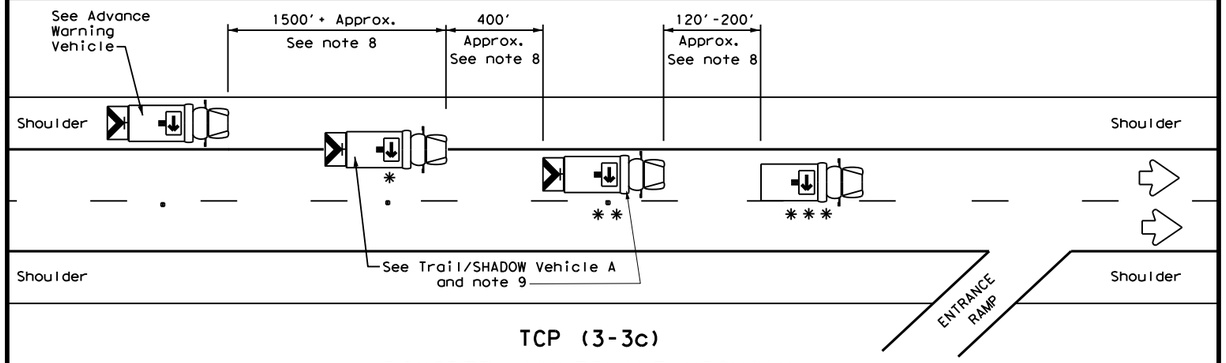
TCP (3-3a)

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



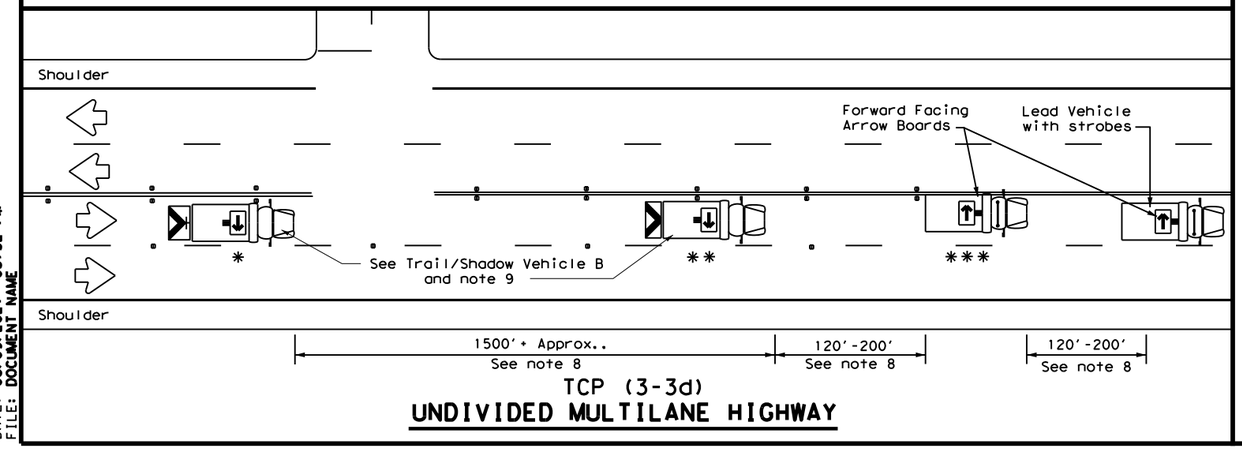
TCP (3-3b)

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



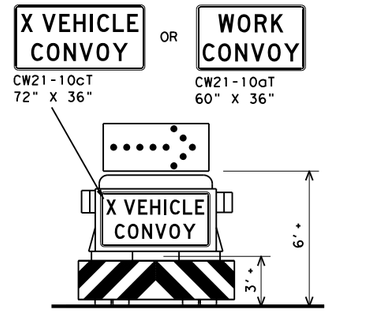
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



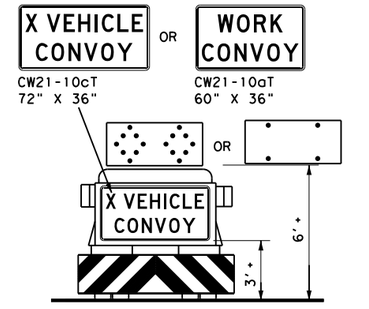
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



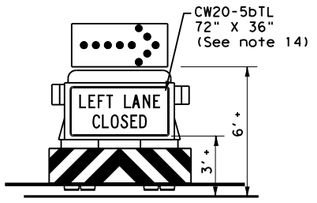
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

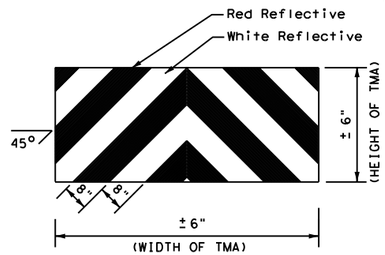


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	HOU	FORT BEND		48
1-97 7-14				

177

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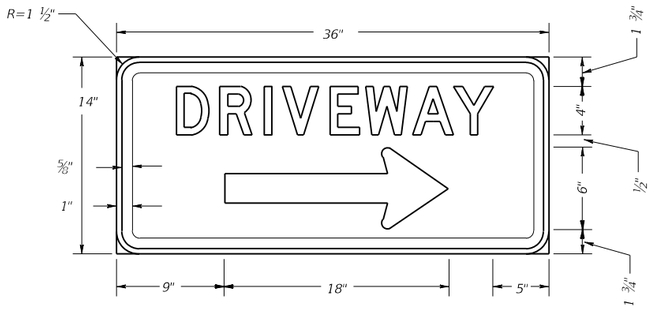
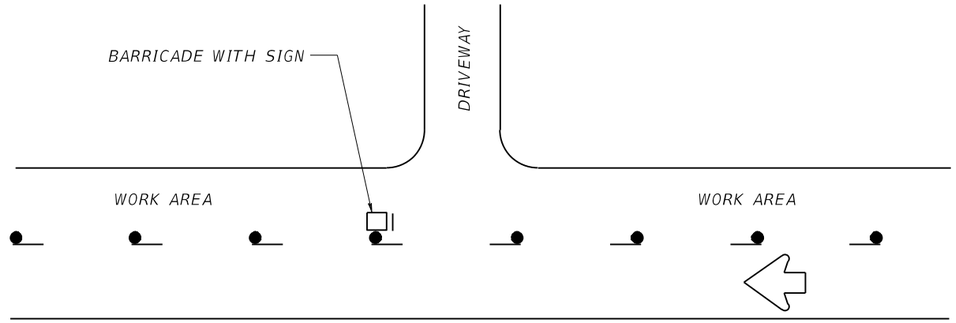


LETTERS: WHITE
BORDER: WHITE
BACKGROUND:BLUE



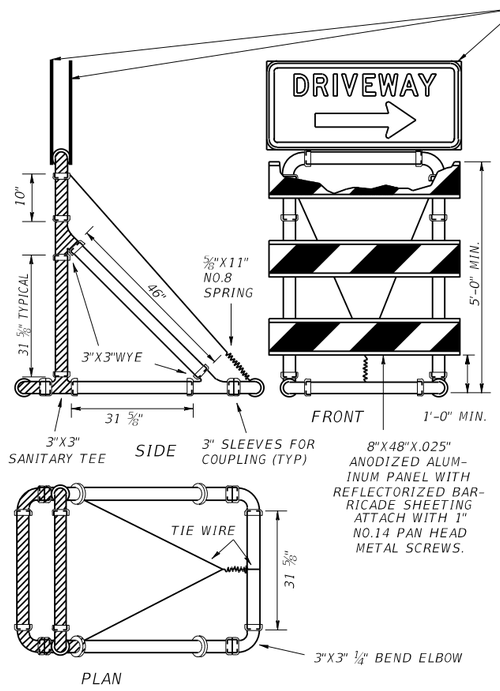
TYPICAL LOCATION OF DRIVEWAY SIGN

TYPE III PVC BARRICADES TYPICAL DESIGN DETAILS

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

1. ALL PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE RATED PIPE SDR 21 OR SDR 26 ASTM D2241.
2. JOINT FITTINGS MAY BE PVC-ASTM D2665 OR ACRYLONITRILE BUTADLENE STYRENE (ABS) ASTM D2661 (DRAINAGE WASTE AND VENT).
3. ALL PIPE AND FITTINGS SHALL BE WHITE.
4. ALL JOINTS SHALL BE FREE TO SEPARATE UPON VEHICLE IMPACT.
5. CROSS HATCHED CONDUIT TO BE TIED TOGETHER WITH ROPE THREADED INTO PIPE INTERIOR. USE 3/16" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.



PLAN

CONSTRUCTION SIGN NOTES

MATERIALS

CONSTRUCTION SIGNS SHALL BE MADE FROM APPROVED FIBERGLASS OR HIGH IMPACT PLASTIC AS PRIMARY MATERIALS.

SIGN SHEETING

REFLECTORIZED SIGN SHALL BE CONSTRUCTED OF RETRO REFLECTIVE SHEETING MEETING THE COLOR AND REFLECTIVITY REQUIREMENTS OF MATERIAL SPECIFICATIONS, DMS-8300.

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

ALL SIGNS LETTERING SHALL BE CLEAR, OPEN ROUNDED TYPE CAPITAL LETTERS AS APPROVED BY AND AS PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION. SIGNS AND LETTERING SHALL BE OF FIRST CLASS WORKMANSHIP EQUIVALENT TO THAT OF THE DEPARTMENT'S STANDARD SIGNS.

Texas Department of Transportation
Houston District

DRIVEWAY SIGNING

DS TC8020-04

FILE: STD H-30	DN:	CK:	DW:	CK:
	CONT	SECT	JOB	HIGHWAY
	1257	01	052, ETC.	FM 1092
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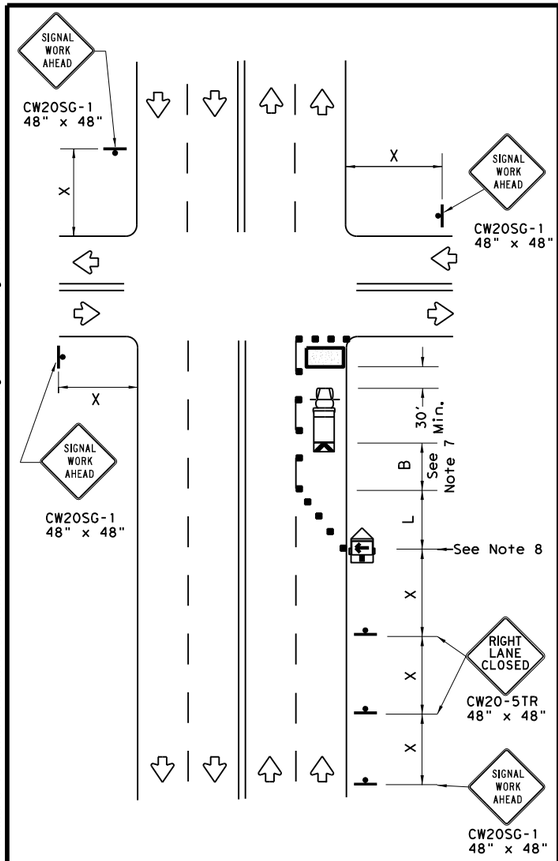
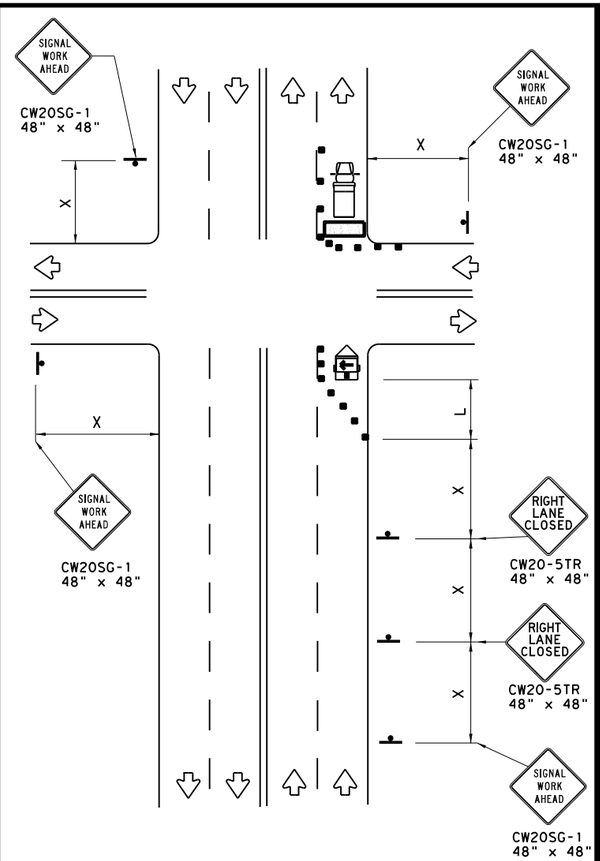


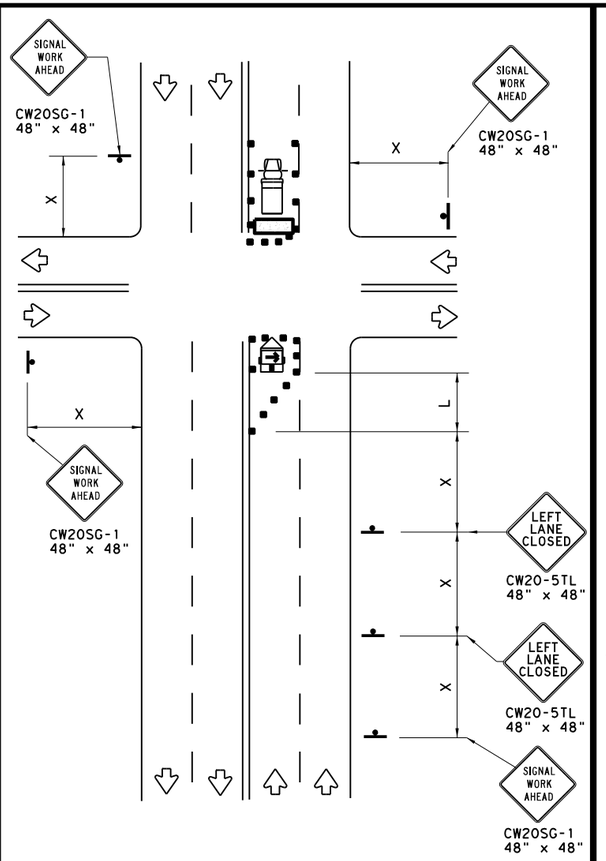
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



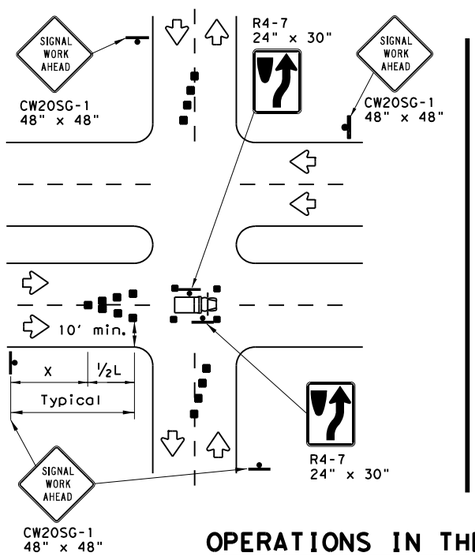
FAR SIDE RIGHT LANE CLOSURE

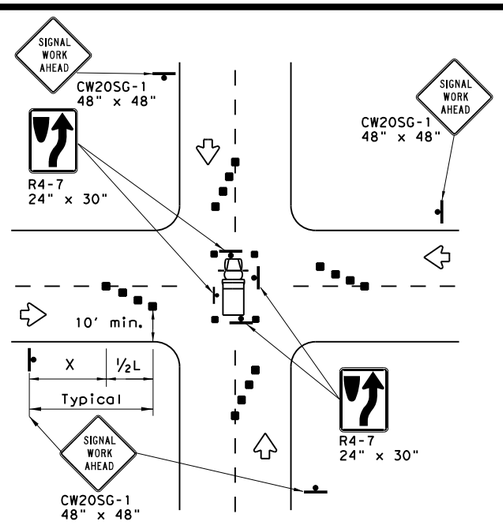
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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4-98 3-03	HOU	FORT BEND		50

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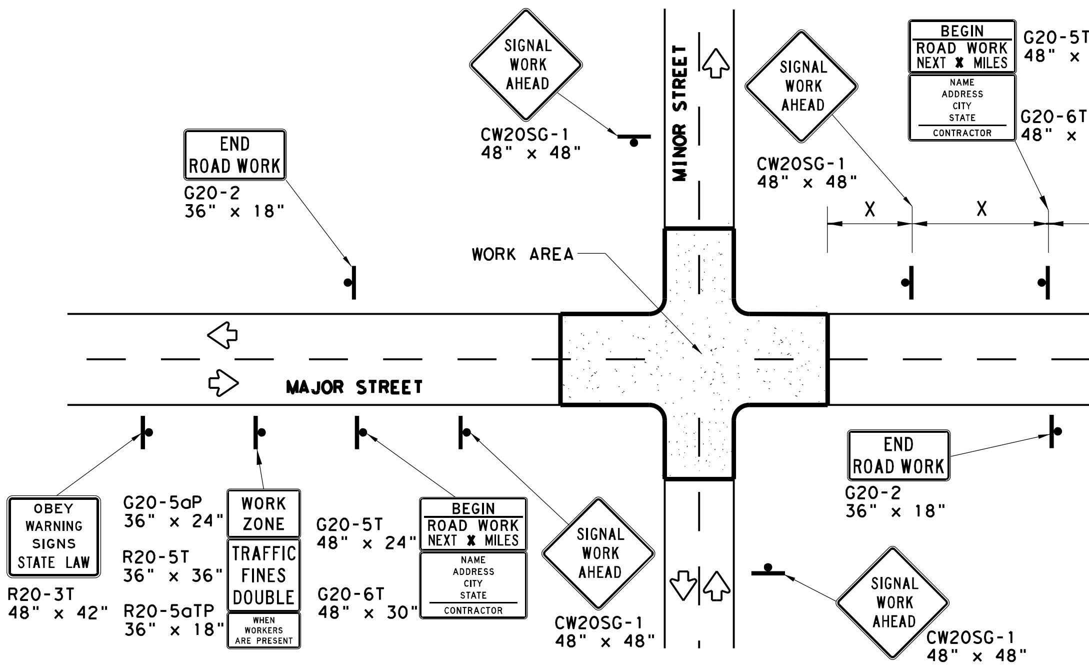
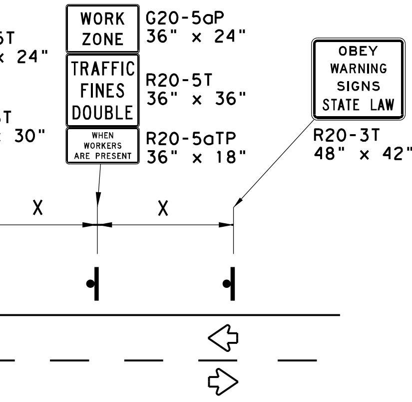




TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

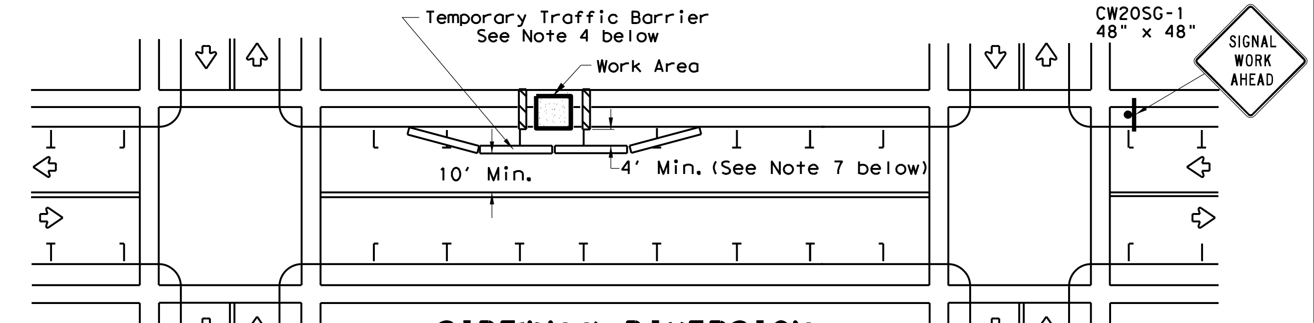
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 fastners. 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.

LEGEND	
┻	Sign
■ ■	Channelizing Devices
▱▱▱	Type 3 Barricade

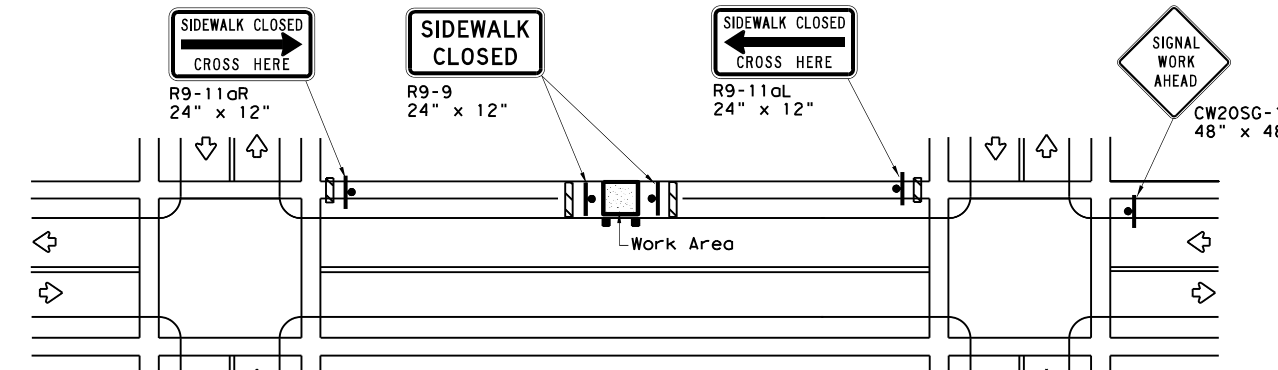
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

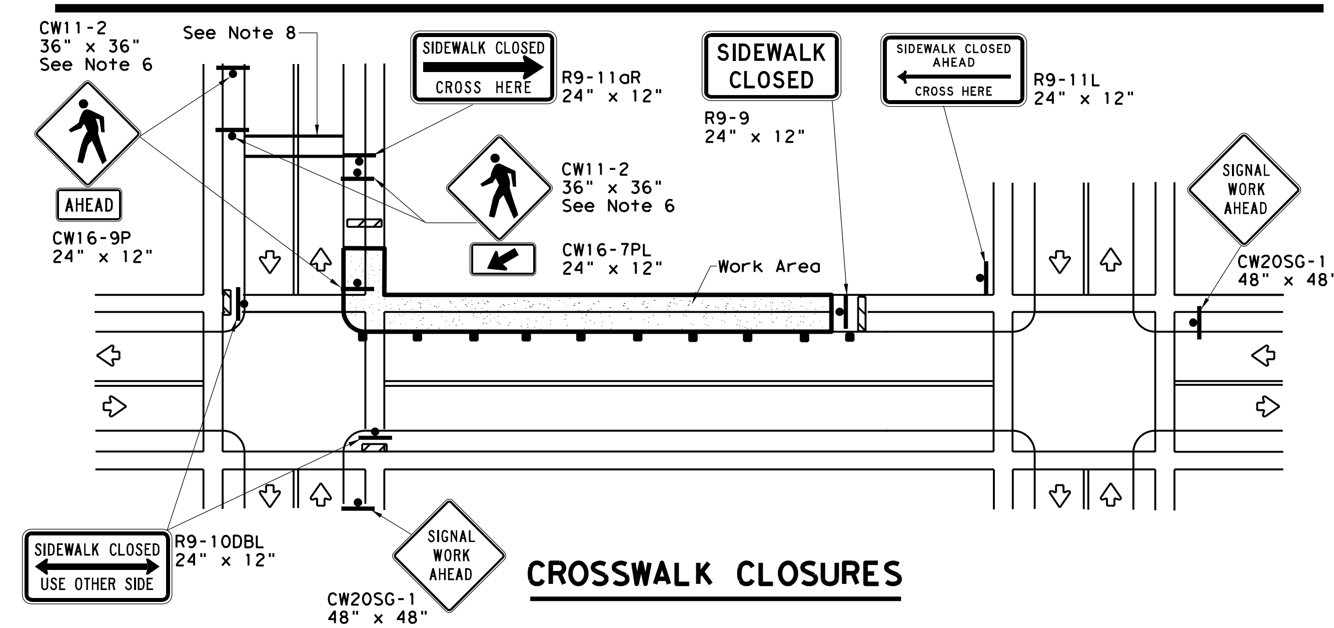
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

Traffic Operations Division Standard

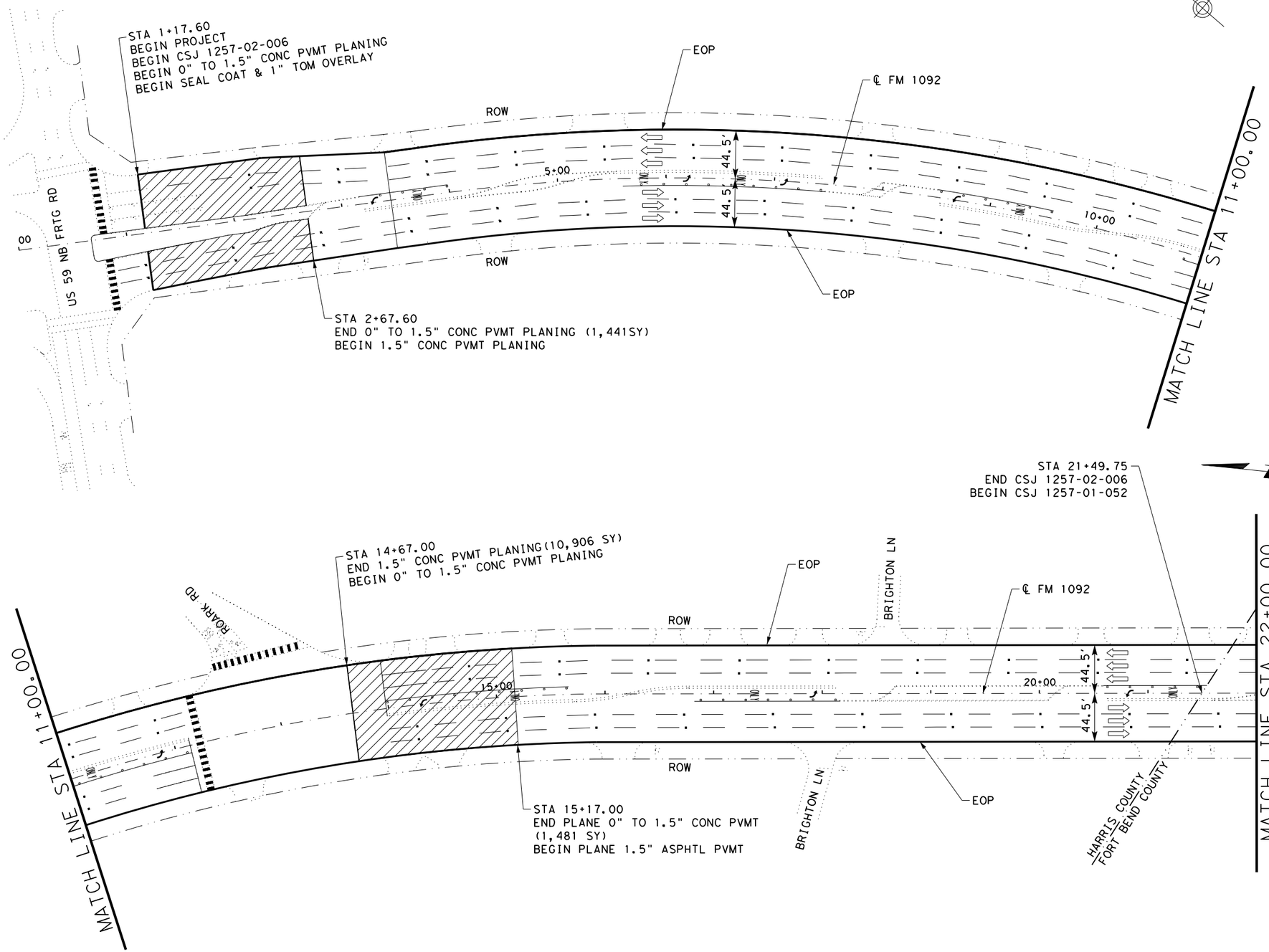
TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB		HIGHWAY
REVISIONS	1257	01	052, ETC.		FM 1092
2-98 10-99 7-13	DIST	COUNTY			SHEET NO.
4-98 3-03	HOU	FORT BEND			51

LEGEND

- TRAFFIC DIRECTION
- MAILBOX TO BE REMOVED AND REPLACED*
- MANHOLE TO BE ADJUSTED*
- EDGE OF PAVEMENT (EOP)
- CONC PLANING 0"-1.5"



STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

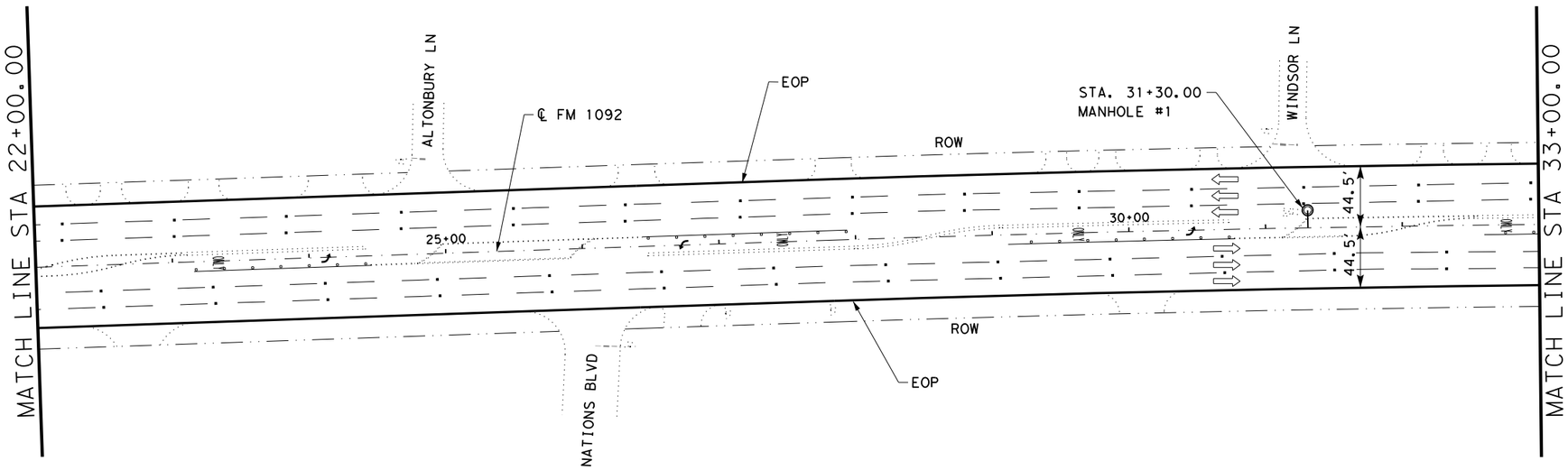
12-07-2021

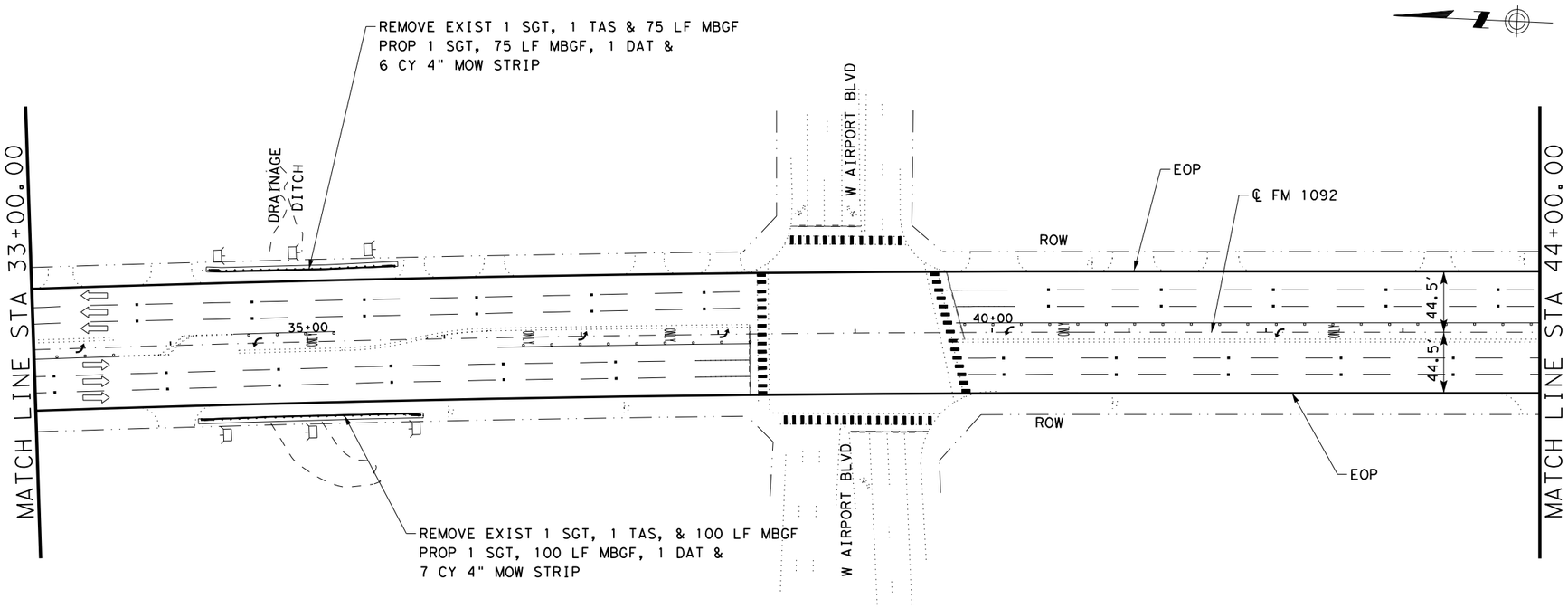
ROADWAY LAYOUT

CSJ: 1257-02-006
CSJ: 1257-01-052
SHEET 1 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		52





LEGEND

- TRAFFIC DIRECTION
- MAILBOX TO BE REMOVED AND REPLACED*
- MANHOLE TO BE ADJUSTED*
- EDGE OF PAVEMENT (EOP)
- CONC PLANING 0"-1.5"

* CONTRACTOR TO FIELD VERIFY LOCATION

STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

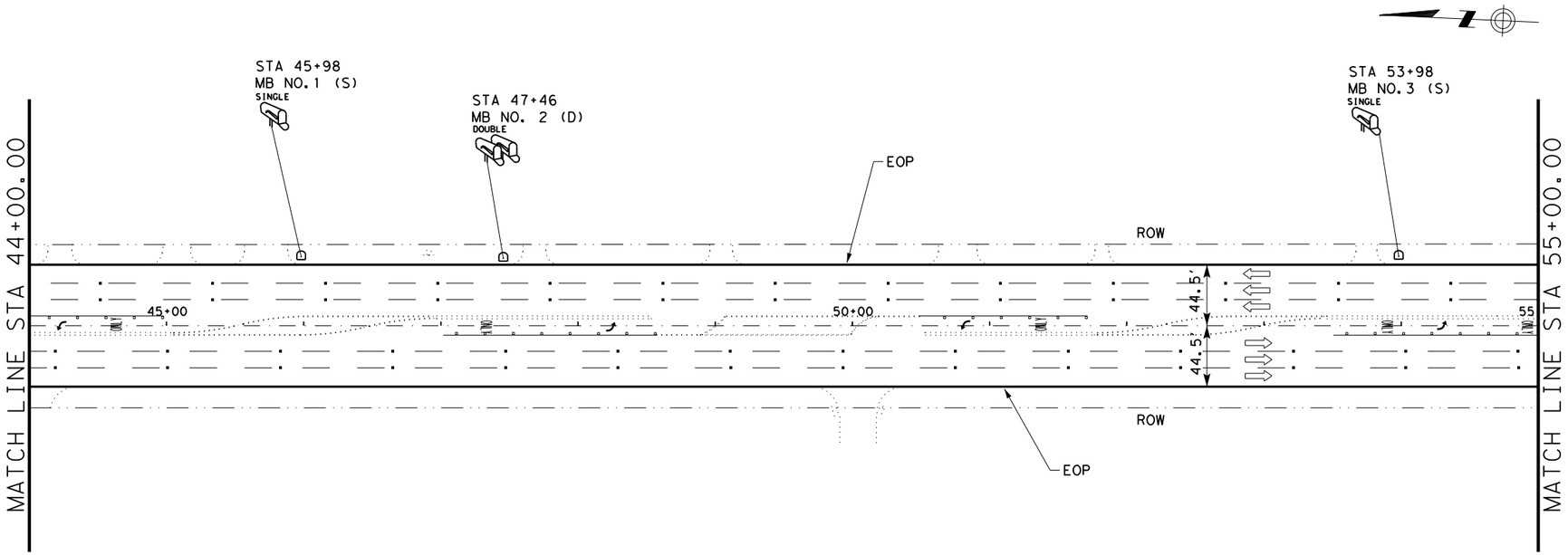
12-07-2021

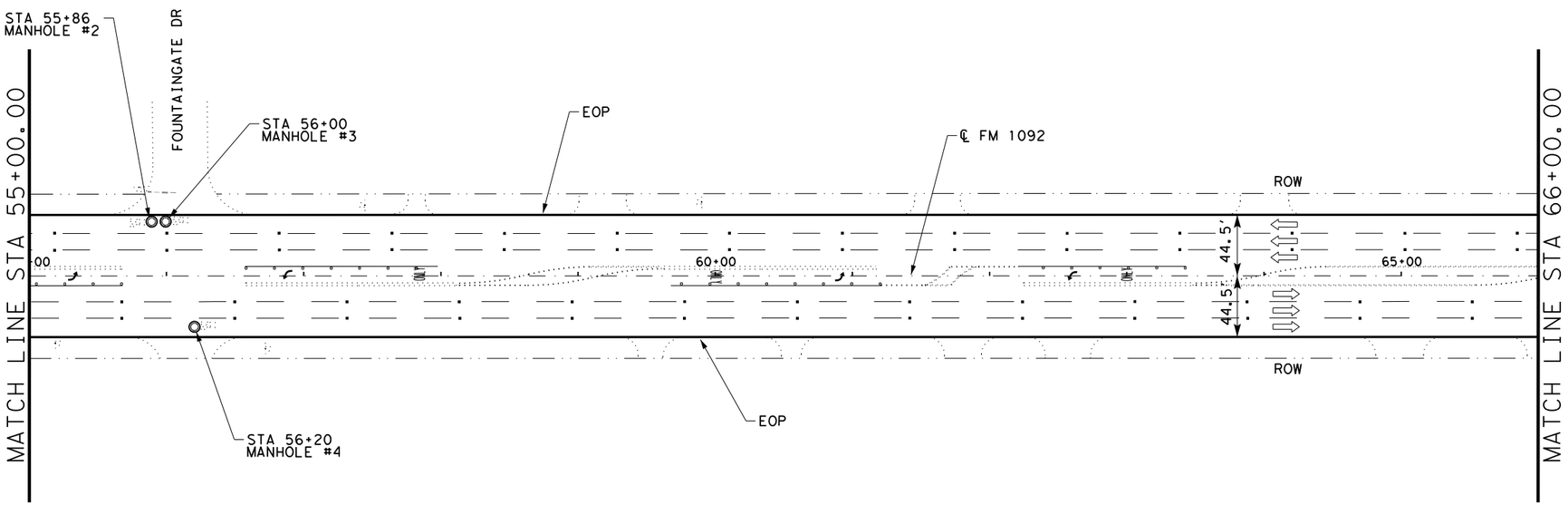
ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 2 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		53





LEGEND

- TRAFFIC DIRECTION
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STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

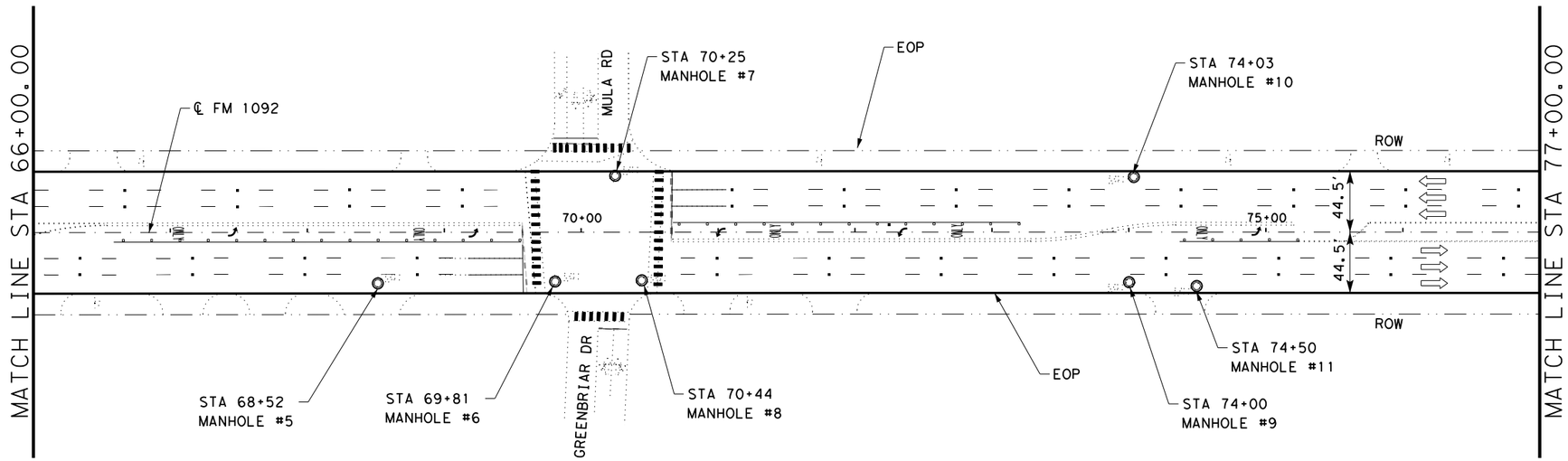
12-07-2021

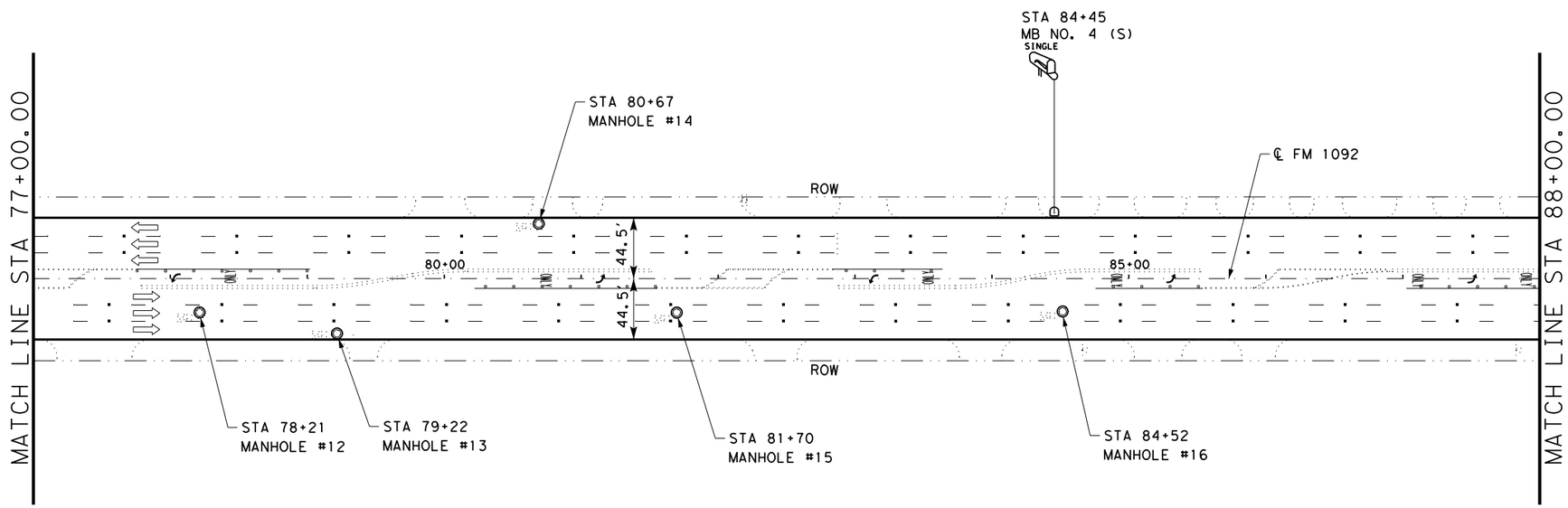
ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 3 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		54





LEGEND

- TRAFFIC DIRECTION
- MAILBOX TO BE REMOVED AND REPLACED*
- MANHOLE TO BE ADJUSTED*
- EDGE OF PAVEMENT (EOP)
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* CONTRACTOR TO FIELD VERIFY LOCATION

STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

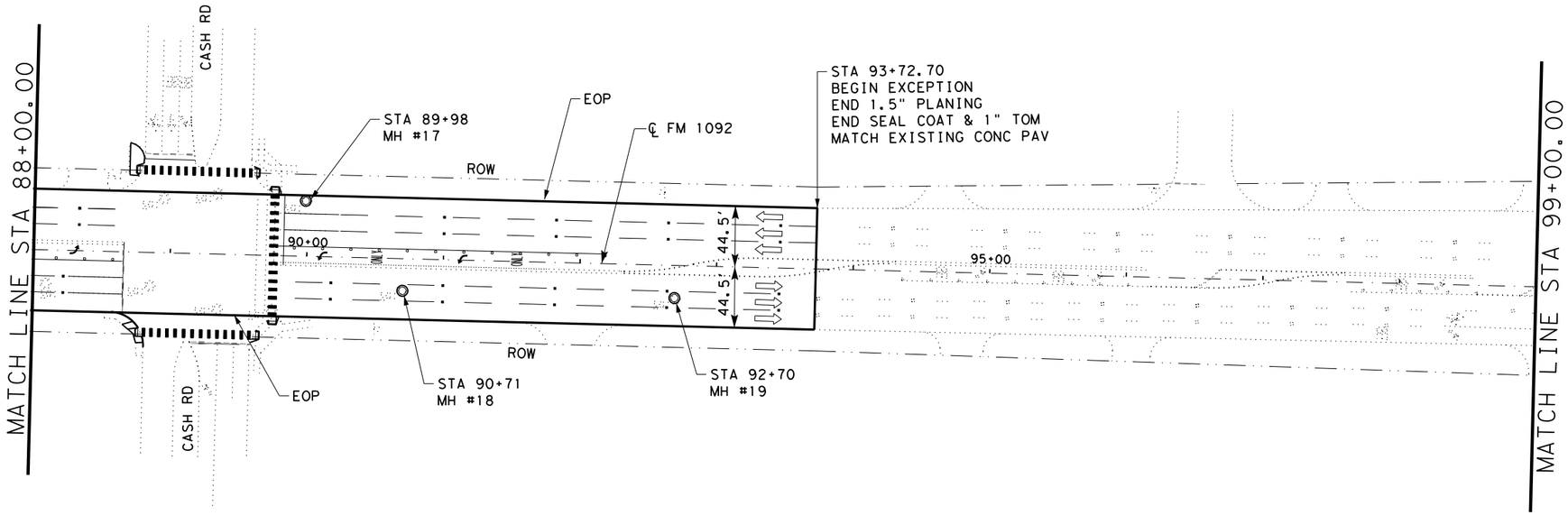
12-07-2021

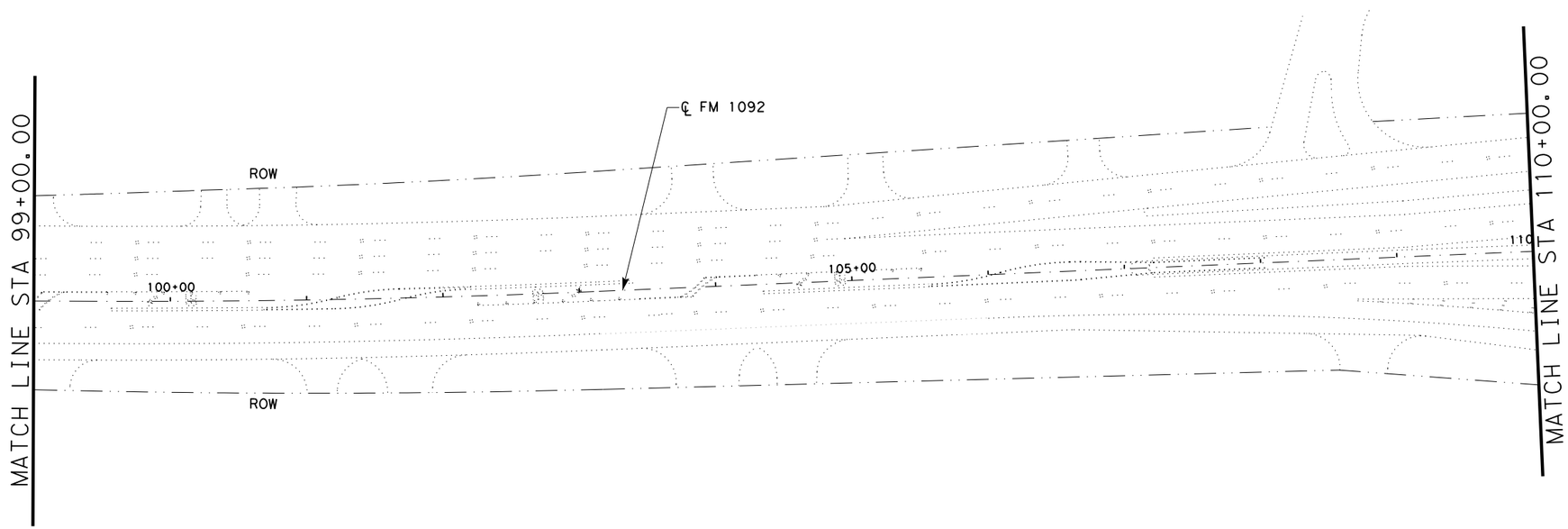
ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 4 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		55





LEGEND

- TRAFFIC DIRECTION
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STATE OF TEXAS
TAN N. LUONG
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PROFESSIONAL ENGINEER

P.E

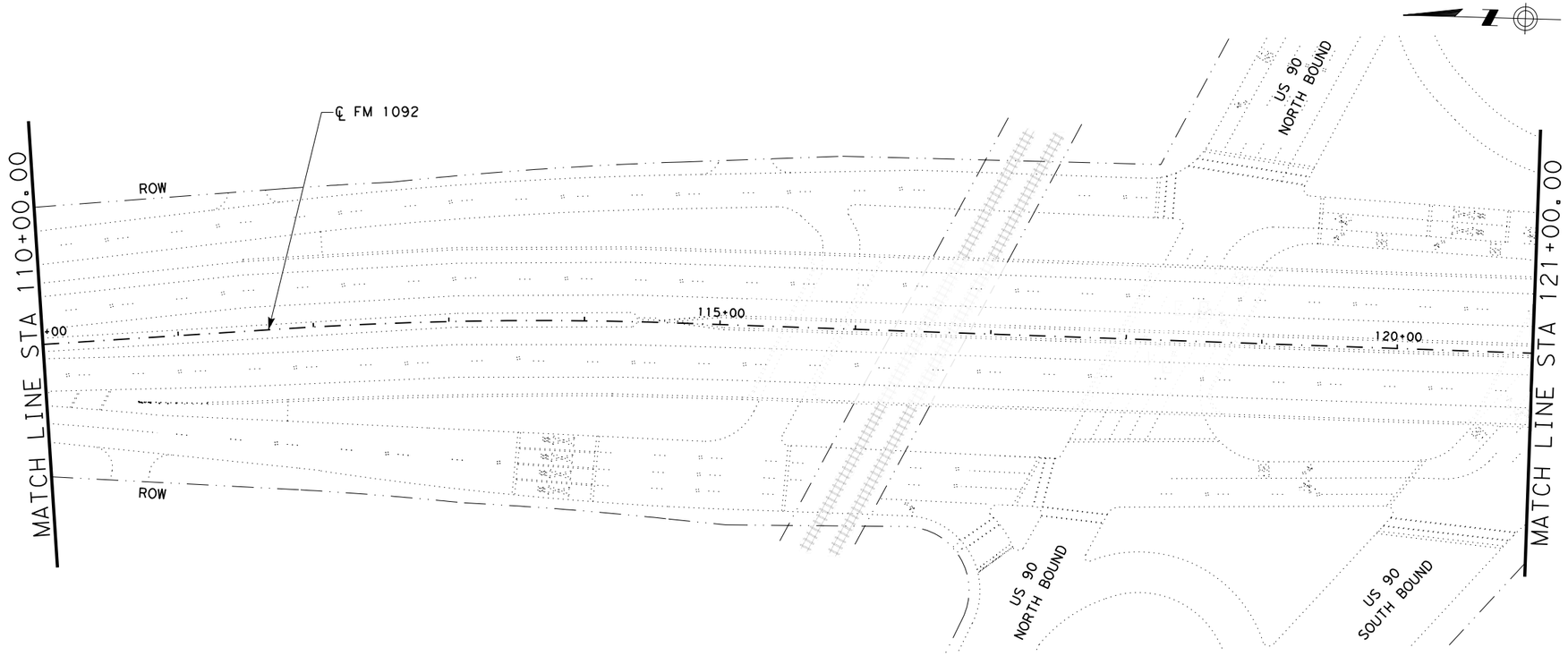
12-07-2021

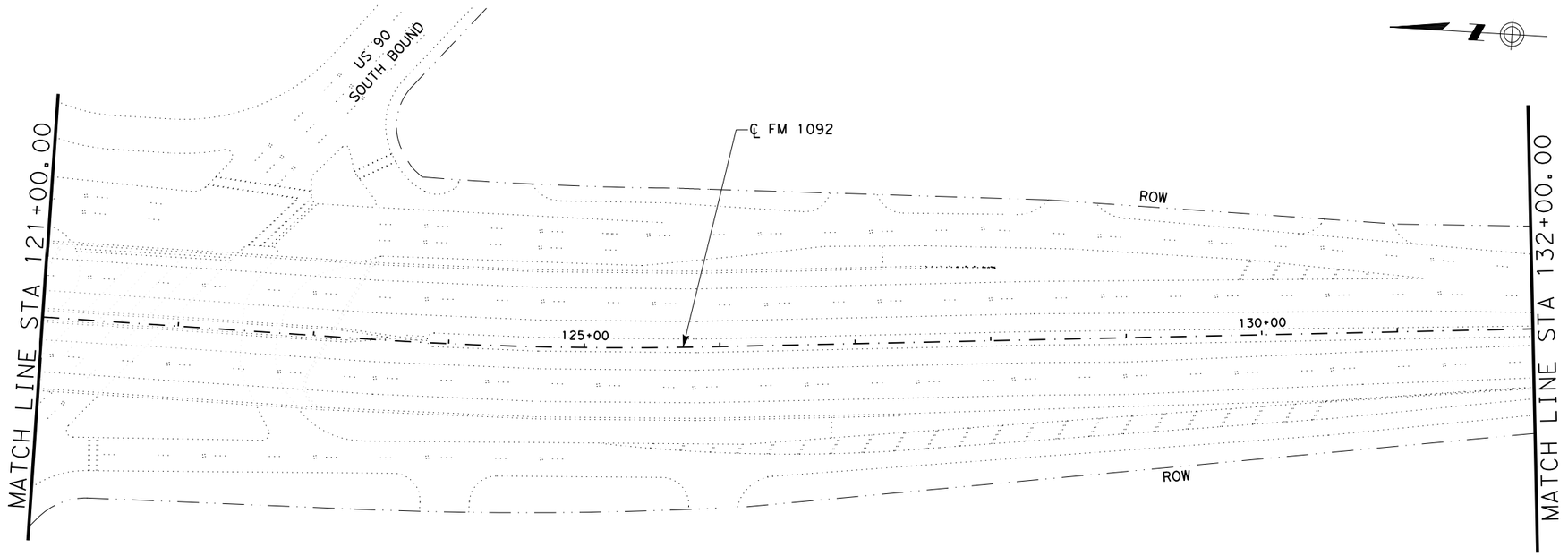
SCALE: 1"=100'

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 5 OF 14

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		56





LEGEND

- TRAFFIC DIRECTION
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- EDGE OF PAVEMENT (EOP)
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* CONTRACTOR TO FIELD VERIFY LOCATION

STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

12-07-2021

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 6 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		57

LEGEND

- TRAFFIC DIRECTION
- MAILBOX TO BE REMOVED AND REPLACED*
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- EDGE OF PAVEMENT (EOP)
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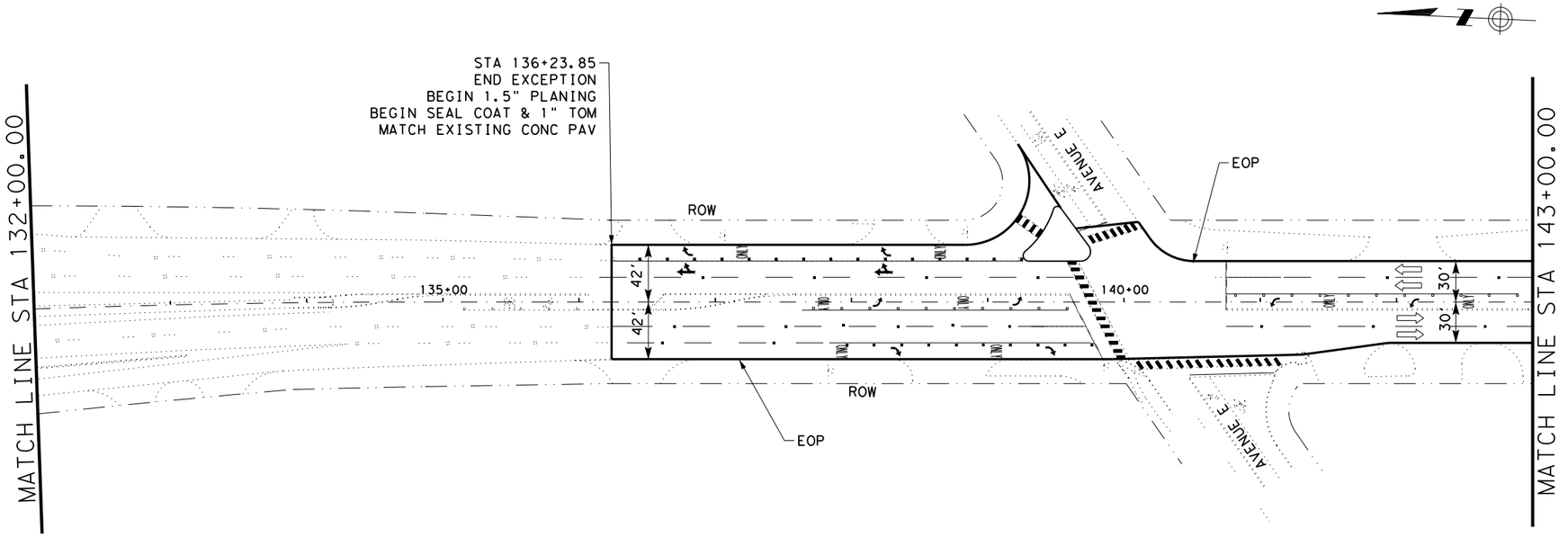
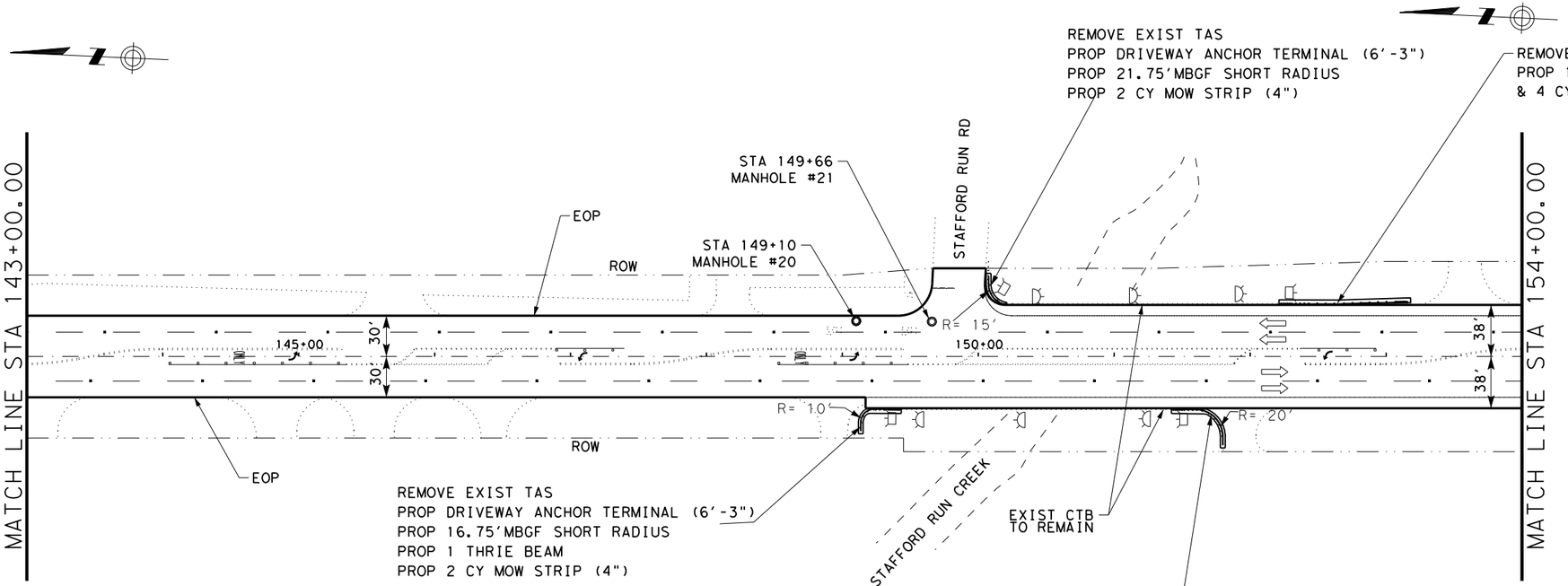




STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

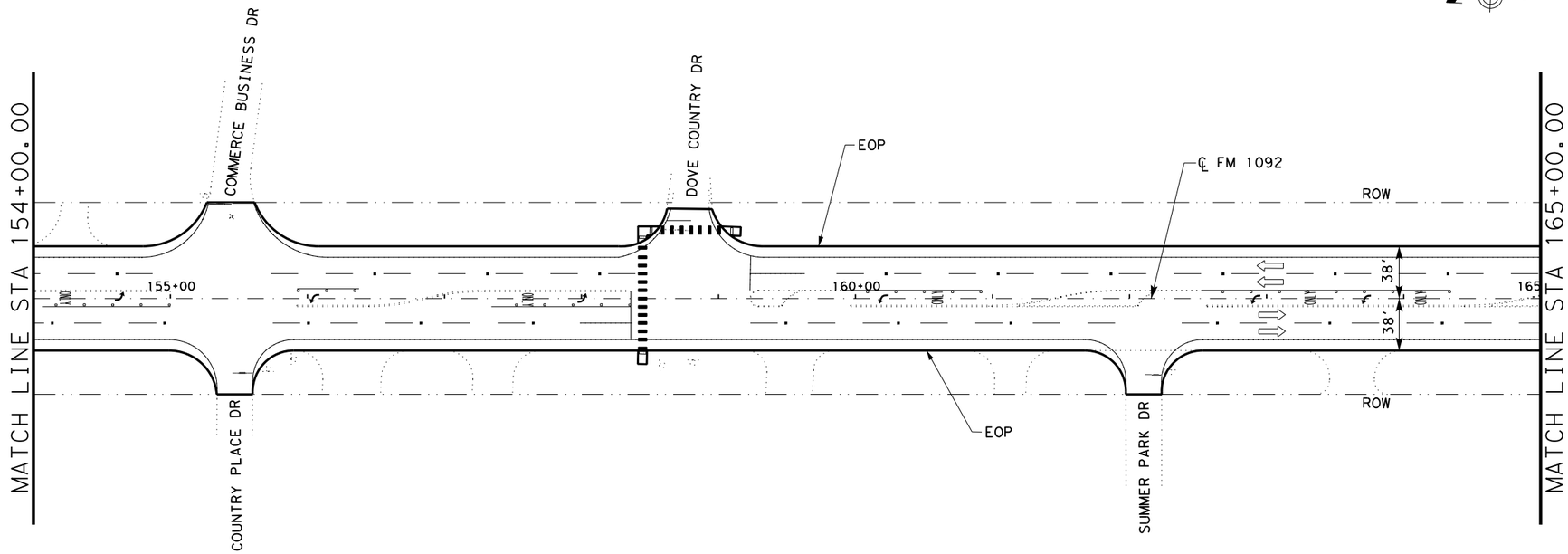
12-07-2021

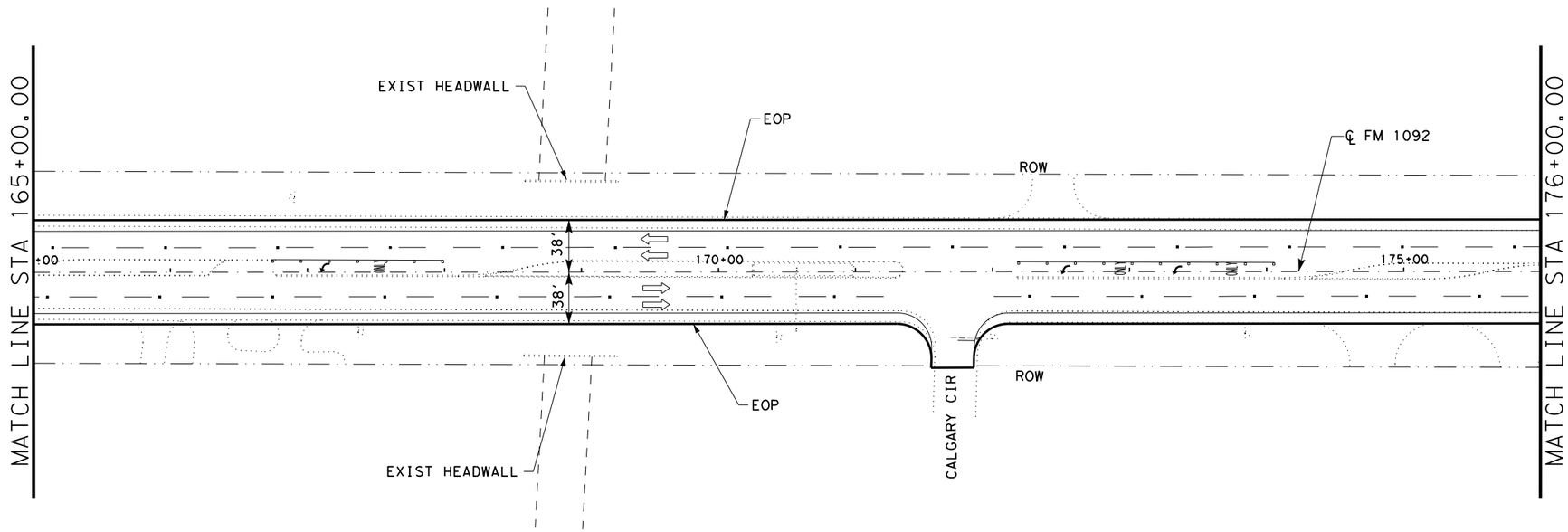
ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 7 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		58





LEGEND

- TRAFFIC DIRECTION
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107515
PROFESSIONAL ENGINEER

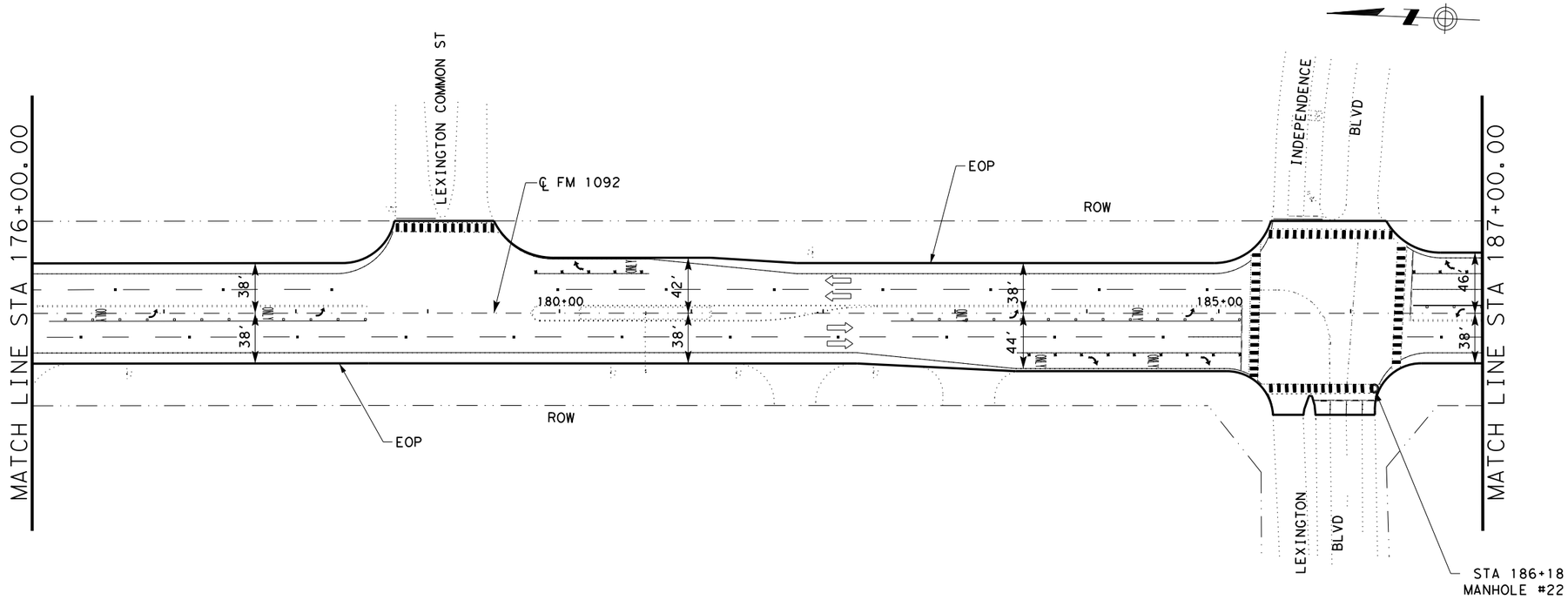
12-07-2021

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 8 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		59



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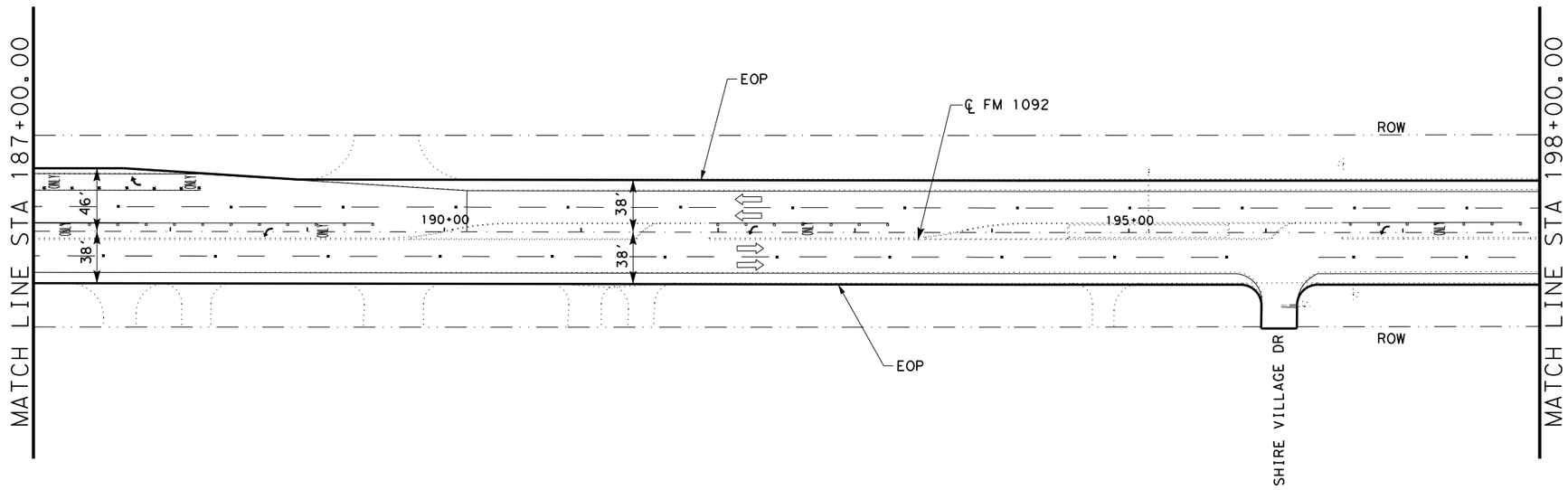


STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

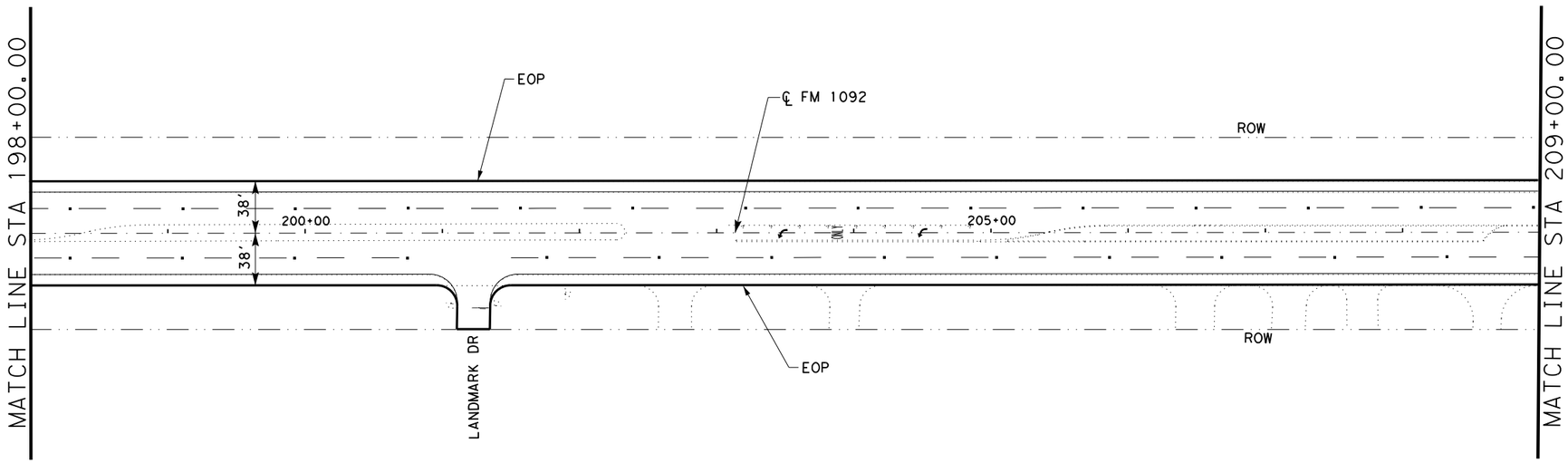
12-07-2021

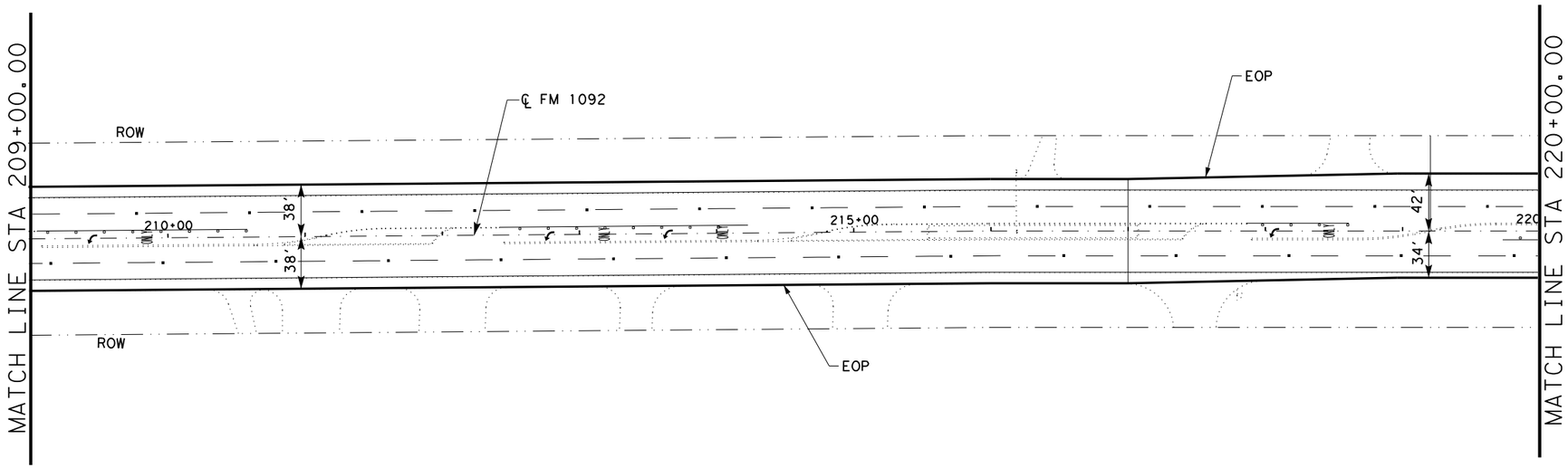
ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 9 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		60





LEGEND

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STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

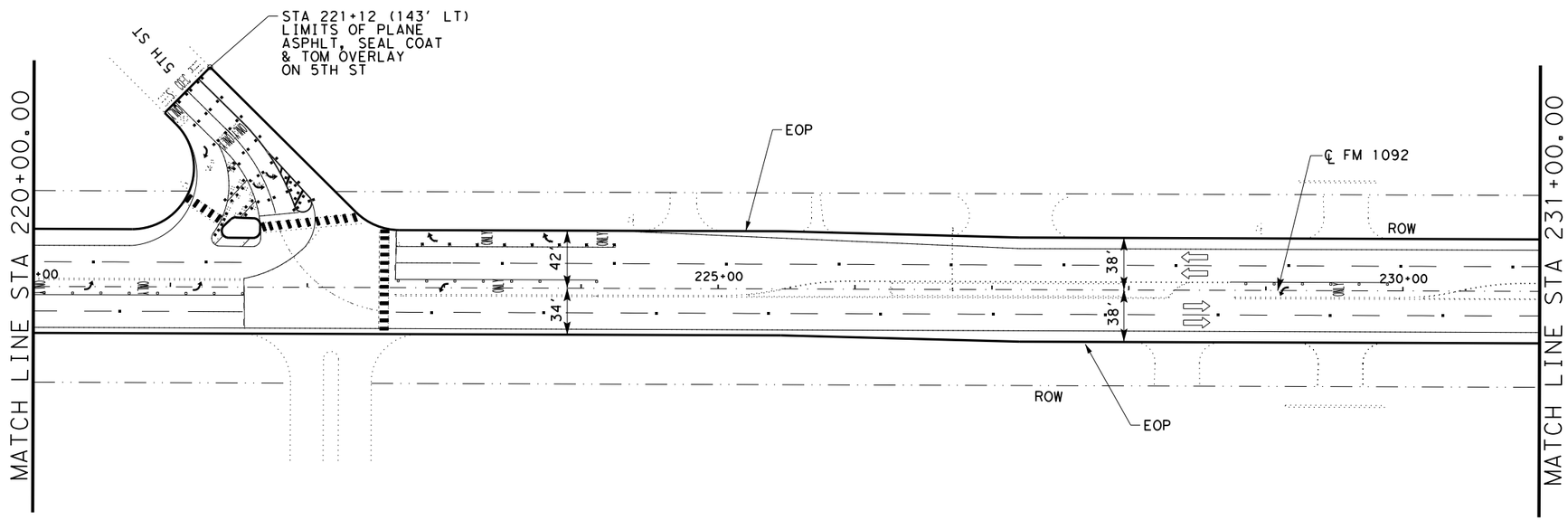
12-07-2021

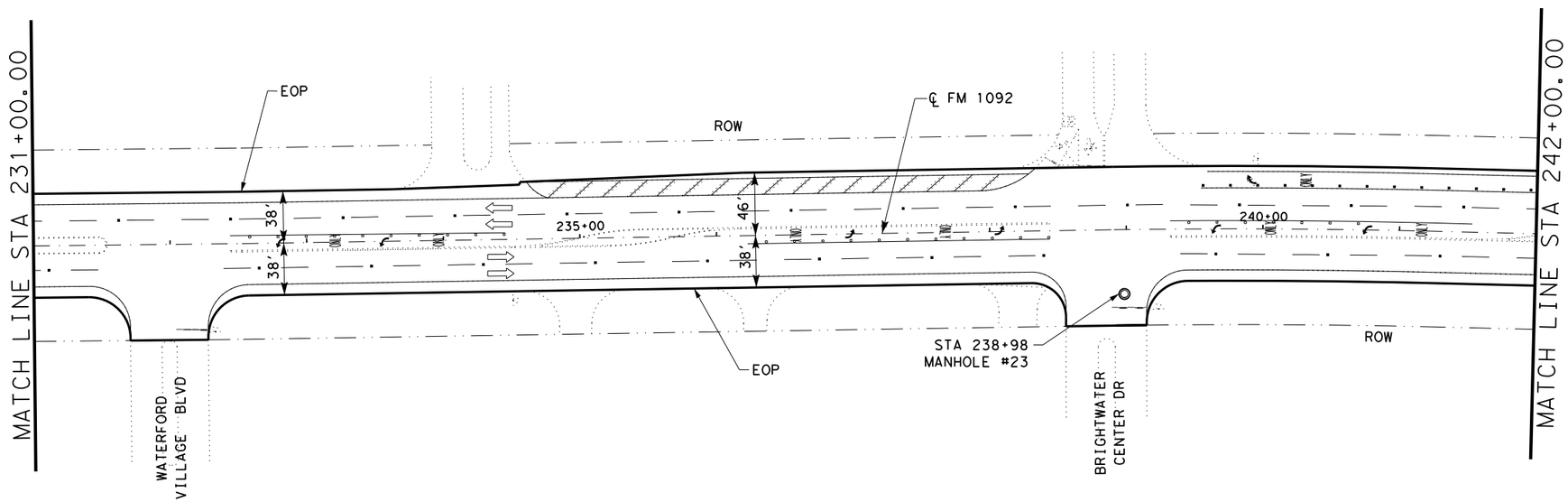
SCALE: 1"=100'

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 10 OF 14

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		61





LEGEND

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STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

, P.E

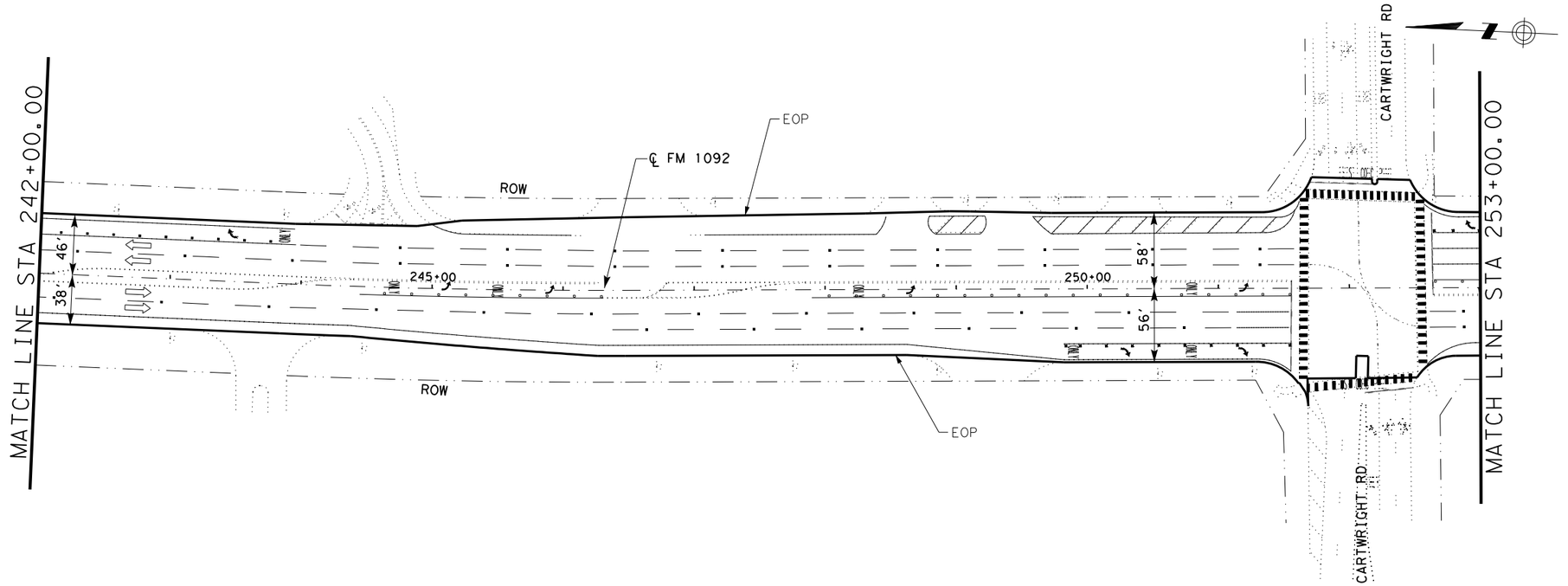
12-07-2021

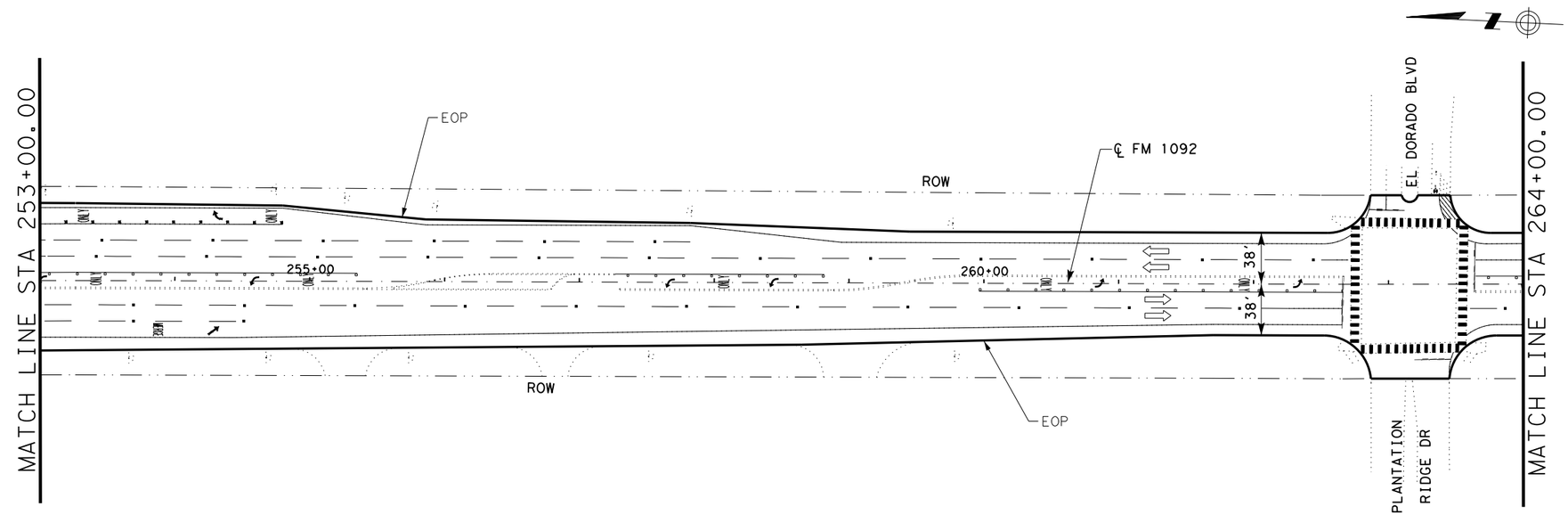
SCALE: 1"=100'

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 11 OF 14

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		62





LEGEND

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STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

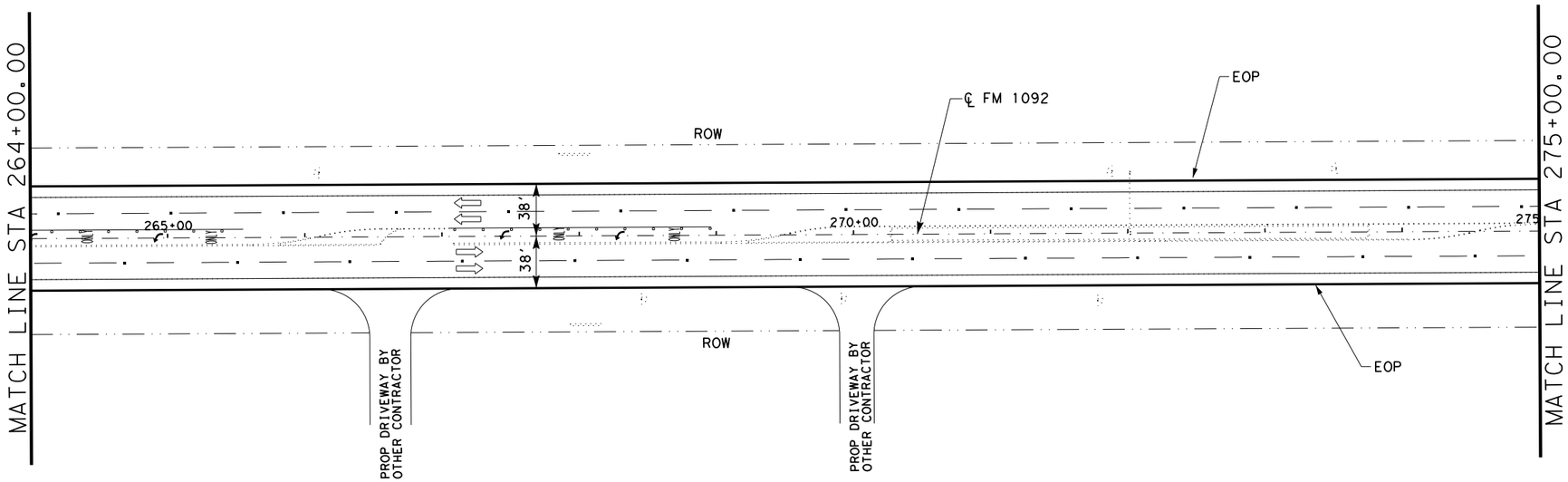
12-07-2021

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 12 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		63



LEGEND

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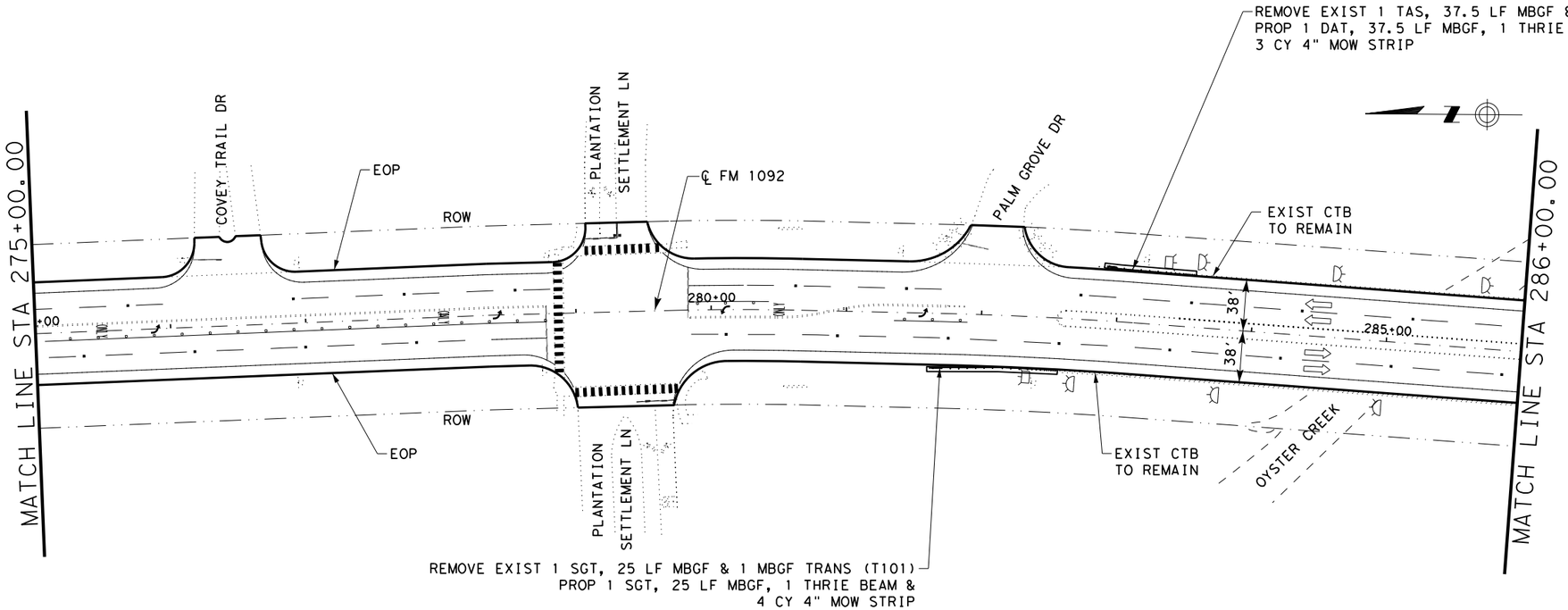


STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

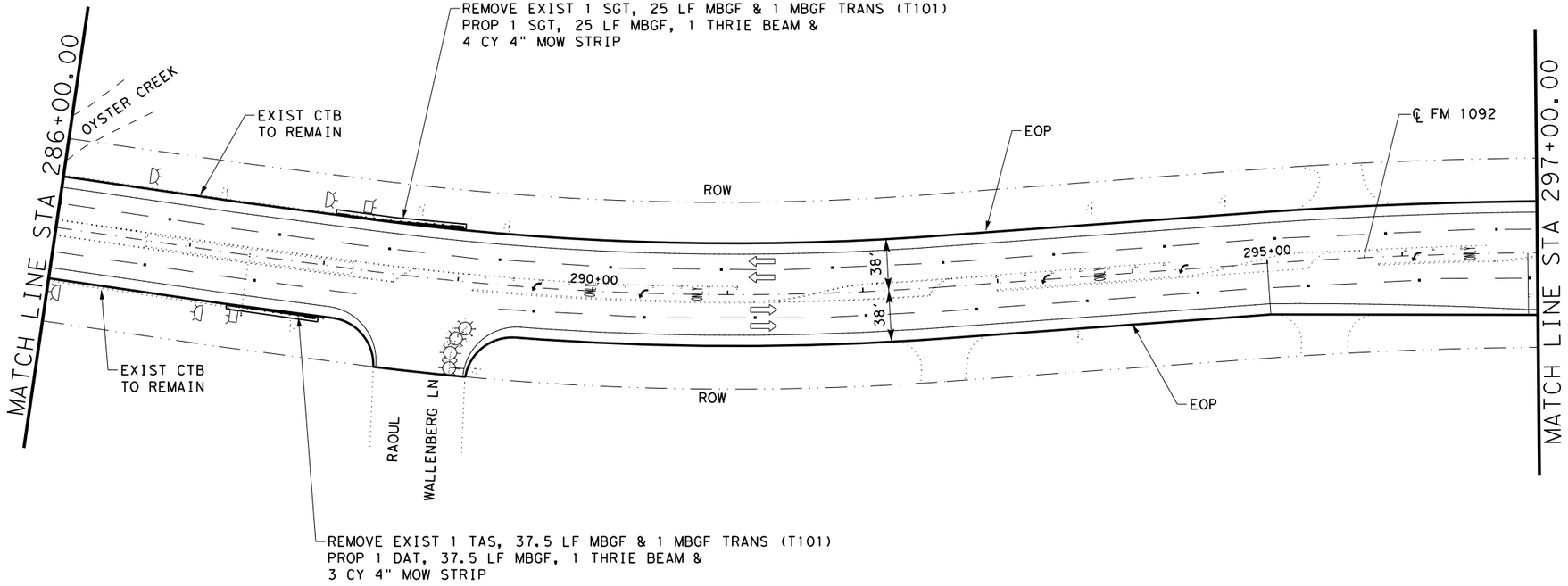
12-07-2021

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 13 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		64



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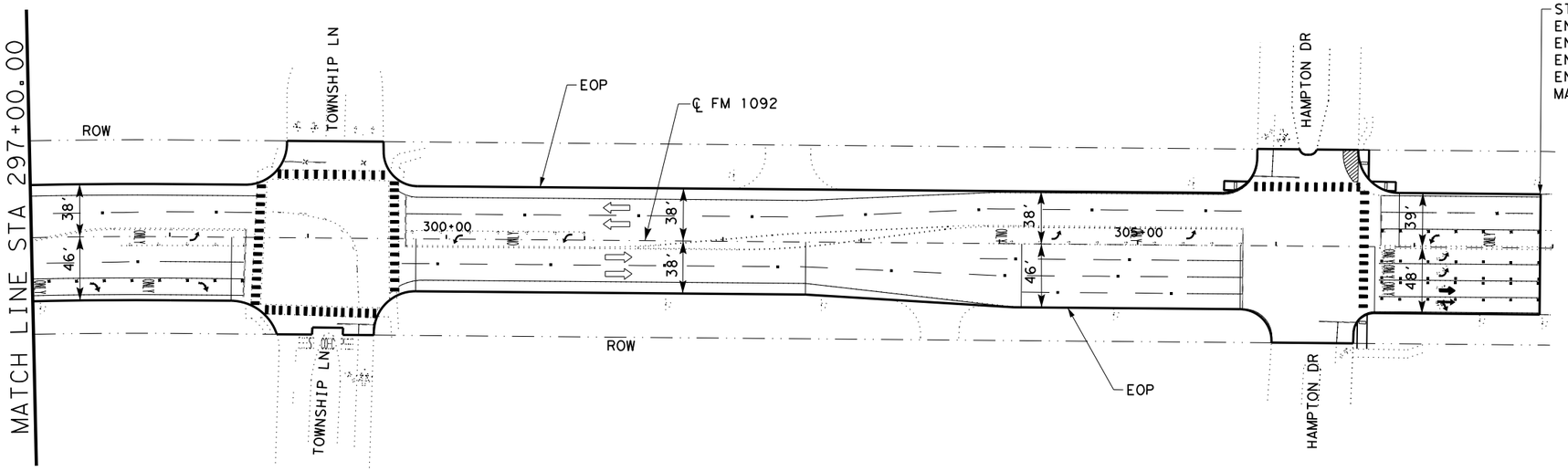


STATE OF TEXAS
TAN N. LUONG
107515
PROFESSIONAL ENGINEER

P.E

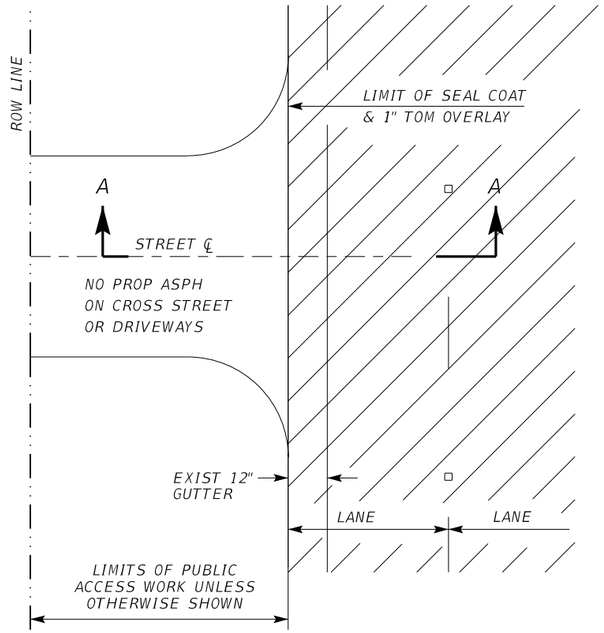
12-07-2021

ROADWAY LAYOUT

CSJ: 1257-01-052
SHEET 14 OF 14

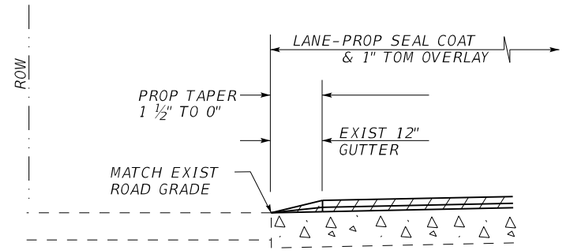
SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		65



PLAN

INTERSECTING
CROSS STREETS/DRIVEWAYS
N.T.S.



SECTION A-A

EXIST CROSS STREET/
DRIVEWAY

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED
PROFESSIONAL ENGINEER

P.E

12-07-2021

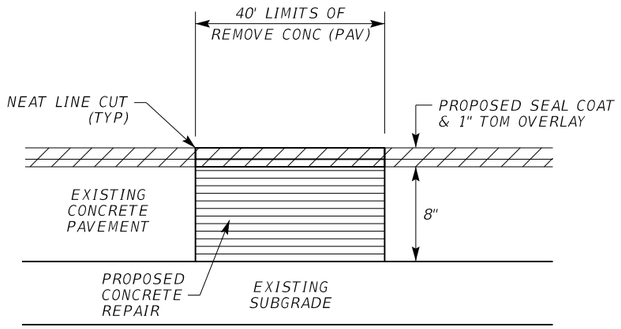
ROADWAY/DRIVEWAY DETAILS

SHEET 1 OF 1

Texas Department of Transportation

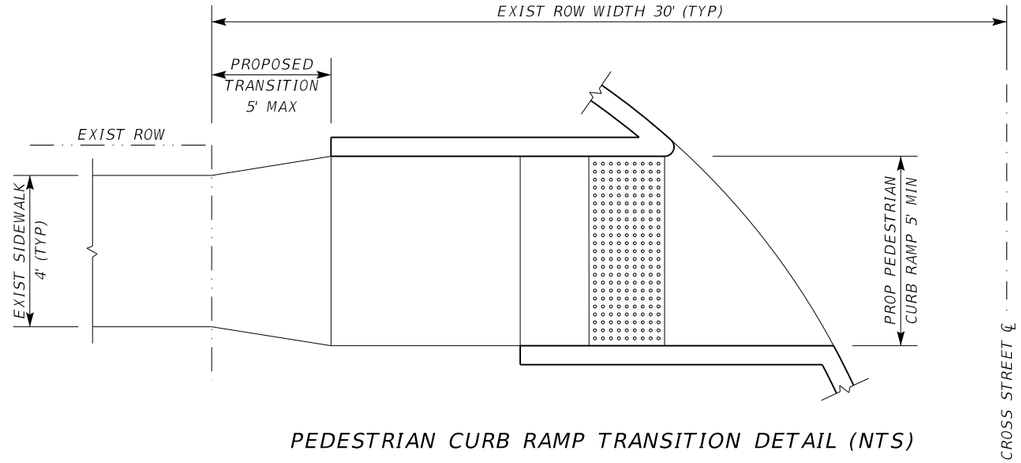
N.T.S.

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		66

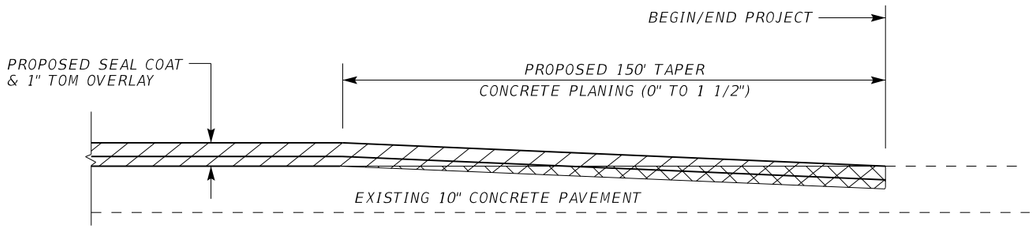


REMOVE CONC PAVEMENT DETAIL (NTS) (BETWEEN STA 1+17.60 TO STA 15+17.00)

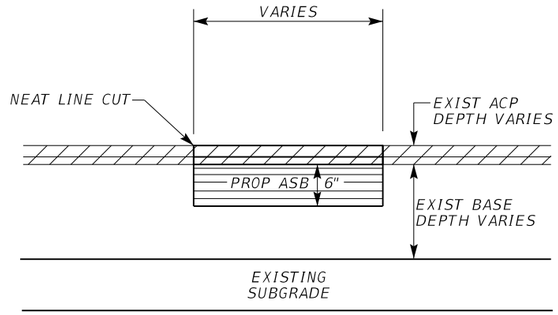
NOTE: REPLACEMENT OF EXISTING 8" CRCP AND 6" CONCRETE CURB IS SUBSIDIARY TO ITEM 0361-6002 "FULL-DEPTH REPAIR CRCP (8").



PEDESTRIAN CURB RAMP TRANSITION DETAIL (NTS)



PLANING & TAPER DETAIL (NTS)



FLEXIBLE PAVEMENT STRUCTURAL REPAIR DETAIL

NTS

ITEM 351-6002

1. LOCATION OF BASE REPAIR HAVE NOT SHOWN ON THE LAYOUTS BUT WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
2. SAW CUTS SHALL BE SUBSIDIARY TO ITEM 351.

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED
PROFESSIONAL ENGINEER

P.E

12-07-2021

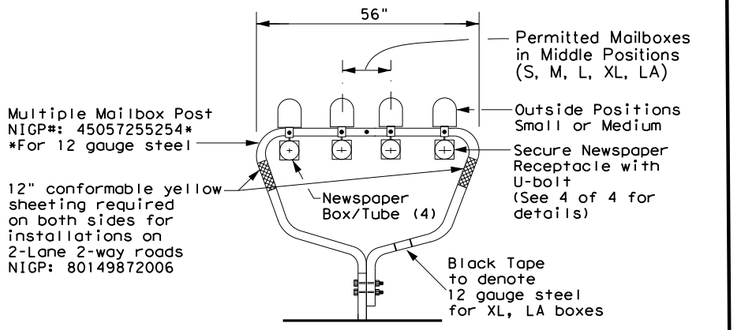
MISCELLANEOUS DETAILS

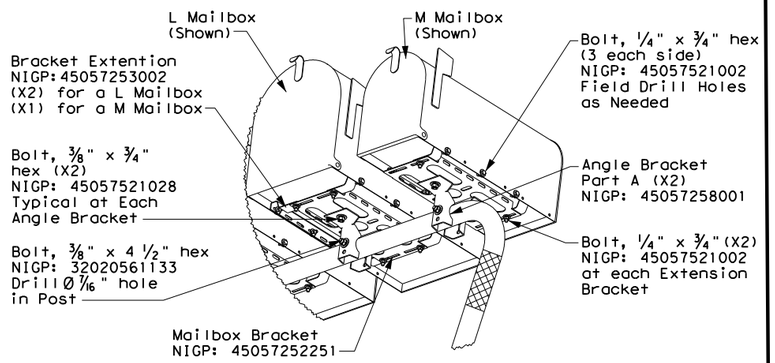
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		67

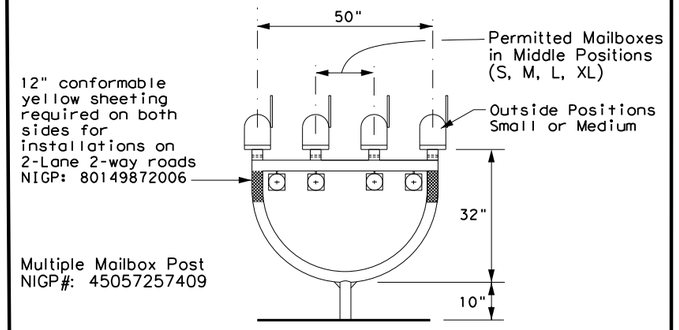
DATE:
FILE:

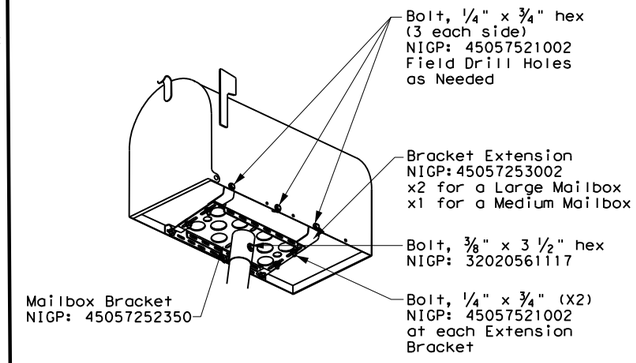
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

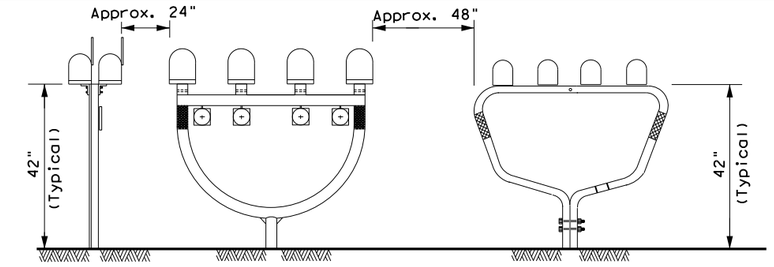
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

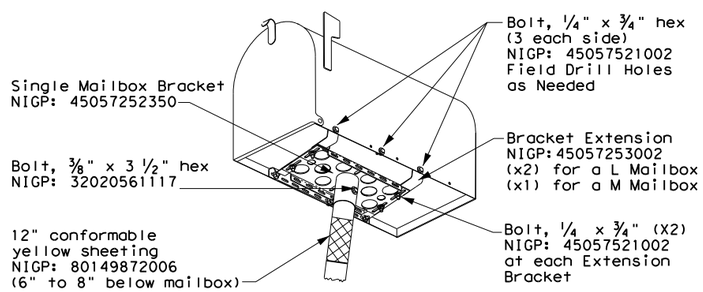
TYPICAL INSTALLATION MEASUREMENTS

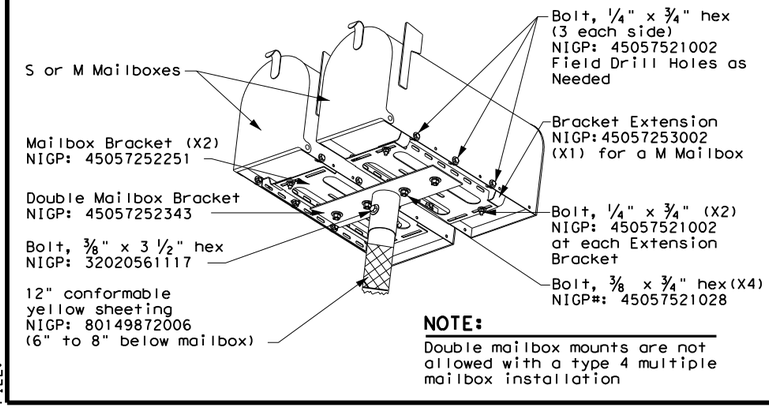


NOTE:

Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

TYPE 2 and 4 - SINGLE/DOUBLE

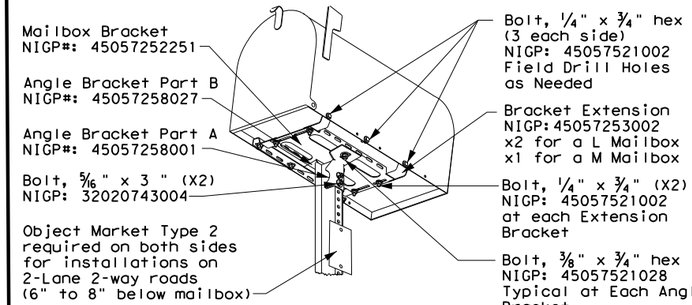


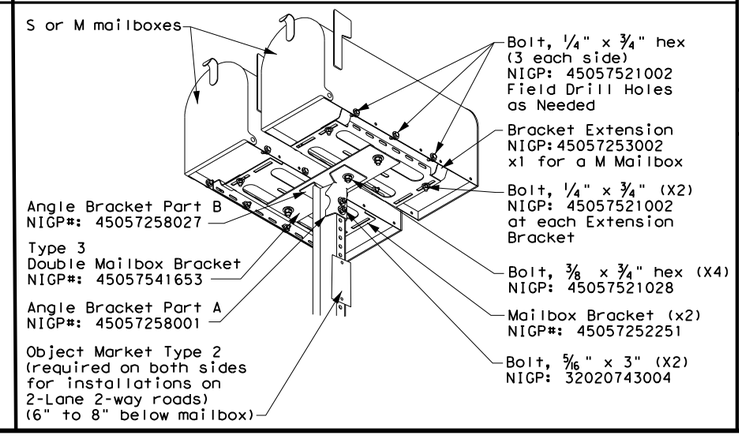


NOTE:

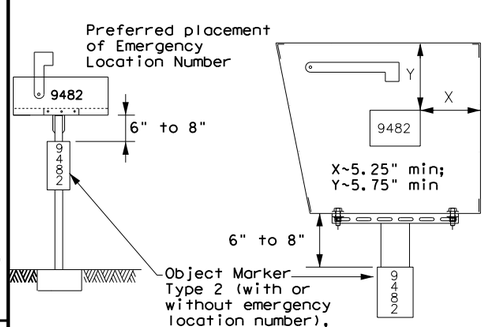
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

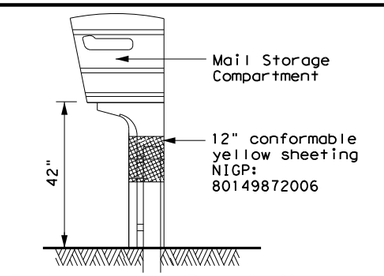


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		68

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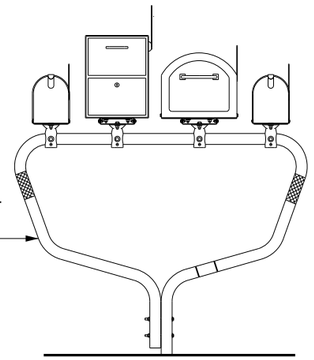
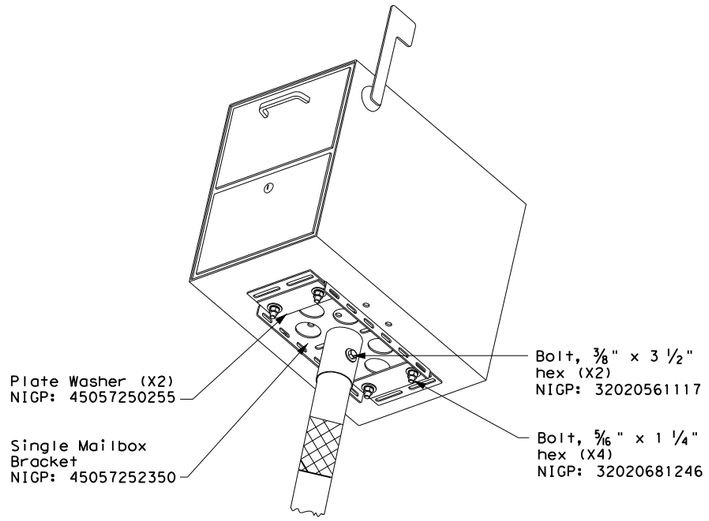
DATE:
FILE:

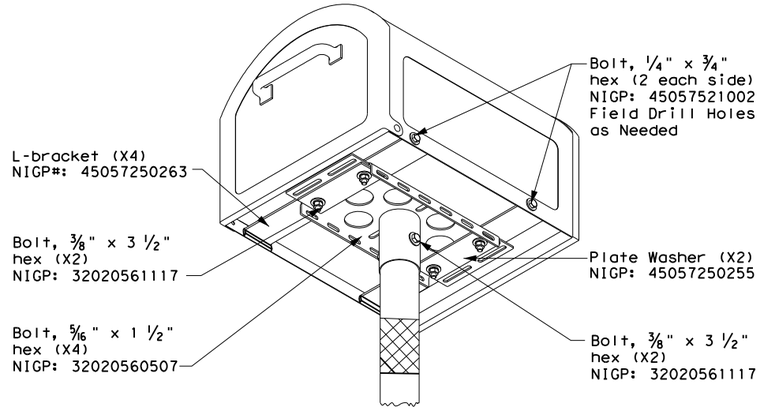
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

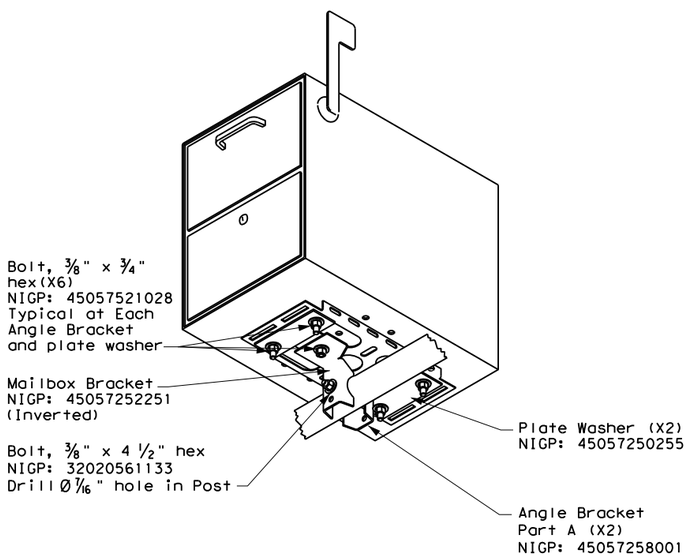


TYPE 2/4 - SINGLE XL MAILBOX

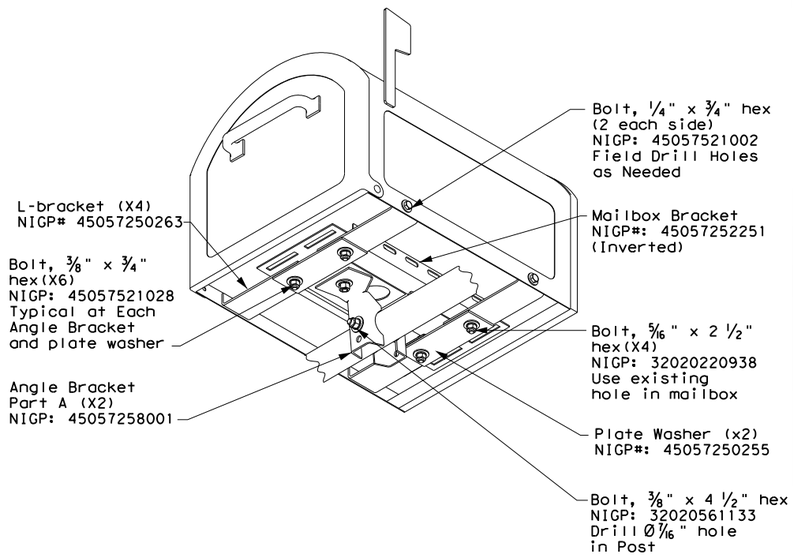


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

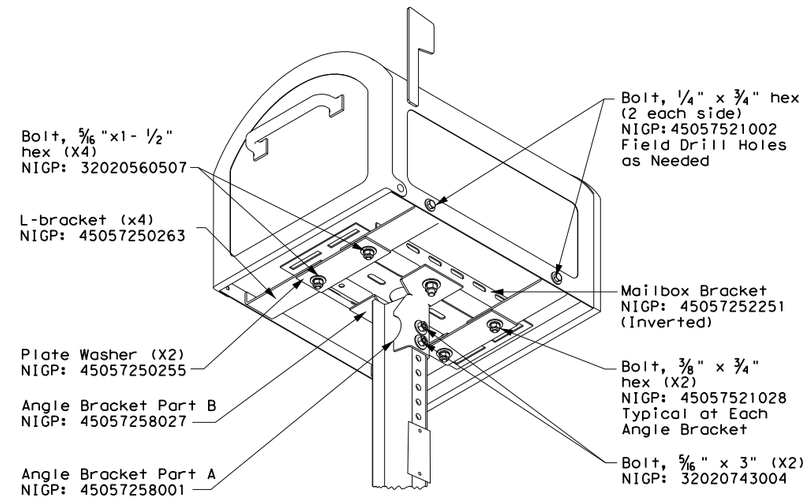
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation | Maintenance Division Standard

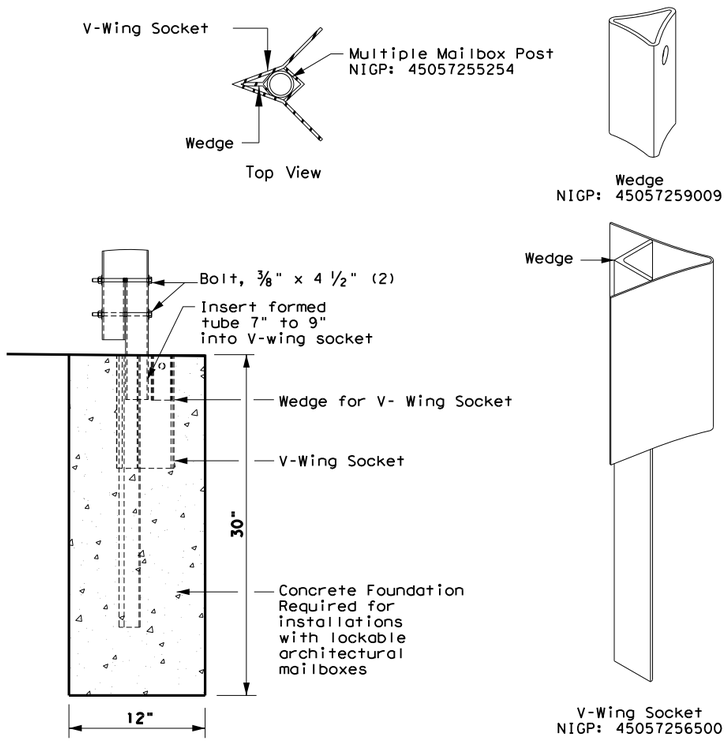
XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

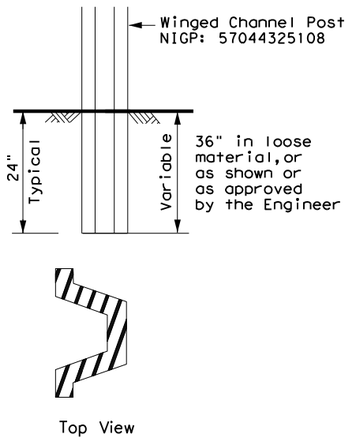
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		69

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



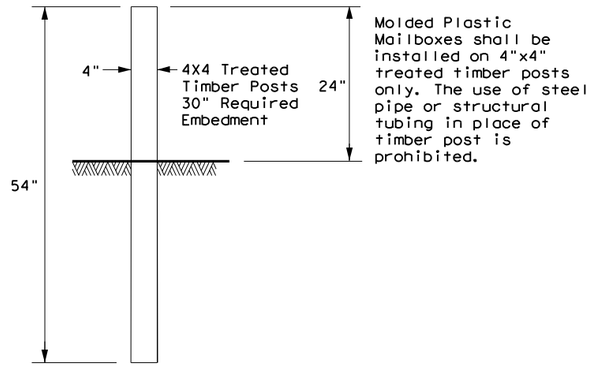
TYPE 3 - SUPPORT/FOUNDATION



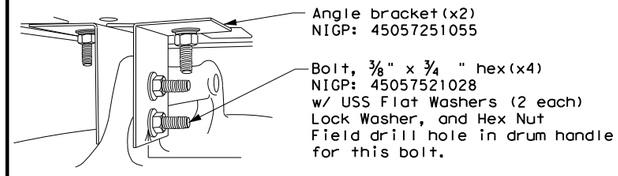
NOTES:

1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

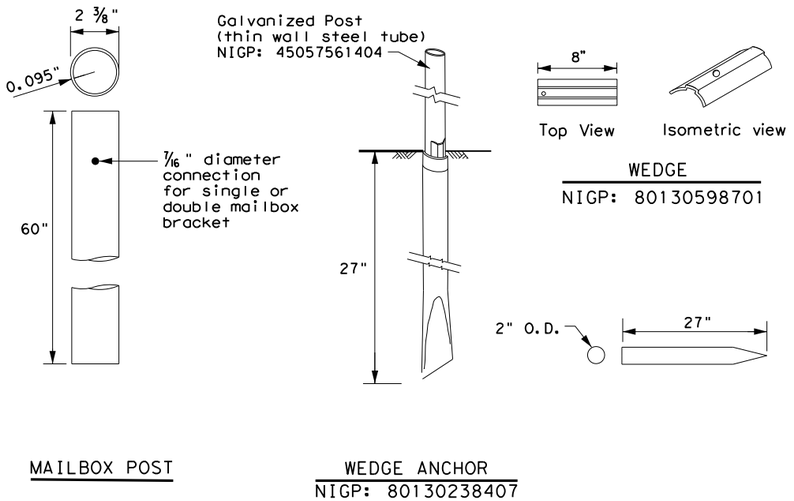
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

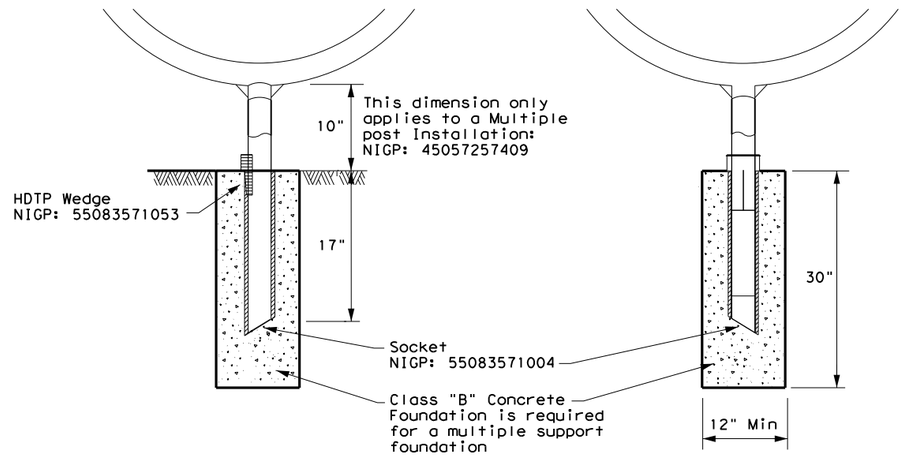


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
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REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		70

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FILE:

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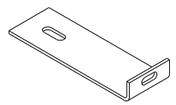
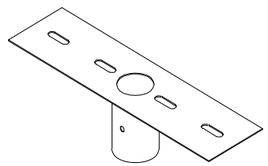
DATE:
FILE:

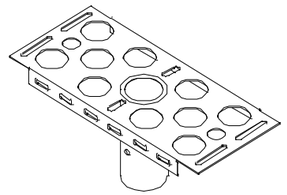
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



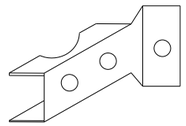
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



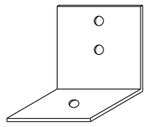
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



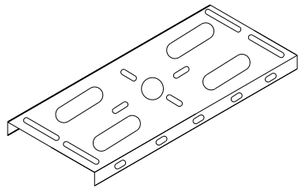
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



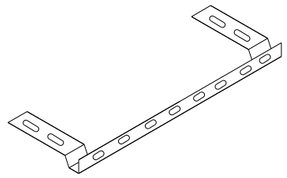
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



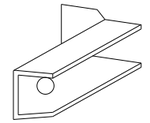
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



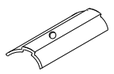
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



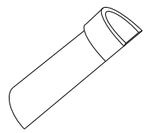
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



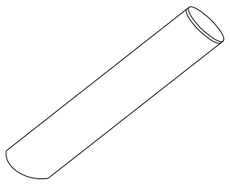
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

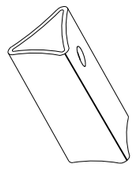


NIGP: 55083571053
Type 4 Mailbox Wedge

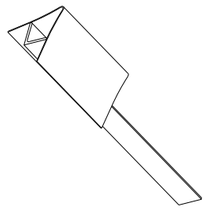


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

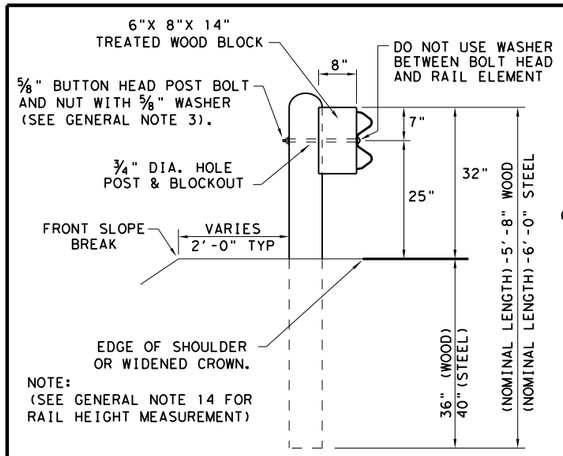
Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

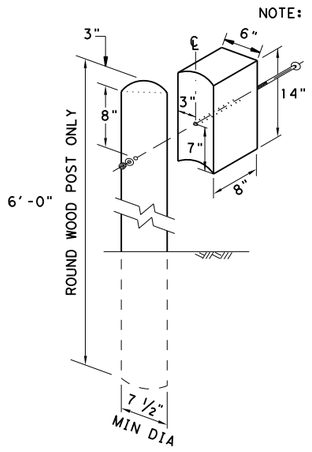
MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		71

DATE:
FILE:

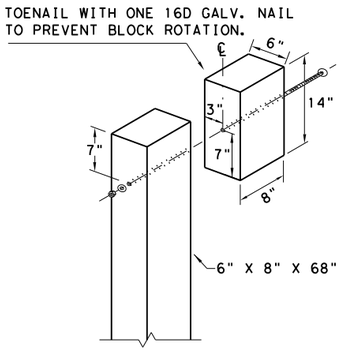


TYPICAL POST PLACEMENT

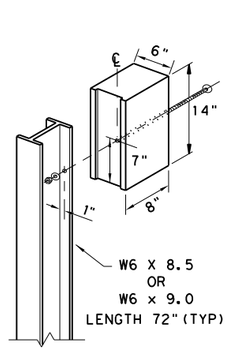


WOOD BLOCK TO ROUND WOOD POST

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

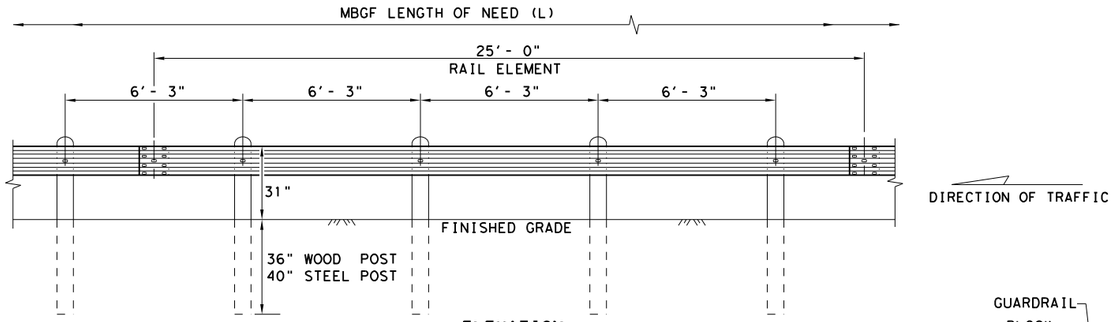


WOOD BLOCK TO RECTANGULAR WOOD POST



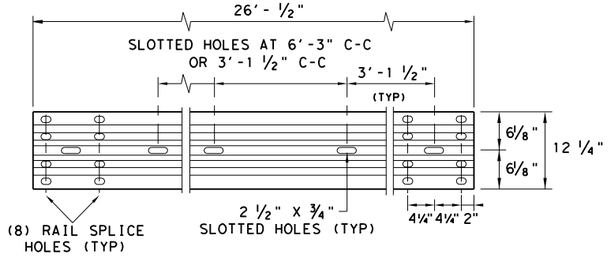
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



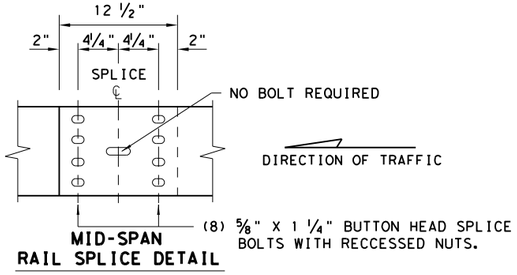
ELEVATION MID-SPAN RAIL SPLICE

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



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

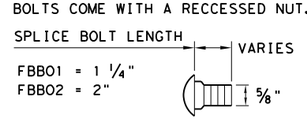
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



MID-SPAN RAIL SPLICE DETAIL

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

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

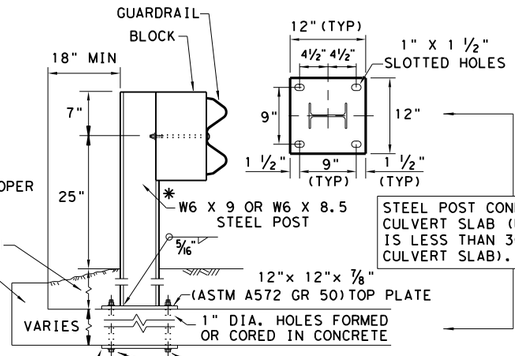


FBB01 = 1 ¼"
FBB02 = 2"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

BUTTON HEAD BOLT

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



* 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	1257	01	052, ETC	FM 1092	
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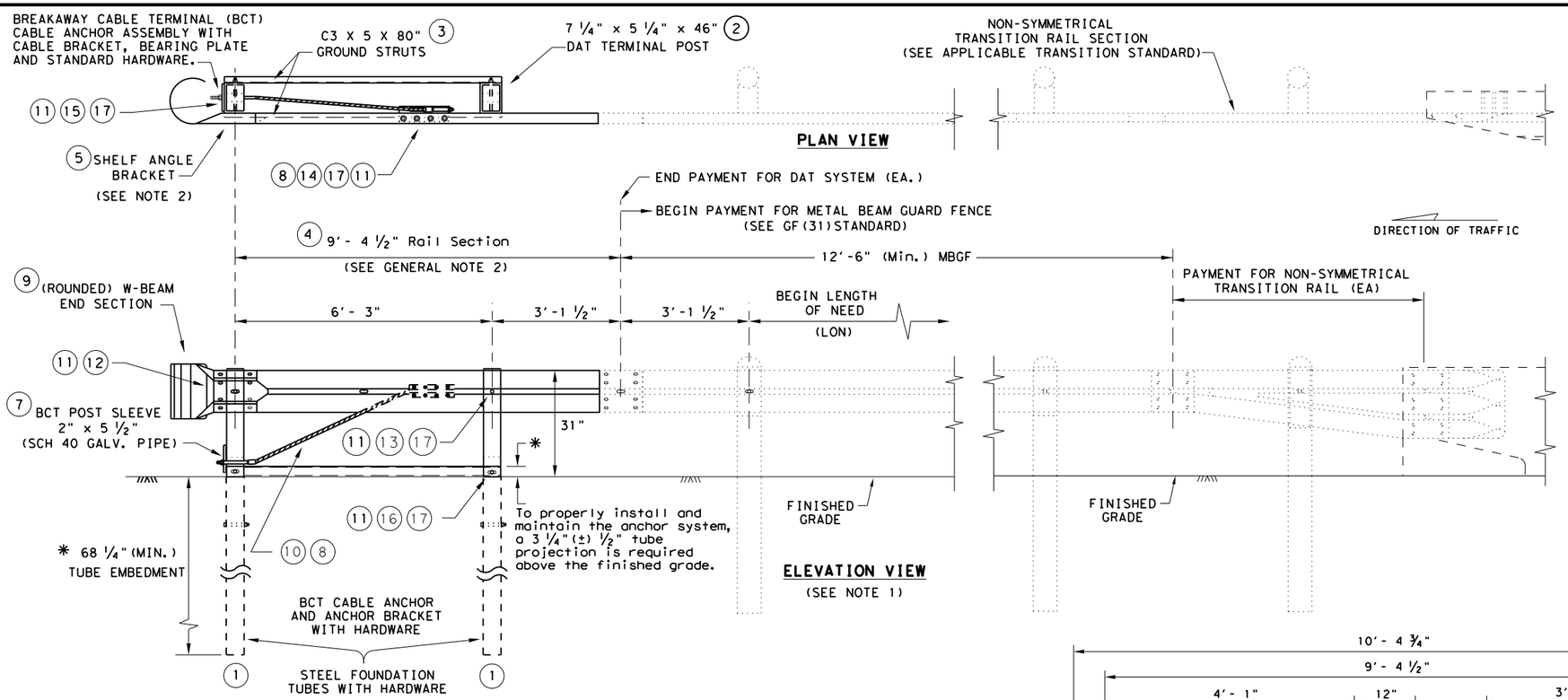


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

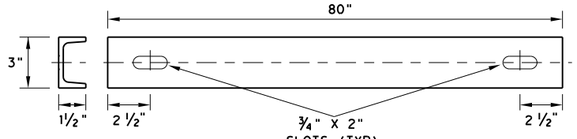
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

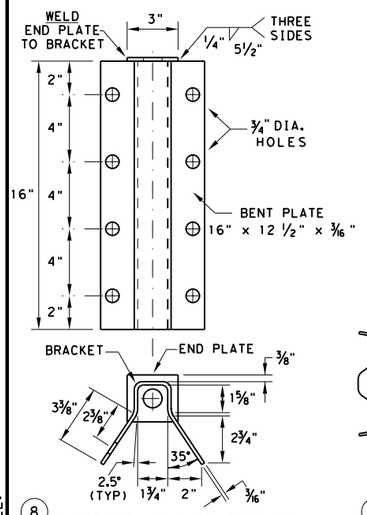
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

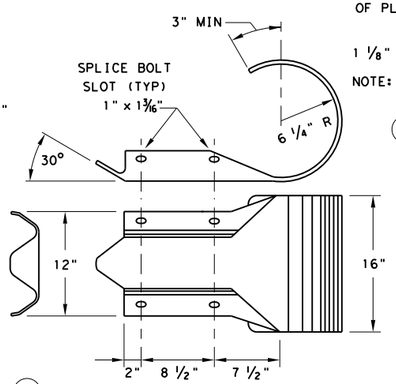
(4) **TERMINAL RAIL ELEMENT FOR DAT**



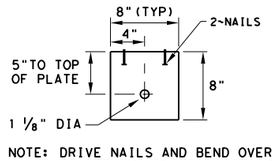
(3) **CHANNEL STRUT**
C3 X 5 X 80", GRADE A36



(8) **GUARDRAIL ANCHOR BRACKET**

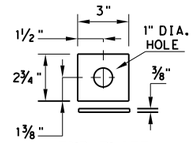


(9) **W-BEAM END SECTION (ROUNDED) (12 GA.)**

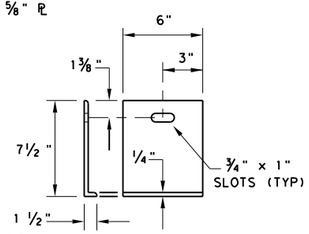


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

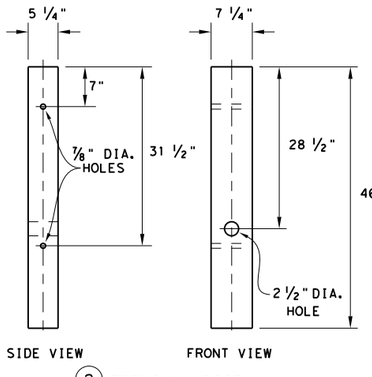
(6) **BEARING PLATE**
8"x 8"x 5/8" ℄



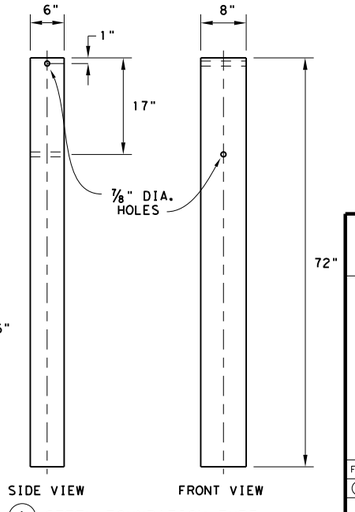
END PLATE



(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
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REVISIONS	1257	01	052, ETC	FM 1092
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	HOU	FT BEND		73

DATE:
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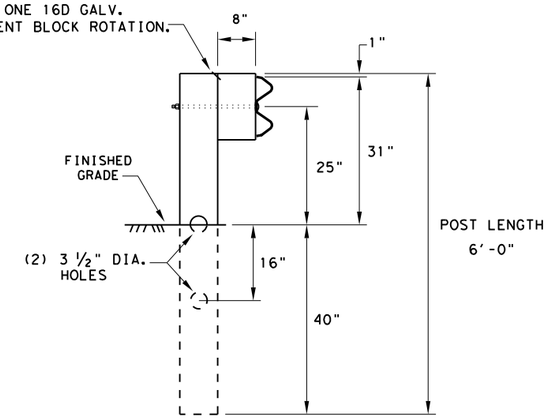
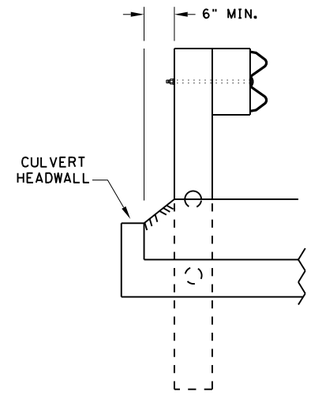


RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



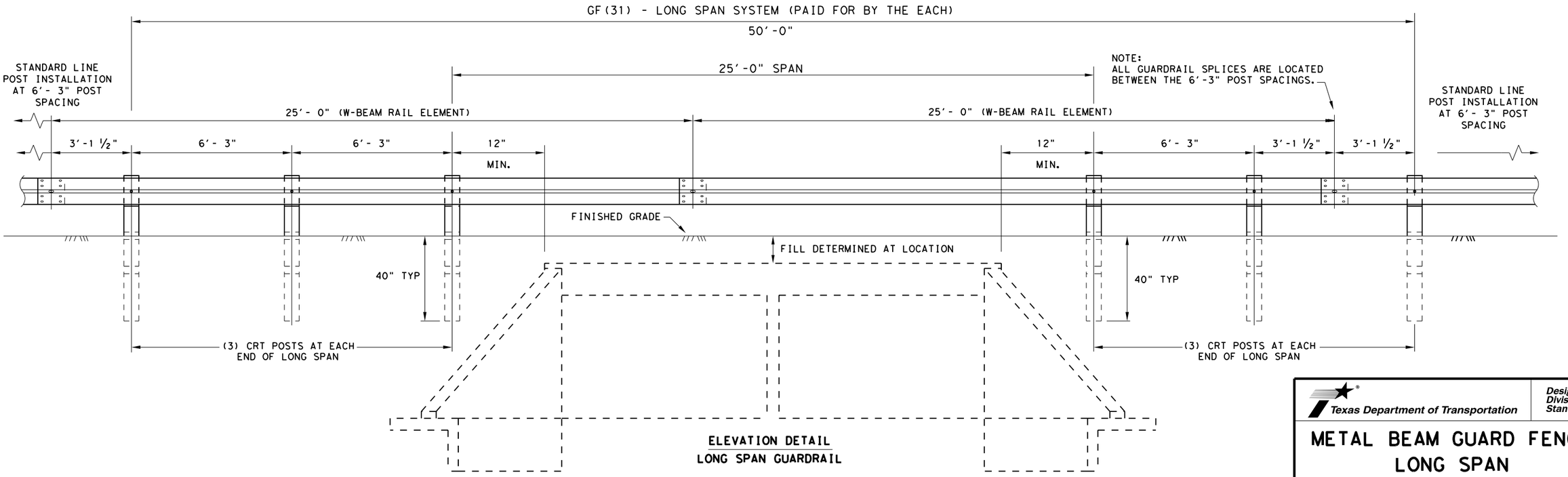
LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

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

DIRECTION OF TRAFFIC



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

FILE: gf31ls19.dgn	DN: TxDOT		CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1257	01	052, ETC		FM 1092	
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DATE:
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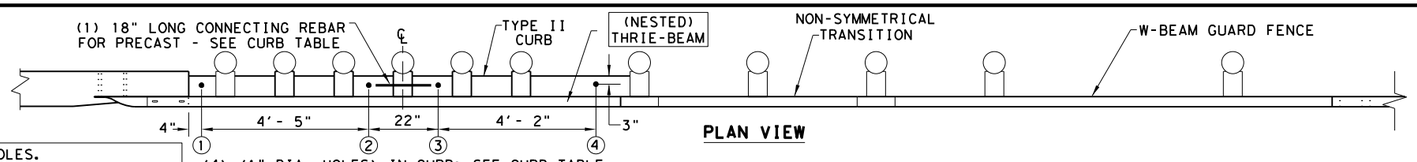


PLAN VIEW

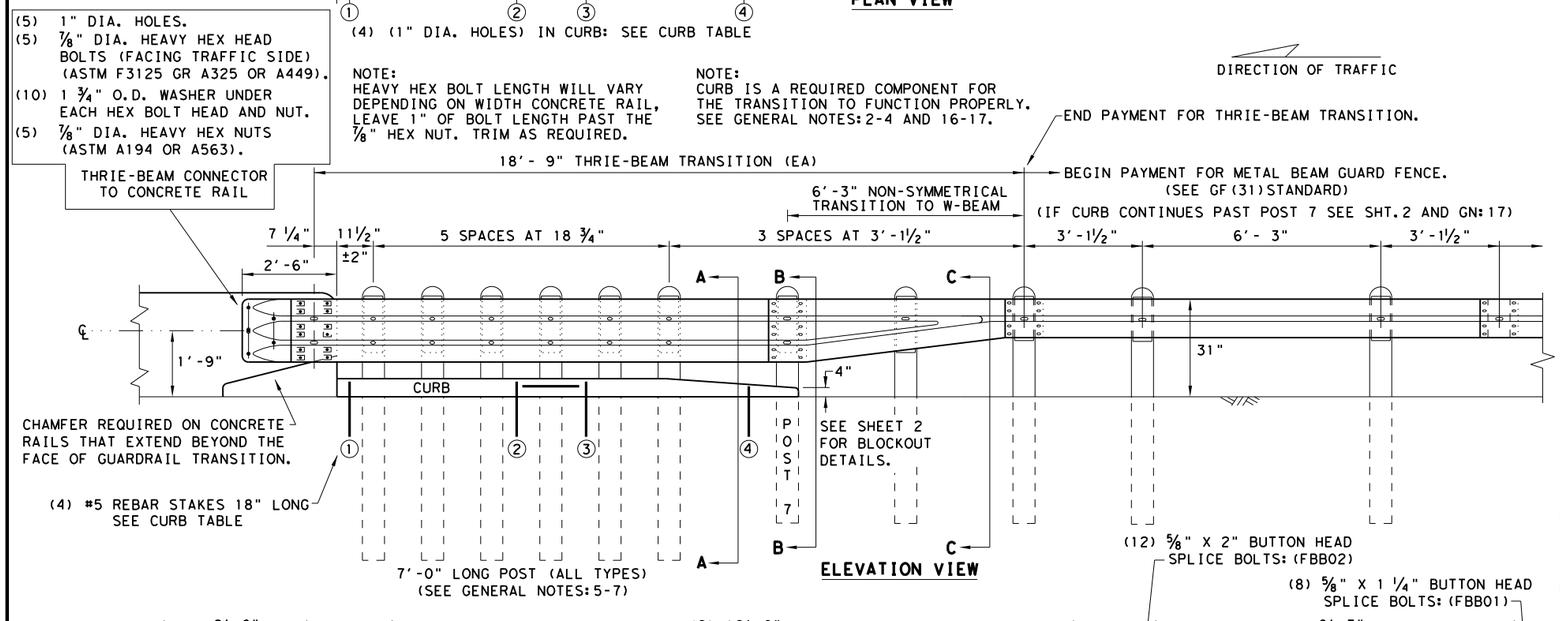
(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

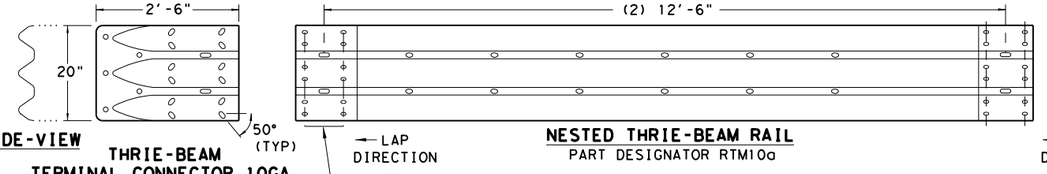
NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

DIRECTION OF TRAFFIC



ELEVATION VIEW



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

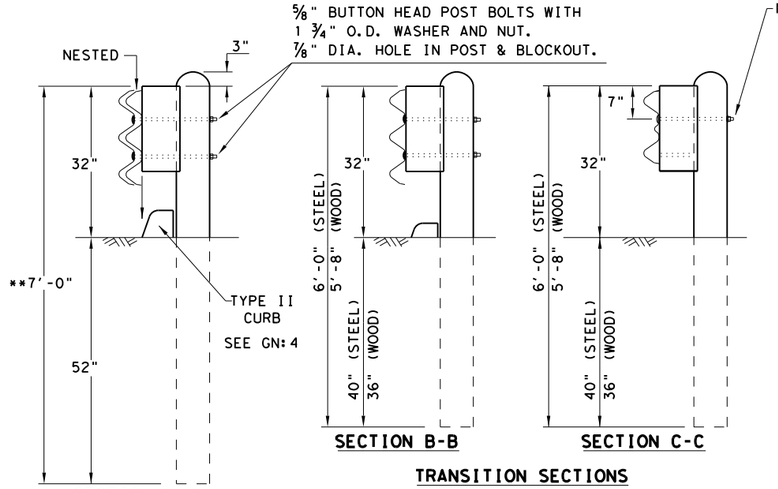
NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

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

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS

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



SECTION A-A

SECTION B-B

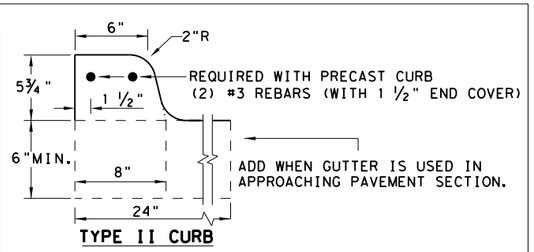
SECTION C-C

TRANSITION SECTIONS

NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8" CURB (2) LENGTH 6'- 6" TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2): FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *: FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. 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.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. 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. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FT BEND		75

DATE:
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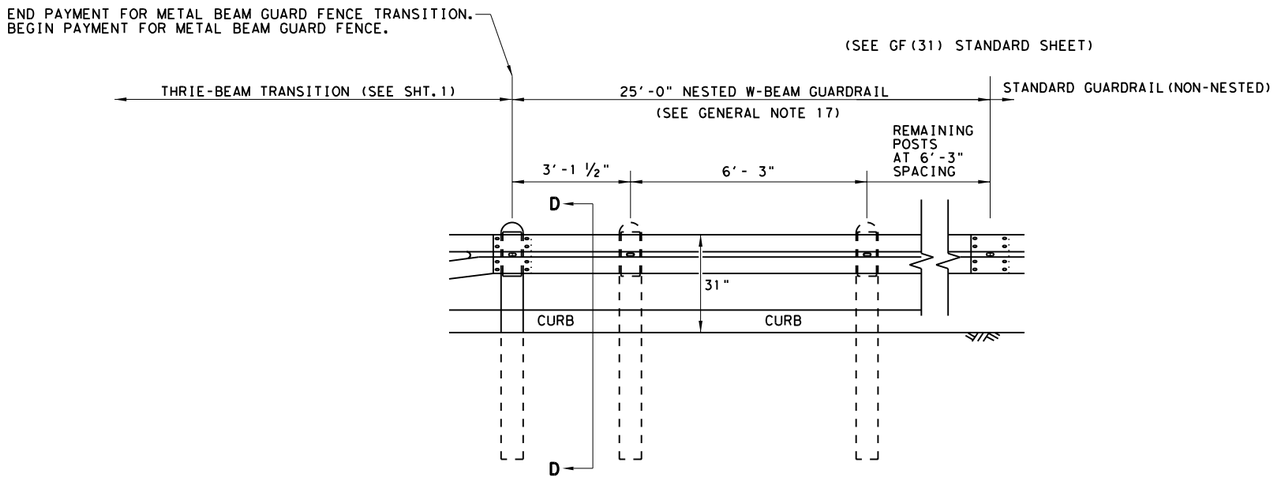
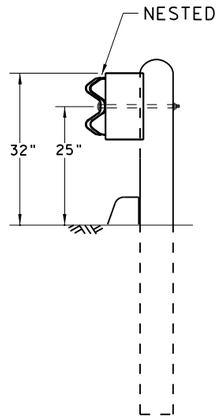
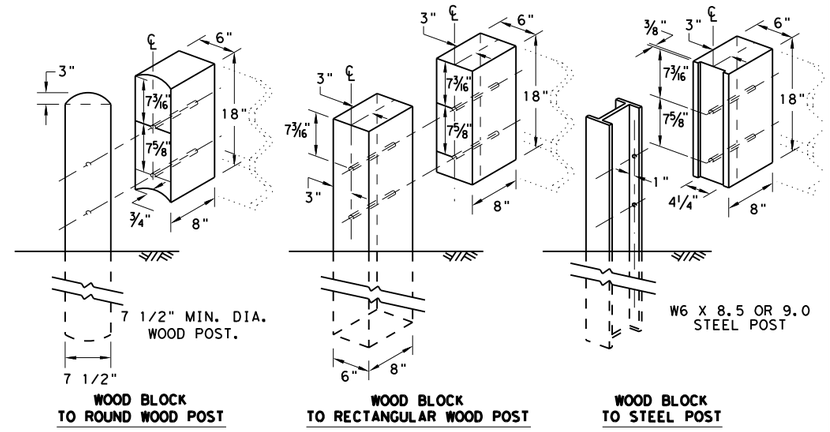
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
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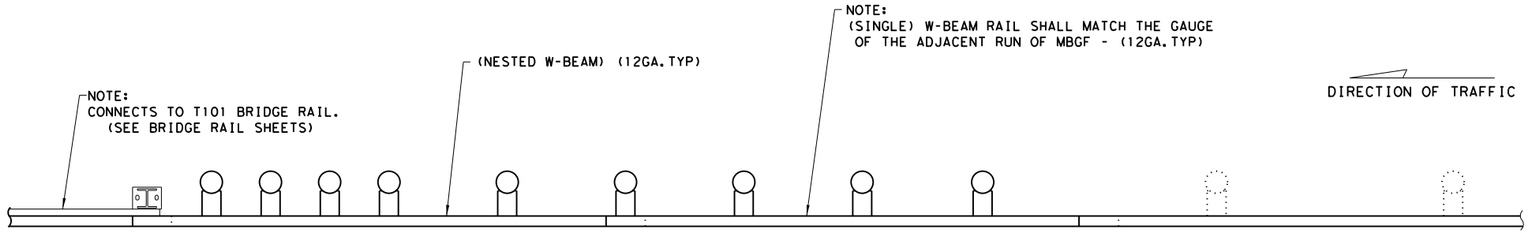
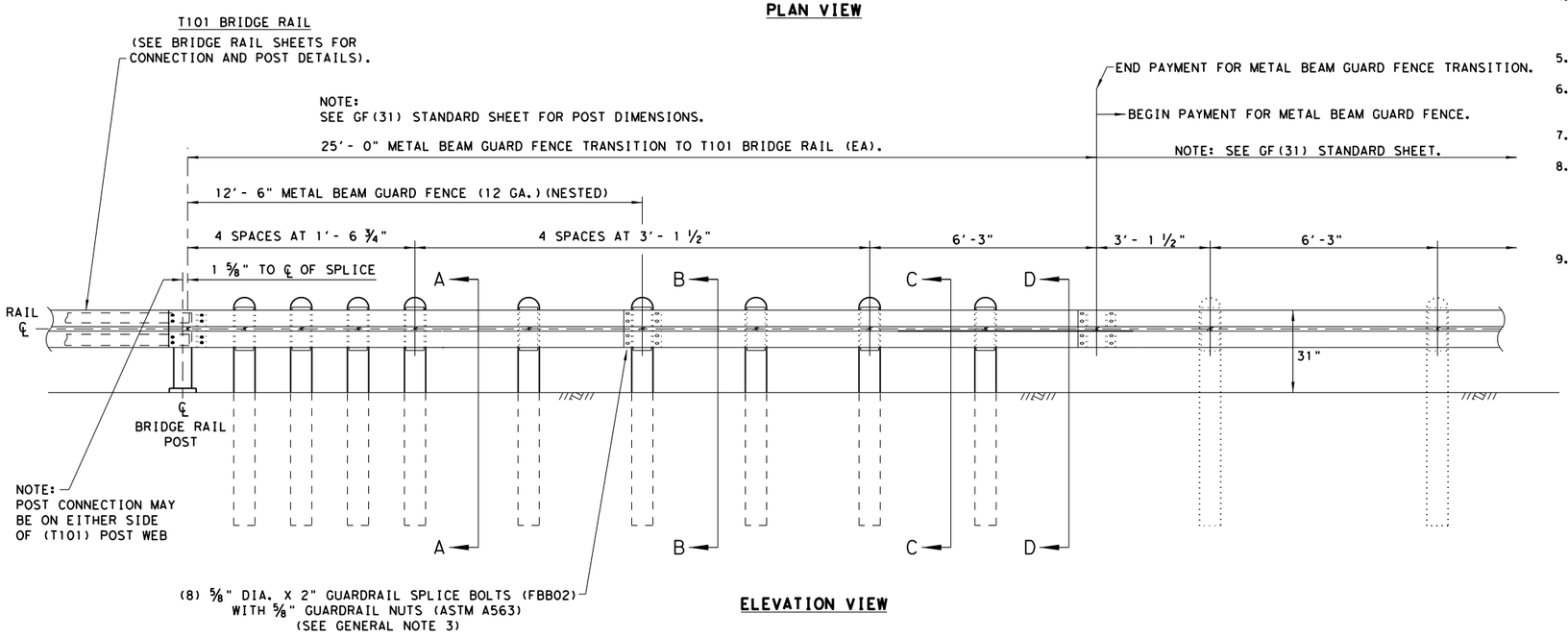
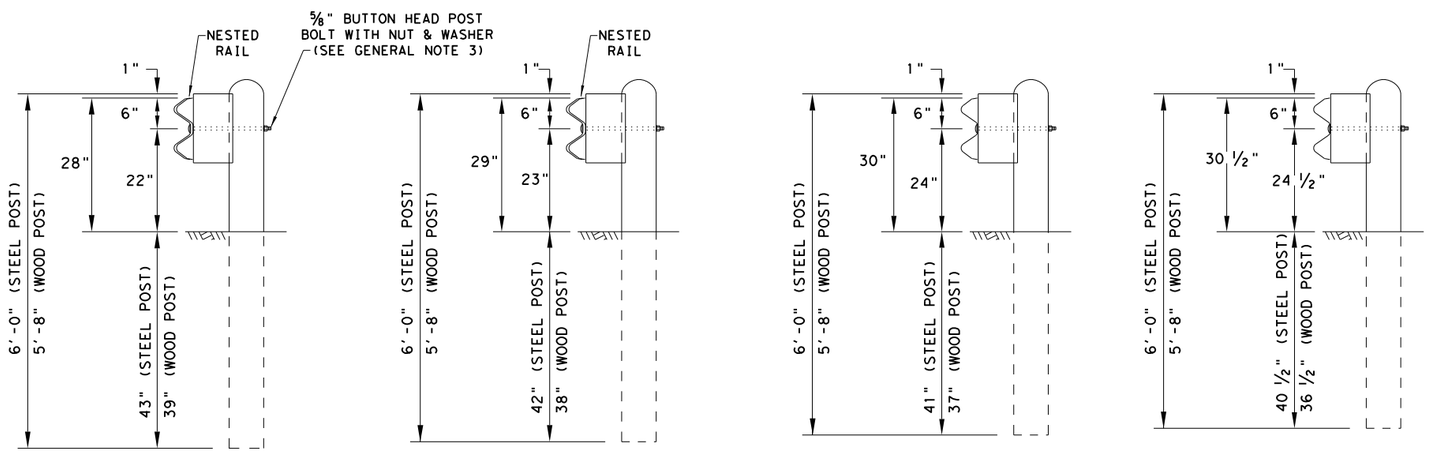


PLAN VIEW



ELEVATION VIEW

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



SECTION A-A | SECTION B-B | SECTION C-C | SECTION D-D

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 ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'- 1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR.A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
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 MAY FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO STANDARD GF(31) AND APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

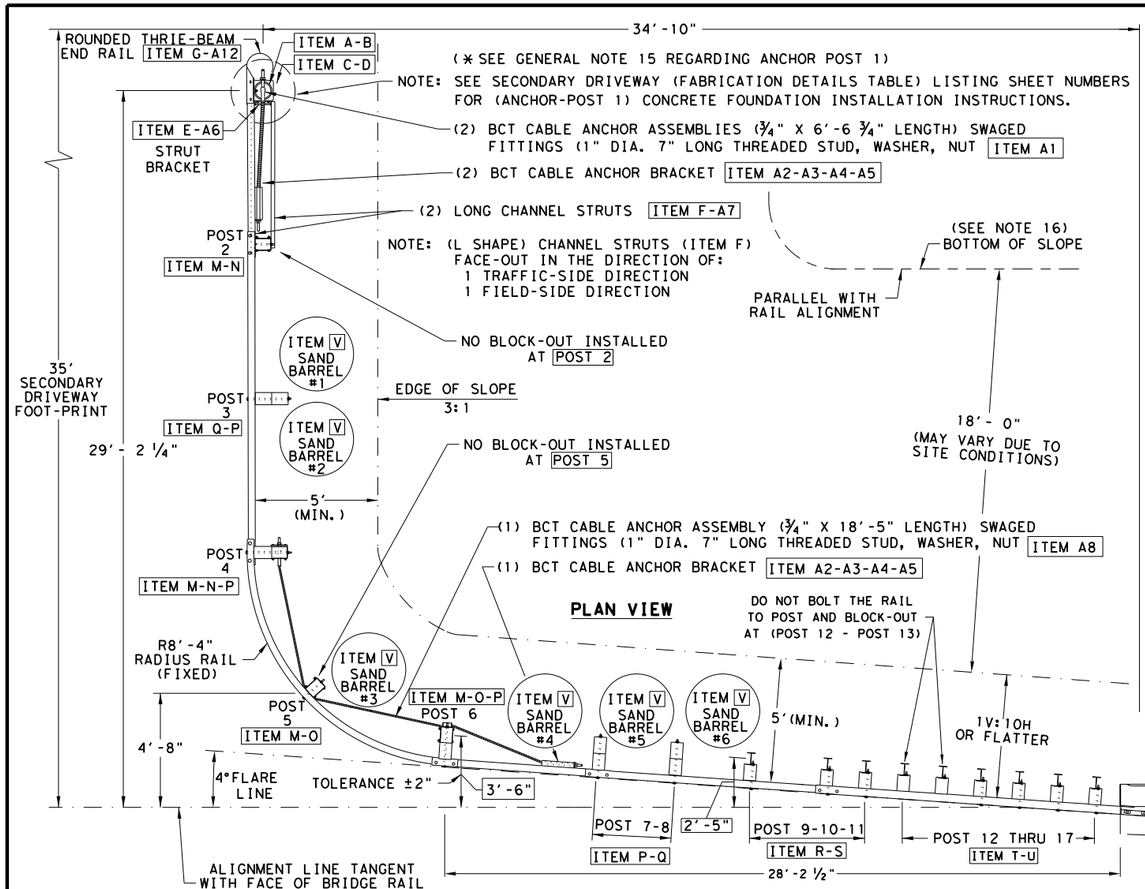
Texas Department of Transportation | Design Division Standard

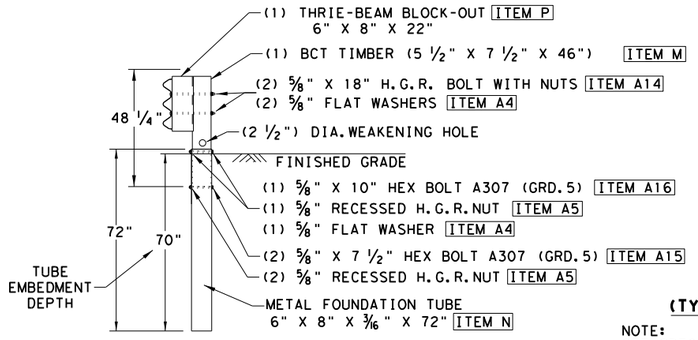
METAL BEAM GUARD FENCE TRANSITION (T101)

GF(31)T101-19

FILE: gf31t10119	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1257	01	052, ETC	FM 1092	
	DIST	COUNTY		SHEET NO.	
	HOU	FORT BEND		77	

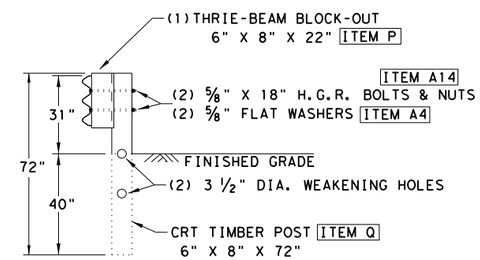
DATE:
FILE:





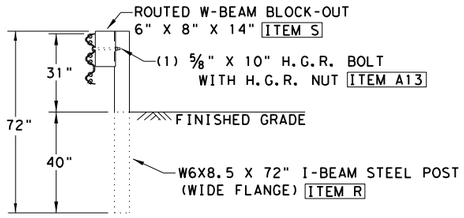
SECTION VIEW (A-A)
TIMBER POST WITH METAL FOUNDATION TUBE
(TYP) BCT POSTS 2-4-5-6

NOTE:
NO BLOCK-OUTS INSTALLED AT BCT POST 2 - POST 5

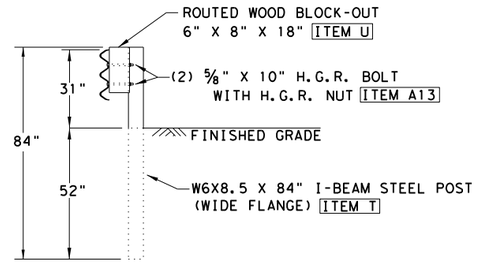


SECTION VIEW (B-B)
(TYP) CRT TIMBER POSTS 3-7-8

NOTE:
SEE SPECIAL APPLICATION NOTES ON SHEET 3 OF 3.
CRT POST WILL REQUIRE AN ADDITIONAL ¾" HOLE TO ACCOMMODATE THE 22" LONG BLOCKOUT.



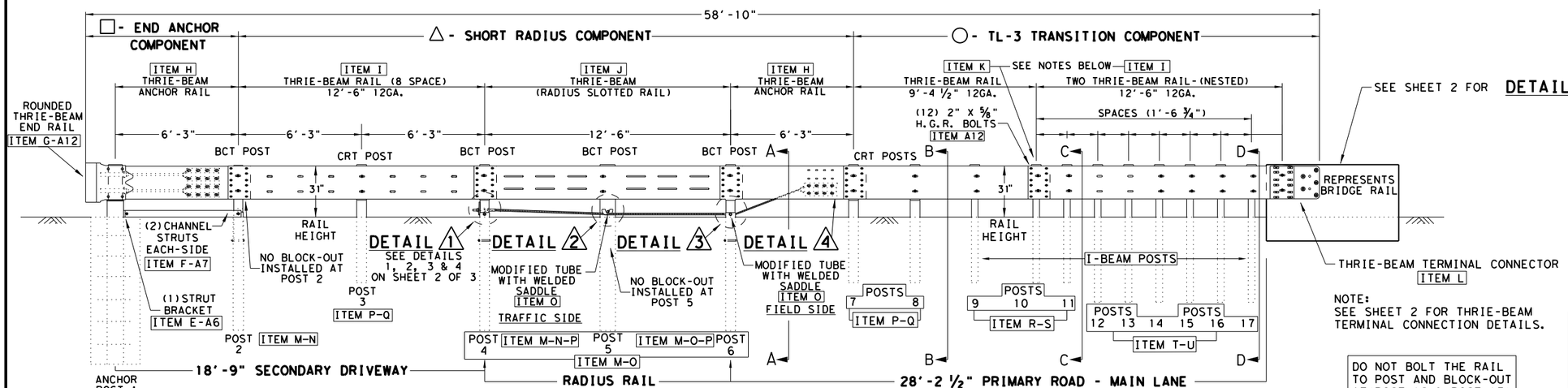
SECTION VIEW C-C
(TYP) AT POSTS 9-10-11



*** SECTION VIEW D-D**
(TYP) AT POSTS 12-13-14-15-16-17

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13



NOTE:
SEE SHEET 2 FOR THRIE-BEAM TERMINAL CONNECTION DETAILS.

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13

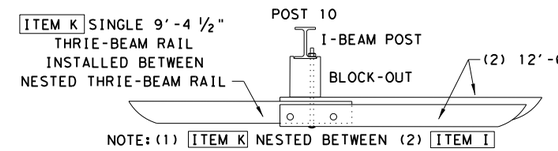
(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

ANCHOR POST 1 FABRICATION DETAILS	
SHEET DESCRIPTION	SHEET NUMBER
ANCHOR POST	SHEET 1 OF 8
ANCHOR SLEAVE	SHEET 2 OF 8
RADIUS RAIL	SHEET 3 OF 8
THRIE-BEAM RAILS	SHEET 4 OF 8
BCT TIMBER POST	SHEET 5 OF 8
STRUT RADIUS ANCHOR	SHEET 6 OF 8
FOUNDATION TUBE	SHEET 7 OF 8
ANCHOR CABLE	SHEET 8 OF 8

FULL-LENGTH ELEVATION VIEW

NOTE: ALL CABLE BRACKET ASSEMBLIES ARE LOCATED ON THE FIELD-SIDE. SHOWN HERE FOR CLARITY.

NOTE: FOR BCT POSTS 2-4-5-6 INSTALL (1) OR (2) ITEM A15-A4-A5 BOLT ASSEMBLIES TO PREVENT TIMBER POST SLIDING DOWN FOUNDATION TUBE.



NOTE: (1) ITEM K NESTED BETWEEN (2) ITEM I

NESTED-GUARDRAIL SPLICE AT POST 10

SHEET 1 OF 3

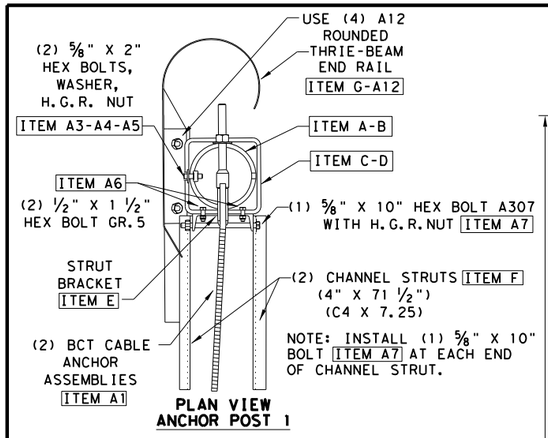
Texas Department of Transportation

Design Division Standard

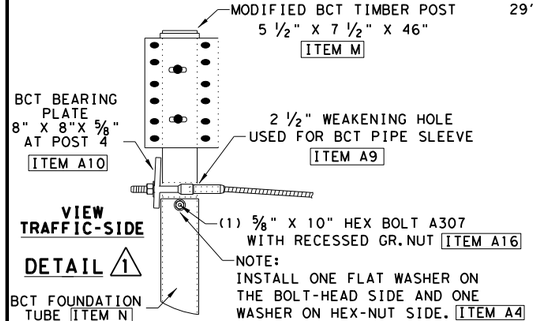
TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT
SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		78

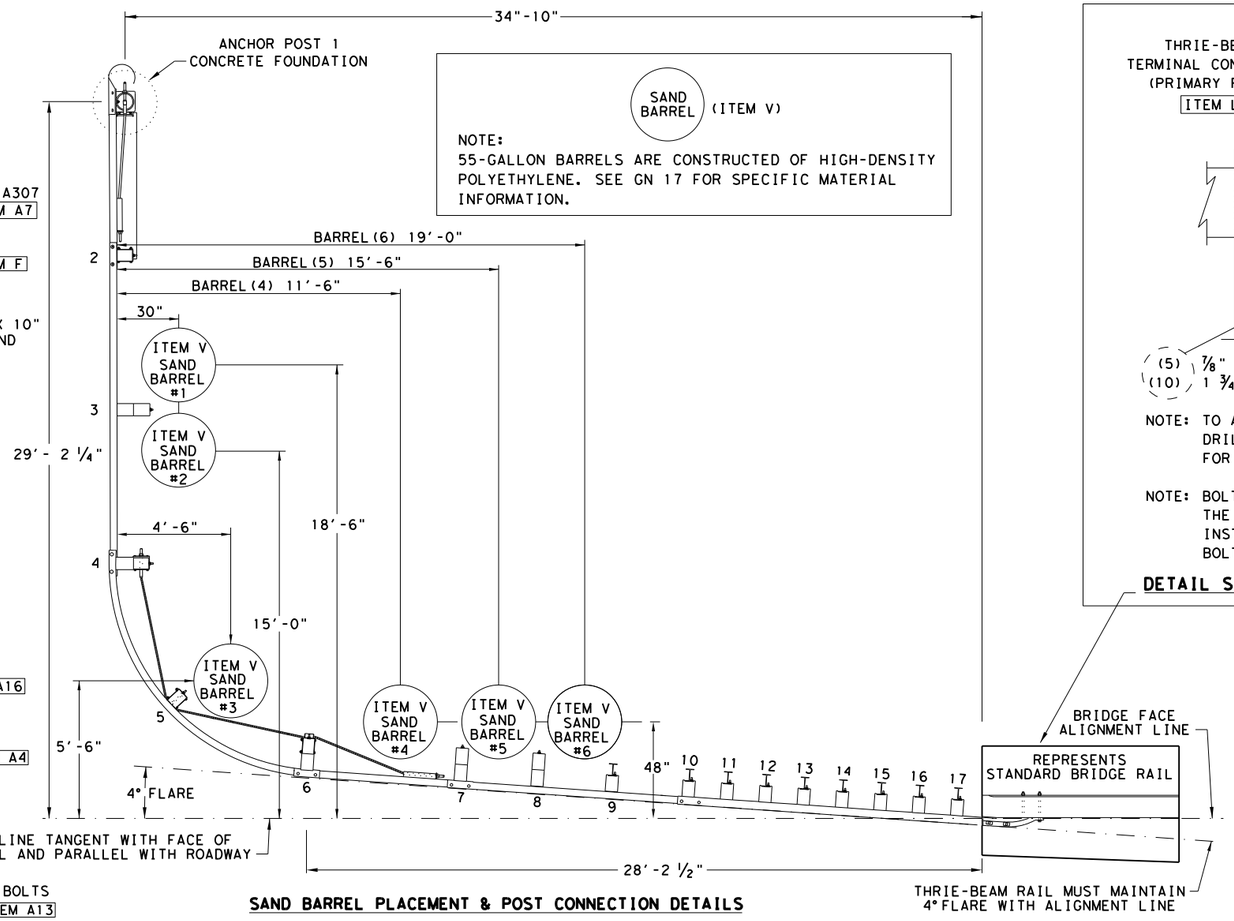
DATE:
FILE:



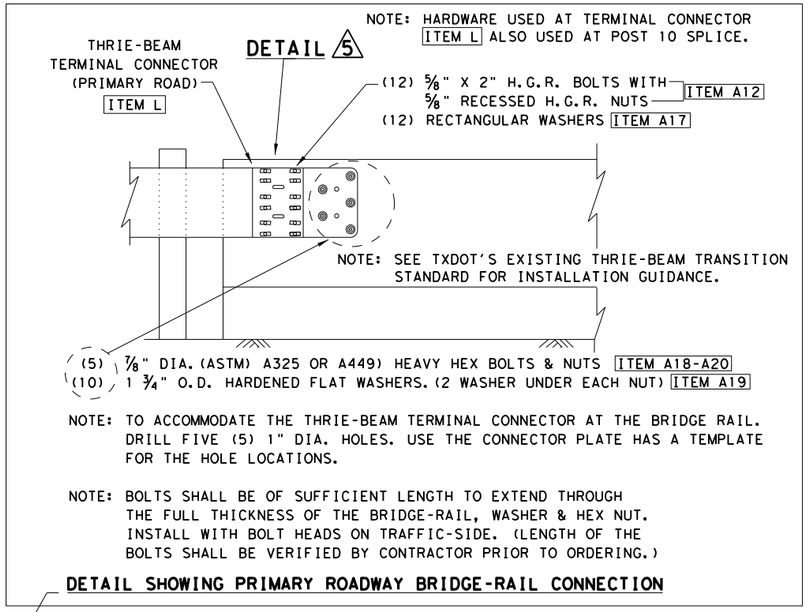
PLAN VIEW ANCHOR POST 1



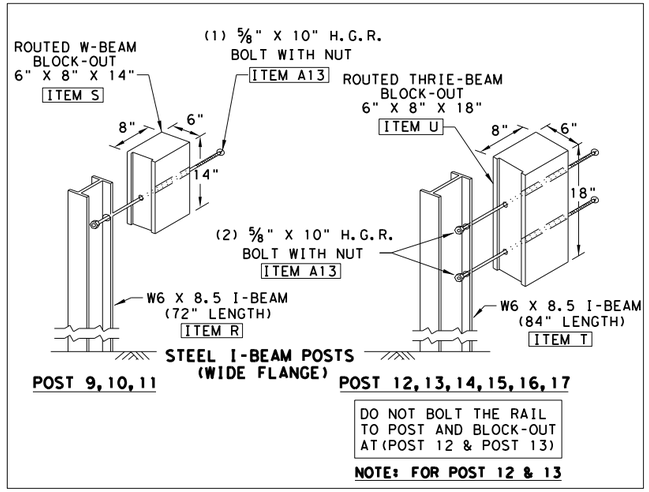
BCT (POST 4) TIMBER POST WITH METAL FOUNDATION TUBE

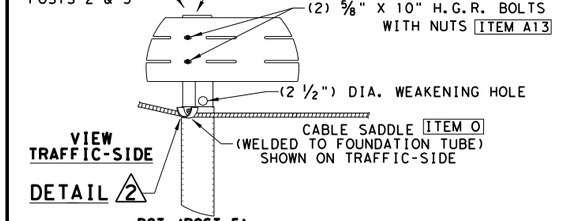


SAND BARREL PLACEMENT & POST CONNECTION DETAILS

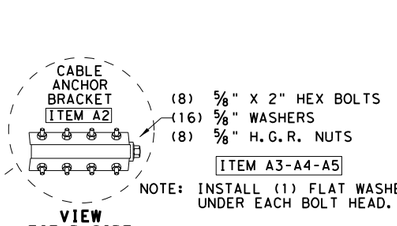


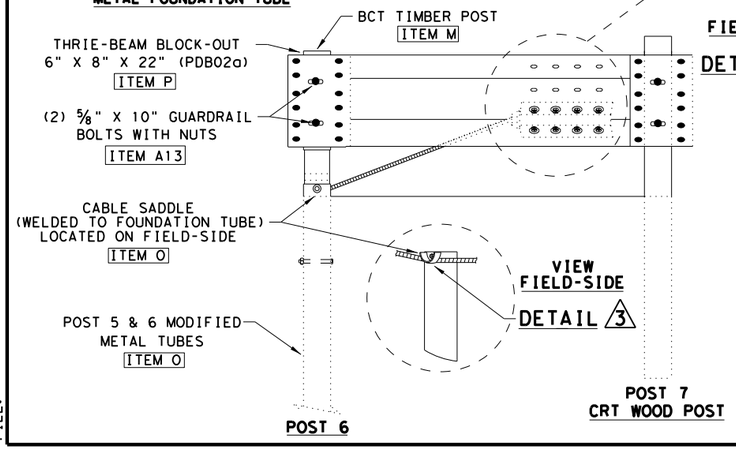
DETAIL SHOWING PRIMARY ROADWAY BRIDGE-RAIL CONNECTION



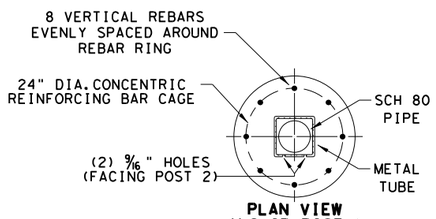


BCT (POST 5) TIMBER POST WITH METAL FOUNDATION TUBE

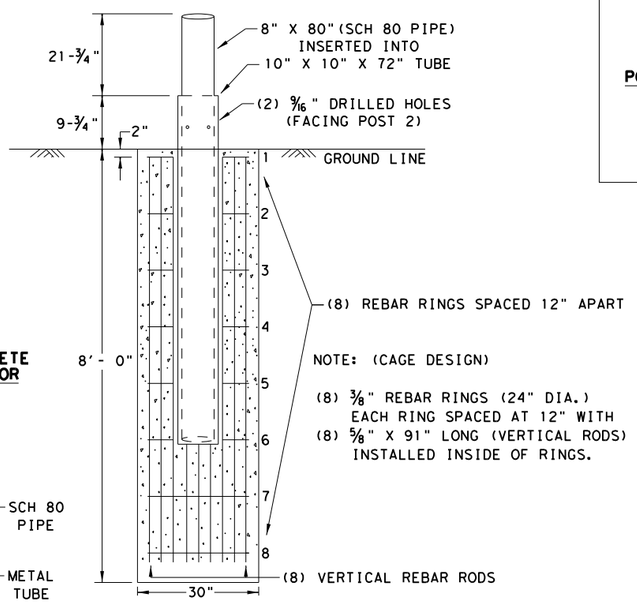




POST 1 REINFORCED CONCRETE FOUNDATION ANCHOR



PLAN VIEW ANCHOR POST 1



ELEVATION VIEW ANCHOR POST 1

(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

Texas Department of Transportation — Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		79

ITEM	ALL LARGE & SMALL COMPONENT DESCRIPTIONS	END ANCHOR (POST 1 & POST 2) □		TL-3 SHORT RADIUS (POST 2 TO POST 7) △		TL-3 TRANSITION (POST 7 TO POST 17) ○		TL-3 SHORT RADIUS GUARDRAIL COMPLETE SYSTEM	
		ITEM	QTY	ITEM	QTY	ITEM	QTY	ITEM	TOTAL QTY
A	POST 1 TOP (SCH.80 PIPE) (8" X 80" LENGTH)	A	1					A	1
B	POST 1 TOP (WELDED SUPPORT COLLAR 10" X 10" X ½" ASTM A36)	B	1					B	1
C	POST 1 TUBE (HSS 10" X 10" X ½" X 72" LENGTH) A500 GR.B	C	1					C	1
D	POST 1 (WELDED PLATE 9 ¼" X 9 ¼" X ⅛") A36	D	1					D	1
E	POST 1 STRUT BRACKET (C8 X 11.50 A36)	E	1					E	1
F	(POST 1 & 2) CHANNEL STRUTS (4" X 71 ½")(C4 X 7.25)A36	F	2					F	2
G	THRIE-BEAM RAIL (END ANCHOR - ROUNDED TYPE) 12GA. (RTE02a)	G	1					G	1
H	THRIE-BEAM RAIL (ANCHOR) (6'-3" LENGTH) 12GA. (RWM14a)	H	1	H	1			H	2
I	THRIE-BEAM RAIL (8 SPACE) (12'-6" LENGTH) 12GA. (RTM08)			I	1	I	2	I	3
J	THRIE-BEAM RAIL (RADIUS 8'-4 ½") (SLOTTED) 12GA.			J	1			J	1
K	THRIE-BEAM RAIL (3 SPACE) (9'-4 ½" LENGTH) 12GA.					K	1	K	1
L	THRIE BEAM RAIL (TERMINAL CONNECTOR) (BRIDGE-RAIL) (RTE01b)					L	1	L	1
M	POST 2,4,5,6 BCT TIMBER (5 ½" X 7 ½" X 46") (PDF04)			M	4			M	4
N	POST 2,4, BCT TUBE (6" X 8" X 3/16" X 72" LENGTH) (PTE05)			N	2			N	2
O	POST 5,6 MODIFIED BCT TUBES (FOR WELDED CABLE SADDLES)			O	2			O	2
P	POST 3,4,6,7,8 THRIE-BEAM BLOCK-OUT (6" X 8" X 22")(PDB02a)			P	4	P	1	P	5
Q	POST 3,7,8 CRT TIMBER POSTS (6" X 8" X 72" LENGTH)(PDE09)			Q	2	Q	1	Q	3
R	POST 9,10,11 I-BEAM POSTS (W6X8.5 X 72" LENGTH) (PWE01)					R	3	R	3
S	POST 9,10,11 ROUTED W-BEAM BLOCK-OUT(6" X 8" X 14")(PDB01b)					S	3	S	3
T	POST 12 THRU 17 I-BEAM POSTS (W6X8.5 X 84" LENGTH) (PWE07)					T	6	T	6
U	POST 12 THRU 17 ROUTED BLOCK-OUT (6" X 8" X 18") (PDB??)					U	6	U	6
V	SAND BARRELS 700-715 LBS							V	6
A1	BCT CABLE ANCHOR ASSEMBLIES (¾" X 6'-6 ¾" LENGTH) (FCA01)	A1	2					A1	2
A2	BCT CABLE ANCHOR BRACKET (FPA01)	A2	2	A2	1			A2	3
A3	⅝" X 2" HEX BOLT A307 GRD.5 (FOR CABLE BRACKETS)	A3	18	A3	8			A3	26
A4	⅝" FLAT WASHER A307 GRD.5 (1 WASHER UNDER BOLT HEAD & 1 NUT)	A4	36	A4	40			A4	76
A5	⅝" RECESSED H.G.R NUT (NUTS FOR HEX BOLTS)	A5	22	A5	20			A5	42
A6	STRUT BRACKET HARDWARE (½" X 1 ½") HEX BOLT A307 GRD.5	A6	2					A6	2
A7	CHANNEL STRUT HARDWARE (⅝" X 10") HEX BOLT A307 GRD.5	A7	2					A7	2
A8	BCT CABLE ANCHOR ASSEMBLY (FCA02) (¾" X 18'-5" LENGTH)			A8	1			A8	1
A9	BCT POST SLEEVE (FMM02a) (POST 4 ONLY)			A9	1			A9	1
A10	BCT CABLE BEARING PLATE (⅝" X 8" X 8" (FPB01) (POST 4 ONLY)			A10	1			A10	1
A11	⅝" X 1 ¼" H.G.R. BOLTS (FBB01) (SPLICES AT POST 2,4,6,7)			A11	48			A11	48
A12	⅝" X 2" H.G.R. BOLTS (FBB02)(ROUND TERM-POST 10-END SPLICE)	A12	4			A12	24	A12	28
A13	⅝" X 10" H.G.R. BOLTS (FBB03) (I-BEAM POSTS RAIL & BLOCKOUT)					A13	18	A13	18
A14	⅝" X 18" H.G.R. BOLTS (FBB04) (POSTS 3,4,6,7,8)			A14	8	A14	2	A14	10
A15	⅝" X 7 ½" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A15	8			A15	8
A16	⅝" X 10" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A16	4			A16	4
A17	RECTANGULAR WASHERS (FWR03) (FOR TERMINAL CONNECTOR RTE01b)					A17	12	A17	12
A18	⅞" X (LENGTH VARIES) HEX BOLTS A325 OR A449 GR.5					A18	5	A18	5
A19	1 ¾" O.D. HARDENED FLAT WASHER A325					A19	10	A19	10
A20	⅞" HEX NUT GR.5 A325					A20	5	A20	5

GENERAL NOTES

1. FOR ADDITIONAL INSTALLATION INFORMATION AND GUIDANCE CONTACT: TEXAS DEPARTMENT OF TRANSPORTATION, (TXDOT'S DESIGN DIVISION). (512) 416-2678. THE EXACT POSITION OF MBGF SHALL BE SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER. THE SIGHT DISTANCE OF THE INSTALLATION WILL NEED TO BE VERIFIED WITH RESPECT TO THE SPECIFIC SITE PLACEMENT.
2. STEEL POSTS ARE NOT PERMITTED AT CRT OR BCT POST POSITIONS.
3. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12 ½" OR 25 FOOT NOMINAL LENGTHS.
4. BUTTON HEAD "POST BOLTS & 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.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
7. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A SLOPE RATE OF NOT MORE THAN 1V:10H.
8. IT IS NOT RECOMMENDED THAT GUARD FENCE BE PLACED IN THE VICINITY OF CURBS.
9. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
10. SPECIAL FABRICATION WILL BE REQUIRED FOR THRIE BEAM RAIL RADIUS (ITEM J).
11. ALL MATERIAL AND WORK INVOLVED IS SUBSIDIARY TO SHORT RADIUS BID ITEM, INCLUDING, BUT NOT LIMITED TO FOUNDATIONS, GRADING, THRIE BEAM RAIL, SAND BARRELS, AND OTHER PARTS.
12. ALL CABLE ASSEMBLIES SHOULD BE TAUT AFTER INSTALLATION. WHEN CABLES ARE MANIPULATED BY HAND THE CABLES SHOULD NOT MOVE MORE THAN 1" IN ANY DIRECTION PERPENDICULAR TO THE CABLE.
13. THE BCT BEARING PLATE INSTALLED AT POST 4 SHOULD BE ORIENTED SUCH THAT THE 3" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE BOTTOM AND 5" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE TOP.
14. FOUNDATION AT POST 1 SHALL BE CLASS C CONCRETE.
- *15. POST (1) IS NOT A CRASHWORTHY TERMINAL. THE DESIGN AND PLACEMENT OF POST (1) MUST BE OUTSIDE OF THE CLEAR ZONE OF THE SECONDARY ROADWAY USING THE RESPECTIVE CLEAR ZONE CRITERIA. PLEASE CONTACT THE DESIGN DIVISION (512) 416-2678 FOR ASSISTANCE IN DETERMINING THE APPROPRIATE USE AND/OR PLACEMENT OF THE SYSTEM IN CONSTRAINED LOCATIONS. THE PAYMENT OF THE COMPLETE SYSTEM WILL BE WITH BID ITEMS: 540 XXXX TL-3 31" SHORT RADIUS (COMPLETE).
16. TESTED TO MASH WITH A 3:1 SLOPE OR SHALLOWER IS PREFERABLE IN THE LIMITS OF THE TOP AND BOTTOM OF THE SLOPE AS SHOWN IN THE PLAN VIEW. IF FIELD CONDITIONS REQUIRE A STEEPER SLOPE, THIS MAY BE ALLOWABLE UP TO A 2:1 SLOPE. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE.
17. THE BARRELS ARE ENERGY ABSORPTION ENERGITE III, MODEL 640 FILLED WITH 715 LB (+/-15) SAND; OR AN APPROVED EQUIVALENT. THE APPROXIMATE HEIGHT OF THE BARREL IS 41" (+/-).
18. ALTERNATE METHODS TO TERMINATE THE SRG ALONG THE PRIMARY ROADWAY ARE AVAILABLE WHEN SITE CONDITIONS DICTATE. CONTACT DESIGN DIVISION FOR DETAILS: 512 416-2678

NOTE: SEE SHEET 1 OF 3.

(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

SPECIAL APPLICATION NOTES.

1. THIS IS A MASH COMPLIANT TL-3 SHORT RADIUS GUARDRAIL SYSTEM WITH A TOP RAIL HEIGHT OF 31". AVAILABLE FOR USE ON ANY SPEED ROADWAY. THE SYSTEM REQUIRES A MINIMUM PLACEMENT FOOTPRINT OF 34'-10" ALONG THE PRIMARY ROAD AND A 35'-0" ALONG SECONDARY DRIVEWAY.
2. IT IS CRITICAL THAT THE PRIMARY GUARDRAIL MAINTAIN A (4 DEGREE FLARE) WITH THE SECONDARY DRIVEWAY.
3. THE SYSTEM REQUIRES A MINIMUM 5' WIDE (WORK ZONE) DIRECTLY BEHIND THE GUARDRAIL SYSTEM WITH A SLOPE AT 1V:10H OR FLATTER FROM THERE A MAXIMUM 3:1 SLOPE IS RECOMMENDED. SEE SHEET 1 OF 3 FOR FLARE AND SLOPE DETAILS.
4. NOTE FOR INSTALLER: THE THREE (3) CRT POSTS ITEM (Q), AT POST LOCATIONS, 3, 7, & 8.), REQUIRE THE FOLLOWING FIELD ADJUSTMENT. USING A ¾" X 10" LONG SPADE BIT DRILL ONE (1) ADDITIONAL HOLE 7-⅞" DIRECTLY BELOW THE EXISTING TOP HOLE TO ACCOMMODATE THE HARDWARE FOR THE 22" LONG BLOCKOUT.

   OPTION FOR ADDITIONAL ¾" HOLE. THE 22" LONG BLOCKOUT (PDB01a) IS MANUFACTURED WITH TWO ¾" DRILLED HOLES FOR THE POST HARDWARE, THEREFORE THE BLOCKOUT CAN BE USED AS A TEMPLATE GUIDE FOR THE BOTTOM ¾" HOLE. AFTER INSTALLING THE CRT POST USE THE TOP HOLE TO MOUNT THE 22" LONG BLOCKOUT TO POST, USE THE BLOCKOUT'S PRE-DRILLED HOLE AS A GUIDE FOR THE BOTTOM ¾" HOLE.

DATE: $DATE$
FILE: $FILE$

SHEET 3 OF 3

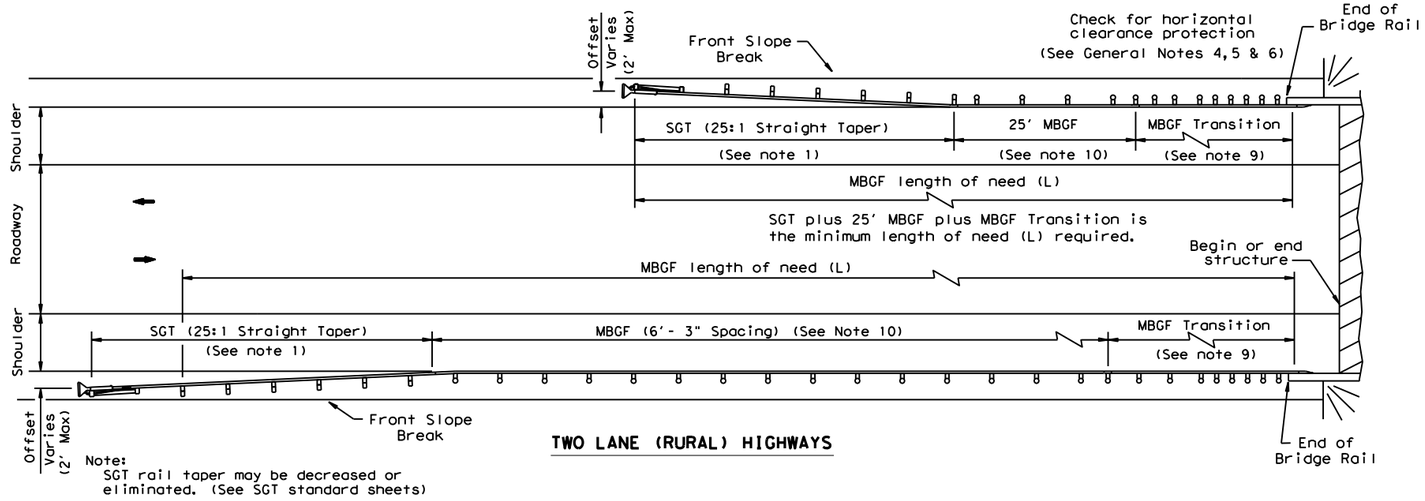
Texas Department of Transportation — Design Division Standard

TL-3 SHORT RADIUS GUARDRAIL MASH COMPLIANT

SRG(TL-3)-21

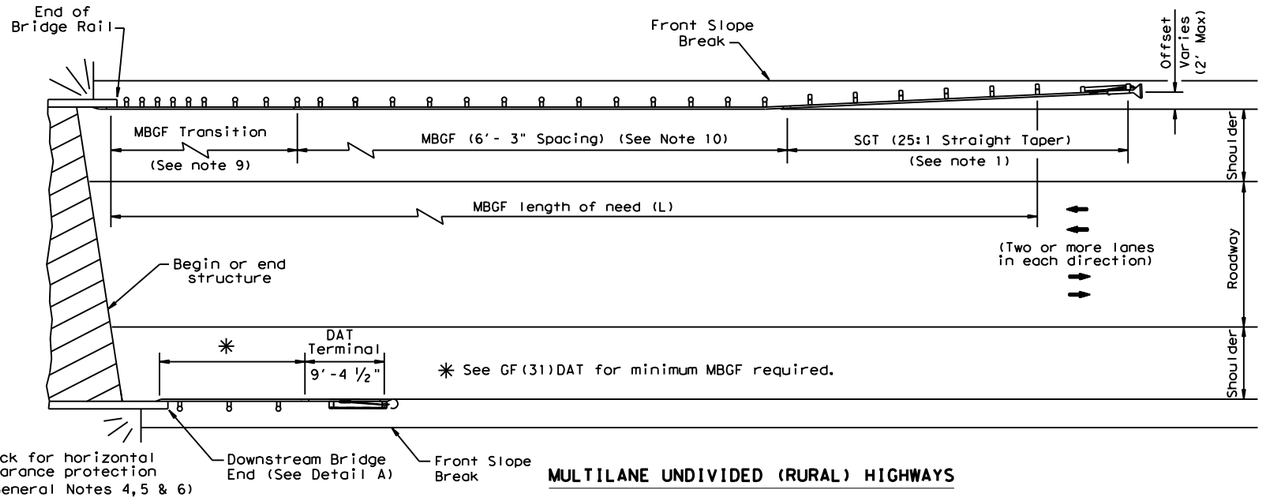
FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		80

DATE:
FILE:

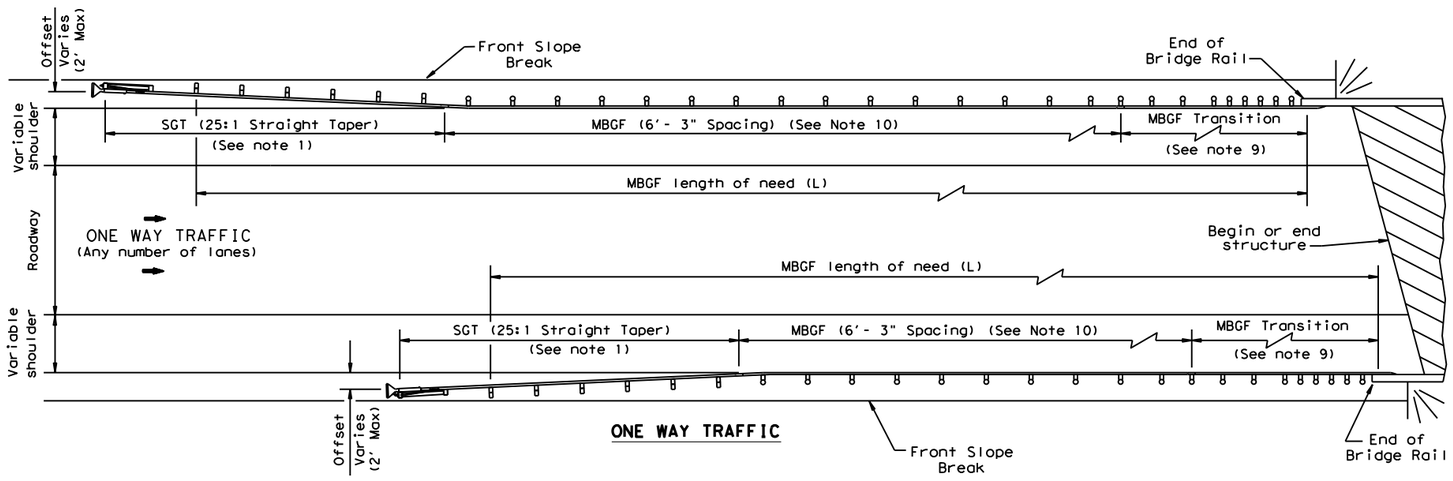


TWO LANE (RURAL) HIGHWAYS

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



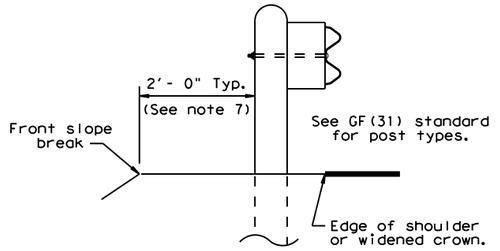
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	HOU	FT BEND		81

DATE:
FILE:

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

TRAFFIC FLOW

PLAN VIEW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE:B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

B B A A

SEE NOTE:C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

31"

RAIL HEIGHT

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

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

POST 40" DEPTH (TYP 1-8)

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

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

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

POST HEIGHT 17"- ½"

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop 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: 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

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	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FT BEND		82

DATE:
FILE:

(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

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2

RAIL 4 RAIL 3 RAIL 2 RAIL 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.

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

PLAN VIEW

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

BEGIN LENGTH OF NEED

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

6'-3" 6'-3" 6'-3" 6'-3/4" 6'-3" 6'-3" 6'-3" 37 ½" 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

DETAIL (D)

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

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

68-⅛"

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2 POST 1

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

SOIL
ANCHOR POST
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9
SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 5/16"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(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)

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

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

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	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FT BEND		83

DATE:
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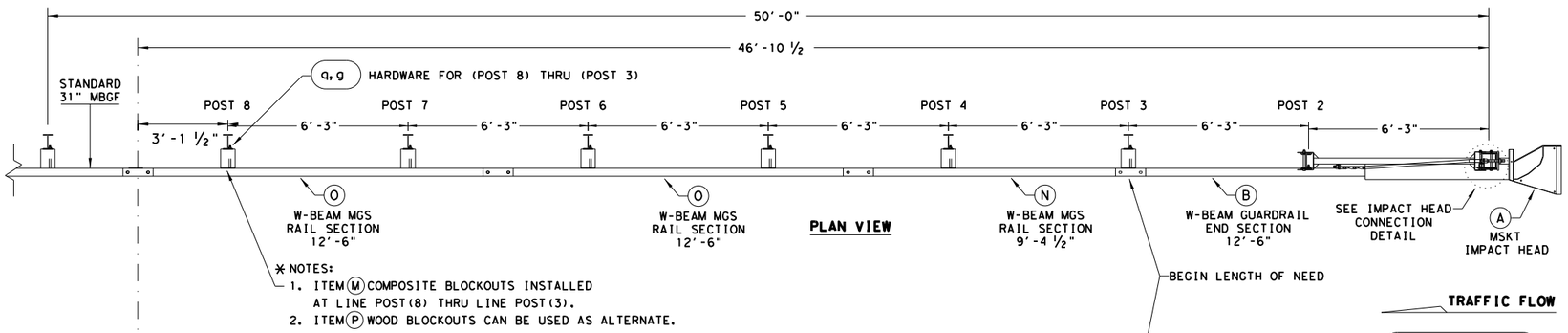
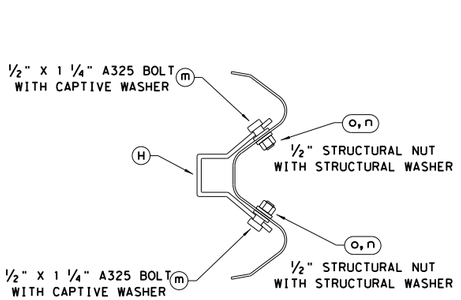
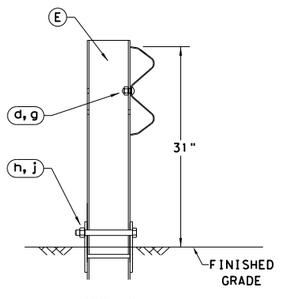


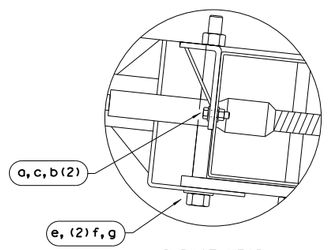
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



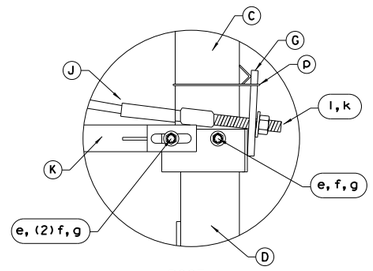
SECTION B-B
ANCHOR BRACKET



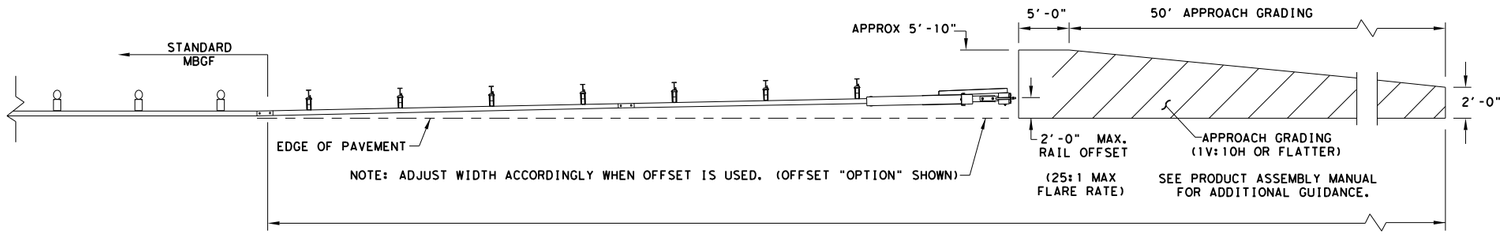
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

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

SEE NOTES: *

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1257	01	052, ETC	FM 1092	
	DIST	COUNTY		SHEET NO.	
	HOU	FT BEND		84	

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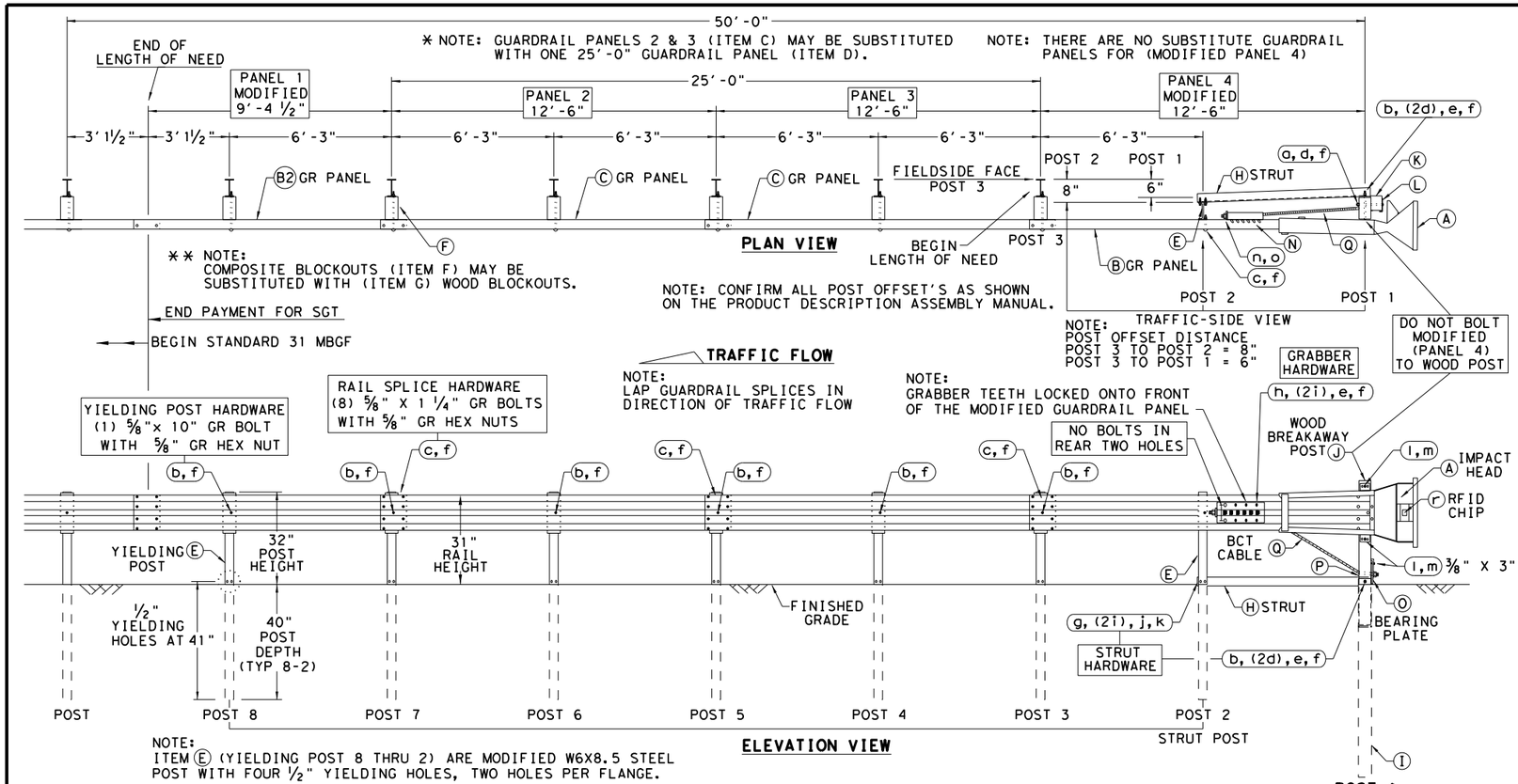
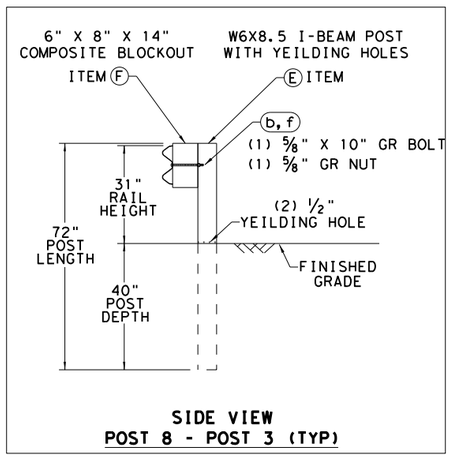


GENERAL NOTES

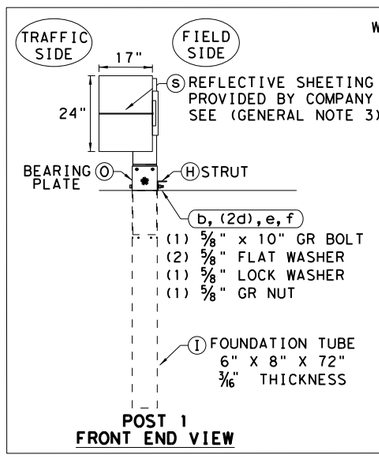
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

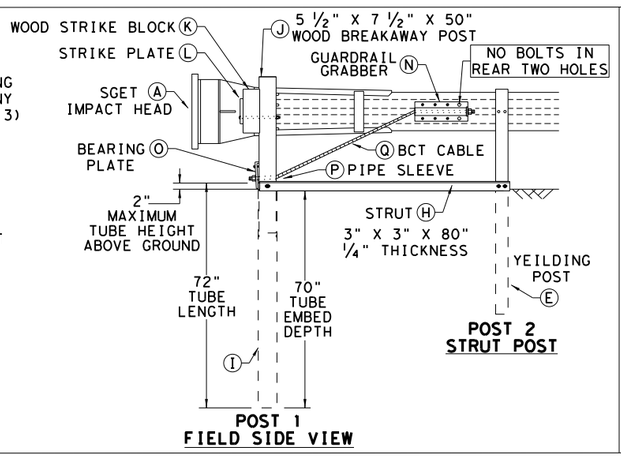
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

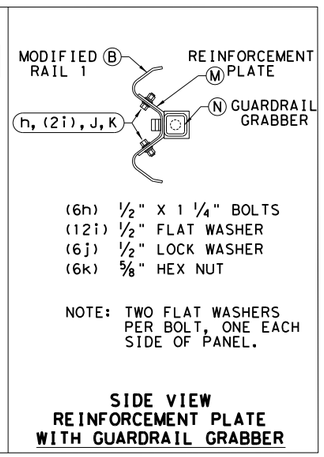


POST 1
FRONT END VIEW

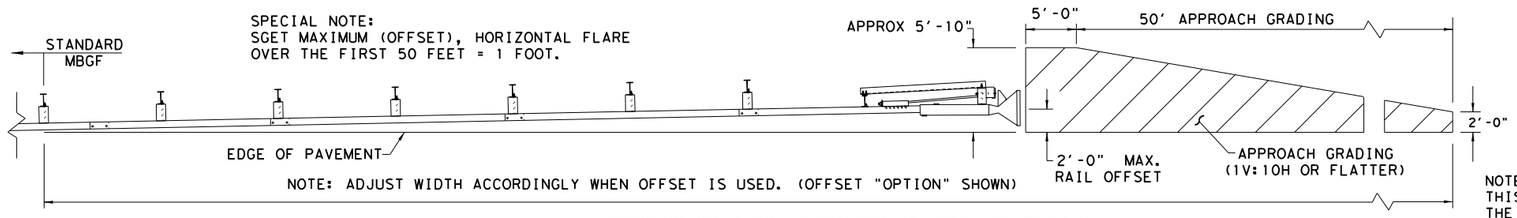


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

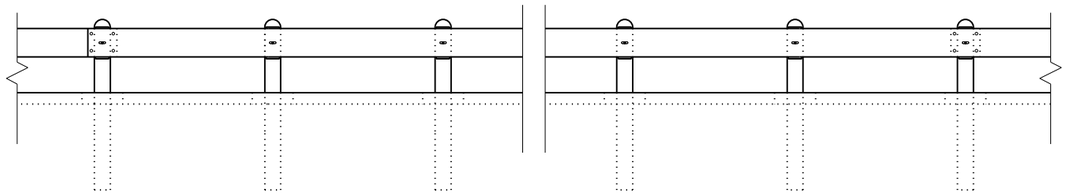
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

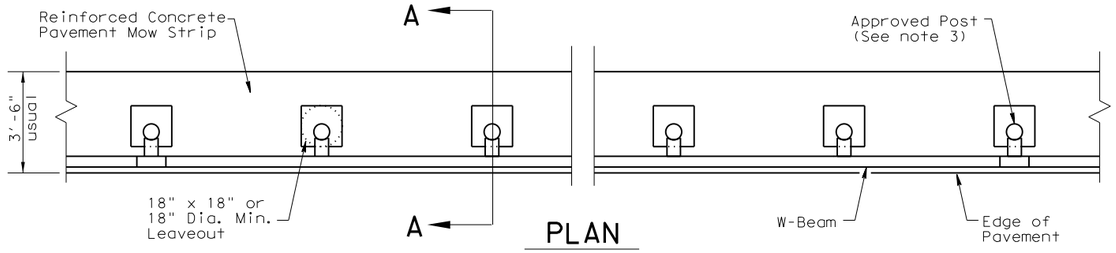
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FT BEND		85



ELEVATION

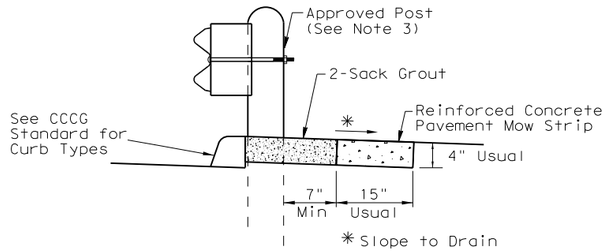
TRAFFIC



PLAN

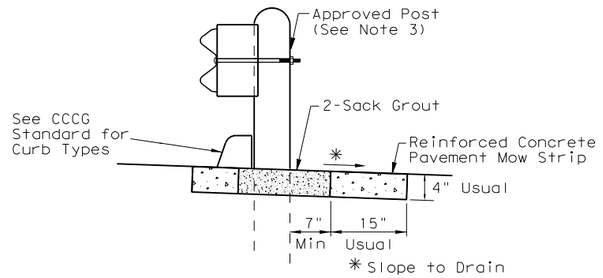
GENERAL NOTES

1. Place concrete riprap mow strips at all Metal Beam Guard Fence locations, and in accordance with Item 432, "Riprap". Use Class B Concrete, reinforced with No. 3 bars spaced at 18 in. centers each direction and 2 in. below the surface.
2. Provide a minimum of 7 in. leave out behind the post. Do not place concrete in the leave out.
3. The type of approved post is shown elsewhere on the plans. See the applicable standard sheets for additional details and information.
4. Other curb placement options may be used. Curbs are not considered part of the mow strip and are paid for under other pertinent bid items.
5. Fill the leave outs with no more than a 2-sack grout mixture and place in accordance with Section 421.2.7, "Mortar and Grout." Payment for furnishing and placing the grout mixture is subsidiary to the Item 432,"RIPRAP."
6. Place the mow strip the entire length of the guard fence plus any Terminal Anchor Section (TAS) or Single Guardrail Terminal (SGT) to 2 ft. beyond the face of the object marker at the end of the SGT. Do not allow concrete to adhere to the ground line strut shown on the SGT standard sheet.



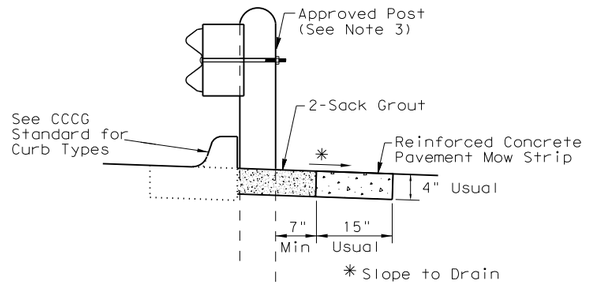
CURB OPTION (1)

Shown at Curbed Location

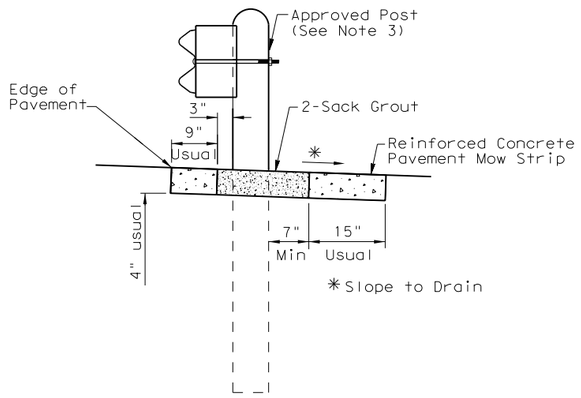


CURB OPTION (2)

Curb Shown on Top of Mow Strip

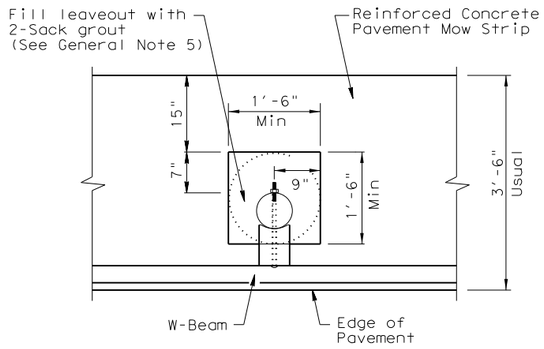


CURB OPTION (3)



SECTION A-A

Typical



MOW STRIP DETAIL

Reinforced Concrete Pavement Mow Strip with 18" x 18"or 18" dia. minimum leaveout.

Texas Department of Transportation
Houston District

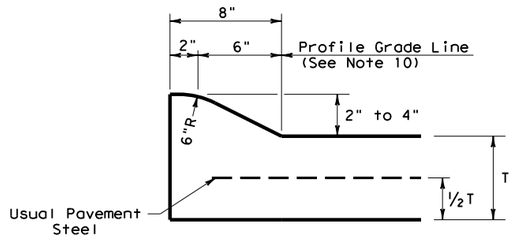
MOW STRIP

MS

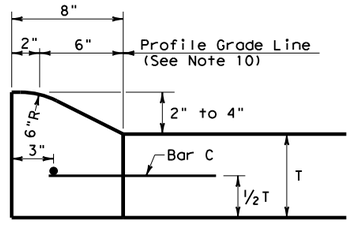
FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2014	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	HOU	6			86
03/15 2014 SPECS	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	FT BEND		1257	01	052, ETC	FM 1092

STDE5.DGN

DATE:
FILE:



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



TYPE I CURB
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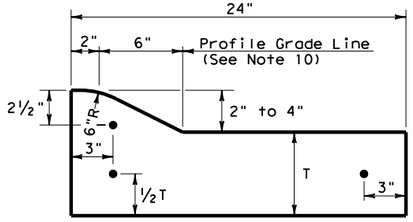
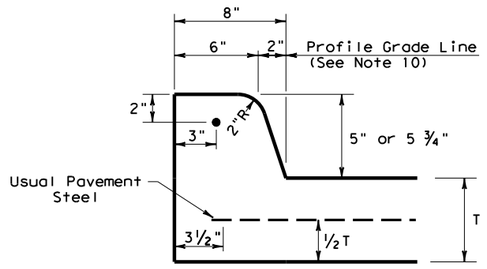
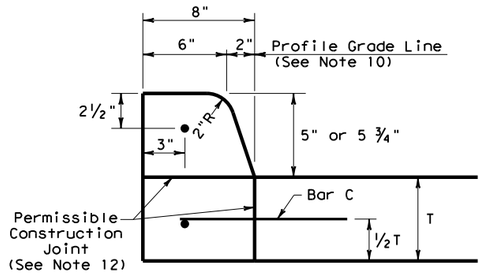


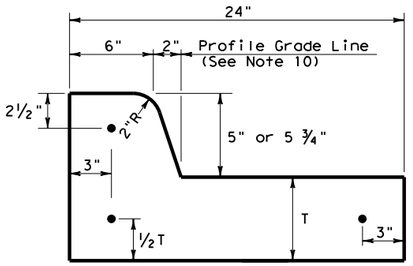
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



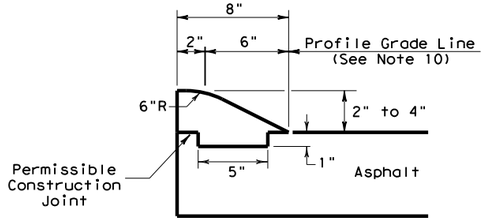
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



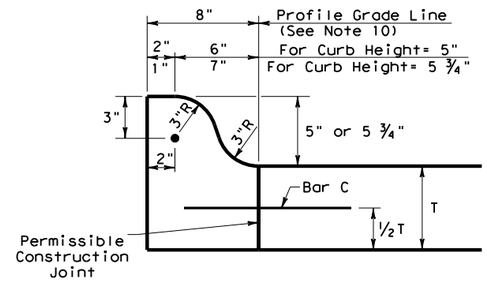
TYPE II CURB
5" - 5 ¾" HEIGHT



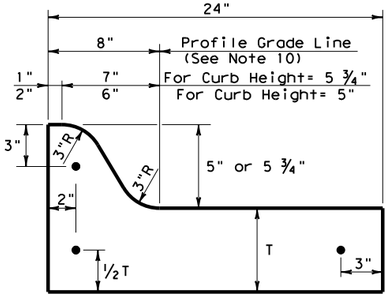
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



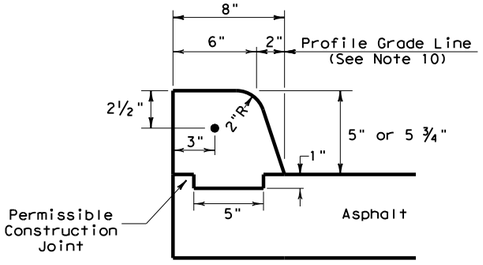
TYPE III CURB (KEYED)
2" - 4" HEIGHT



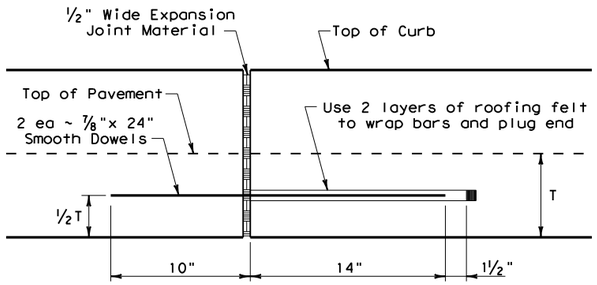
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

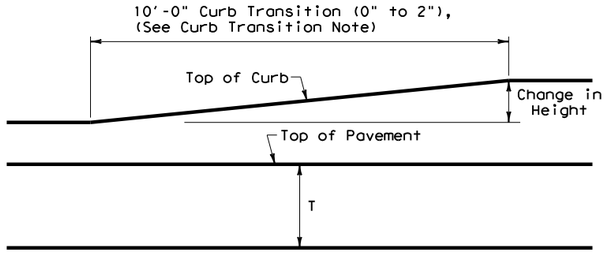


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

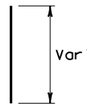
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



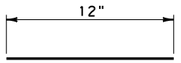
CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B used as needed to support curb reinforcing steel during concrete placement.



BAR B



BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
© TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		87

DATE:
FILE:

SEAL COAT MATERIAL SELECTION TABLE

TIER I: HEAVY USE - USE ONLY THE SELECTED MATERIALS.

TYPE	ASPHALT RUBBER (A-R)	ASPHALT CEMENT (AC)
	☐ A-R ONLY	☐ AC ONLY
ASPHALT	☐ A-R TY II ☐ A-R TY III ☐ SP 300-	☒ AC-20-5TR ☐ AC-20XP ☐ AC-15P ☐ SP 300-

TIER II: MODERATE USE - USE THESE MATERIALS OR ANY SELECTED TIER I MATERIAL COMBINATIONS OF THE ALLOWED TYPES.

TYPE	ASPHALT CEMENT (AC)	ASPHALT EMULSION
	☐ AC ONLY	☐ EMULSION ONLY
ASPHALT	☐ AC-10-2TR ☐ AC-15P ☐ AC-20XP ☐ AC-10 W/2%SBR ☐ AC-5 W/2%SBR ☐ SP 300-	☐ CHFRS-2P ☐ HFRS-2P ☐ CRS-2P ☐ SP 300-

TIER III: LIGHT USE - USE THESE MATERIALS OR ANY SELECTED TIER I OR TIER II MATERIAL COMBINATIONS OF THE ALLOWED TYPES.

TYPE	ASPHALT CEMENT (AC)	ASPHALT EMULSION
	☐ AC ONLY	☐ EMULSION ONLY
ASPHALT	☐ AC-10 ☐ AC-5 ☐ SP 300-	☐ CRS-2 ☐ CRS-2H ☐ HFRS-2 ☐ SP 300-

DISTRICTWIDE SEAL COAT PROJECT SEASONS: REFER TO ITEM 316 FOR TEMPERATURE AND WEATHER RESTRICTIONS.

SEASON 1:	AMA, CHS, LBB	MAY 15 TO AUG 31
SEASON 2:	ABL, ATL, BWD, DAL, FTW, LFK, ODA, PAR, SJT, TYL, WAC, WFS	MAY 1 TO AUG 31
SEASON 3:	AUS, BMT, BRY, ELP, HOU, SAT, YKM	MAY 1 TO SEP 15
SEASON 4:	CRP, LRD, PHR	APR 1 TO SEPT 30

NOTE: SEAL COATS ON ROUTINE MAINTENANCE CONTRACTS MUST BE COMPLETED BY AUGUST 31 UNLESS OTHERWISE SHOWN ON THE PLANS.

INSTRUCTIONS TO THE CONTRACTOR:

1. PROVIDE MATERIALS ACCORDING TO THE ALTERNATES SELECTED FOR THE ROADWAY TIER DESIGNATIONS SPECIFIED AT VARIOUS ROADWAY LOCATIONS SHOWN ON THE PLANS;
2. ALTERNATELY, SUPPLY SELECTED BINDERS FROM A HIGHER TIER, BUT ONLY IF THE TYPE OF MATERIAL IS ALLOWED FOR THE DESIGNATED TIER; PAYMENT WILL ONLY BE MADE FOR THE TIER DESIGNATED FOR THE PAVEMENT;
3. SUPPLY THE AGGREGATE TYPE, GRADE AND SURFACE AGGREGATE CLASS SHOWN ON THE PLANS; AND
4. ADHERE TO THE APPLICATION SEASON SELECTED.

THERE ARE 103 WORKING DAYS ALLOWED FOR THIS PROJECT.
THE LATEST ROADWAY START WORK DATE IS JULY 3, 2022.

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

12-08-2021

SEAL COAT MATERIAL SELECTION TABLE

SCTABLE

FILE: sctable.dgn	DN: TxDOT	CK:	DW:	CK:	
© TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1257	01	052, ETC	FM 1092	
	DIST	COUNTY		SHEET NO.	
	HOU	FORT BEND		88	

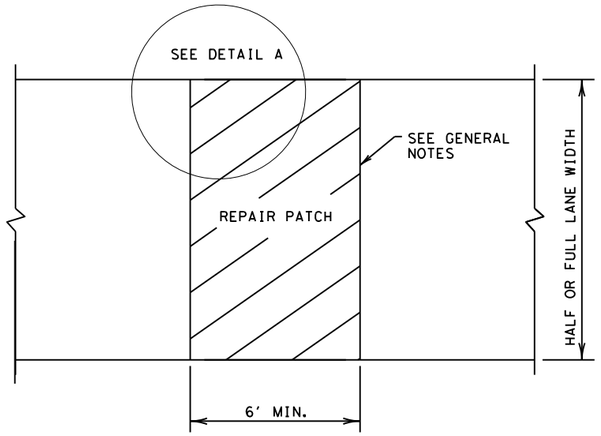
DATE:
FILE:

TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0		6.5	6.5		
	11.5		6.25	6.25		
	≥12.0		6.0	6.0		
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

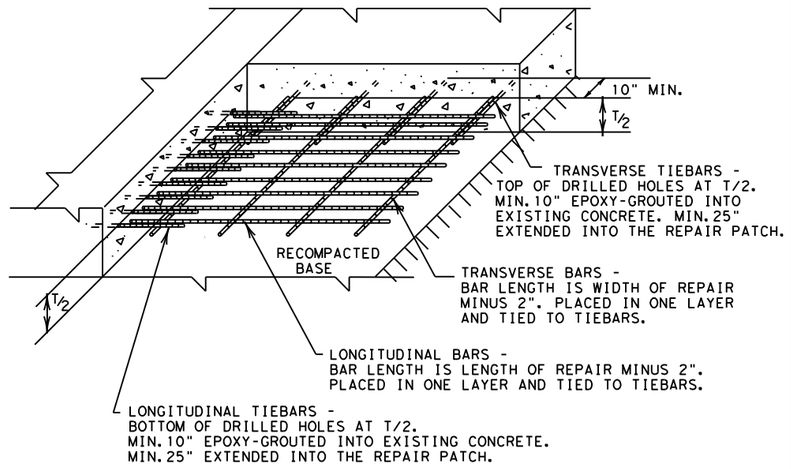
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW

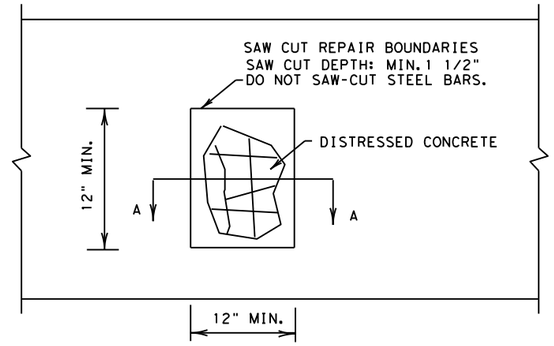


DETAIL A
GROUTED TIEBARS & REINFORCEMENT

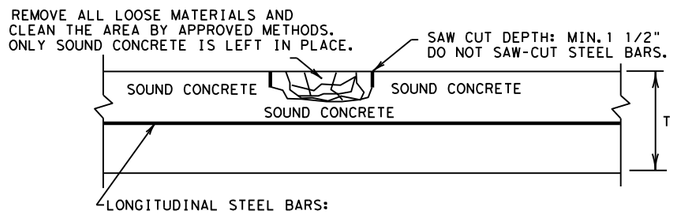
FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
3. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:

*REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.

*INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A

HALF-DEPTH REPAIR

Texas Department of Transportation

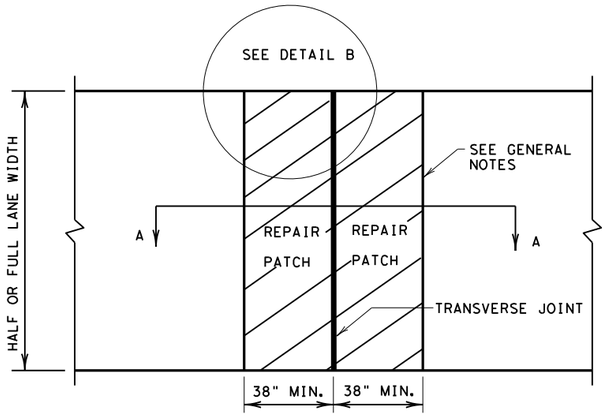
Design Division Standard

REPAIR OF CONCRETE PAVEMENT

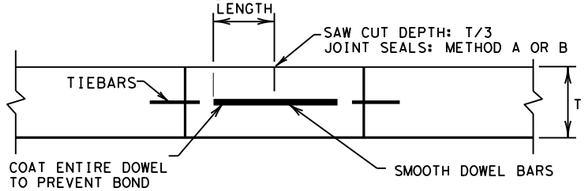
REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		89

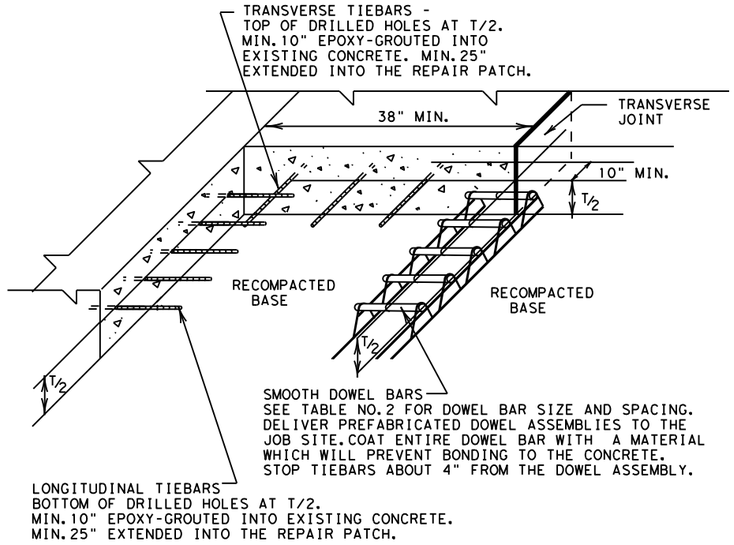
DATE:
FILE:



PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

REPAIR OF TRANSVERSE JOINT OF CPCD

SHEET 2 OF 2

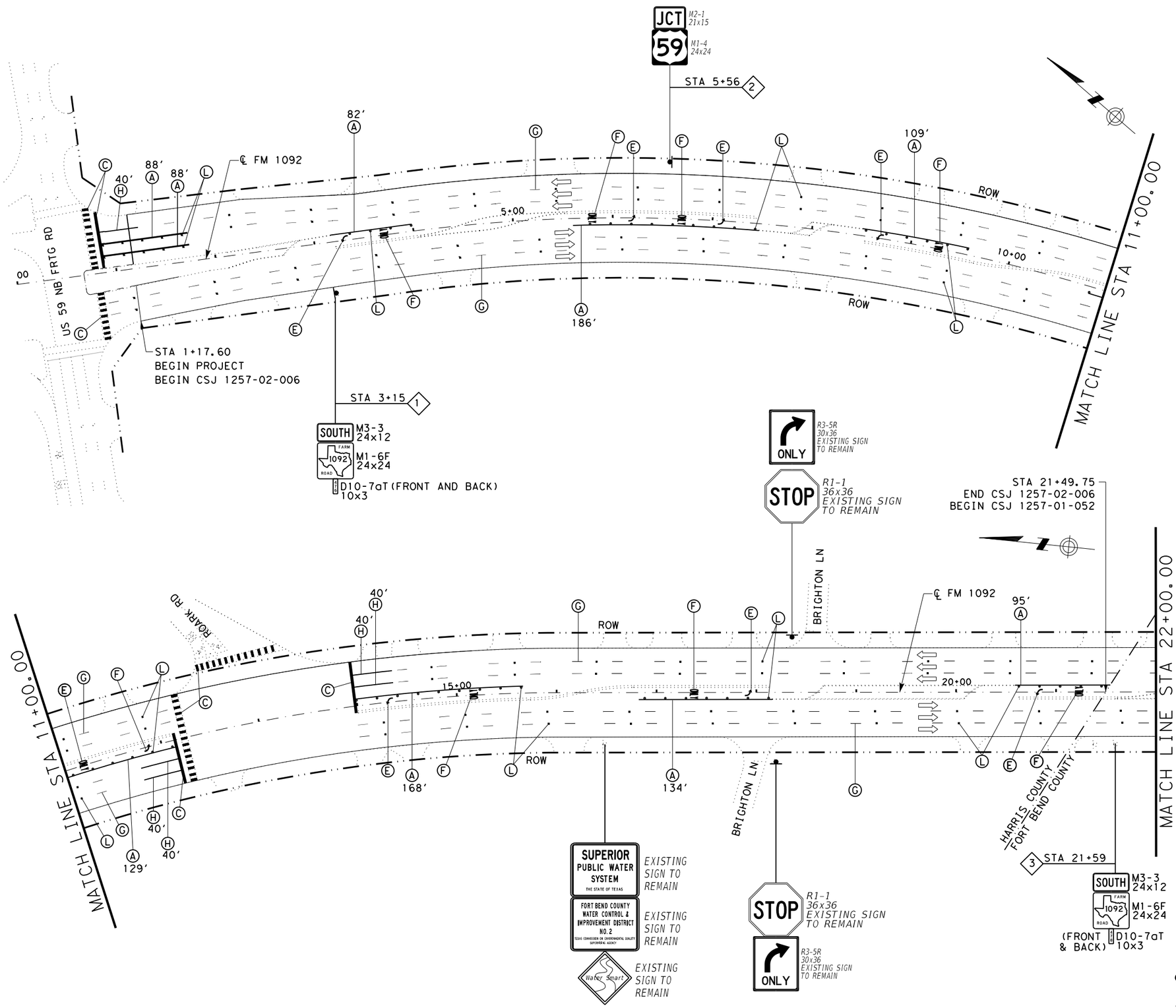
Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		90



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
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- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

(#) PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

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STATE OF TEXAS
TAN N. LUONG
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LICENSED
PROFESSIONAL ENGINEER

P.E

10-01-2021

SIGNING & PAVEMENT MARKING LAYOUT

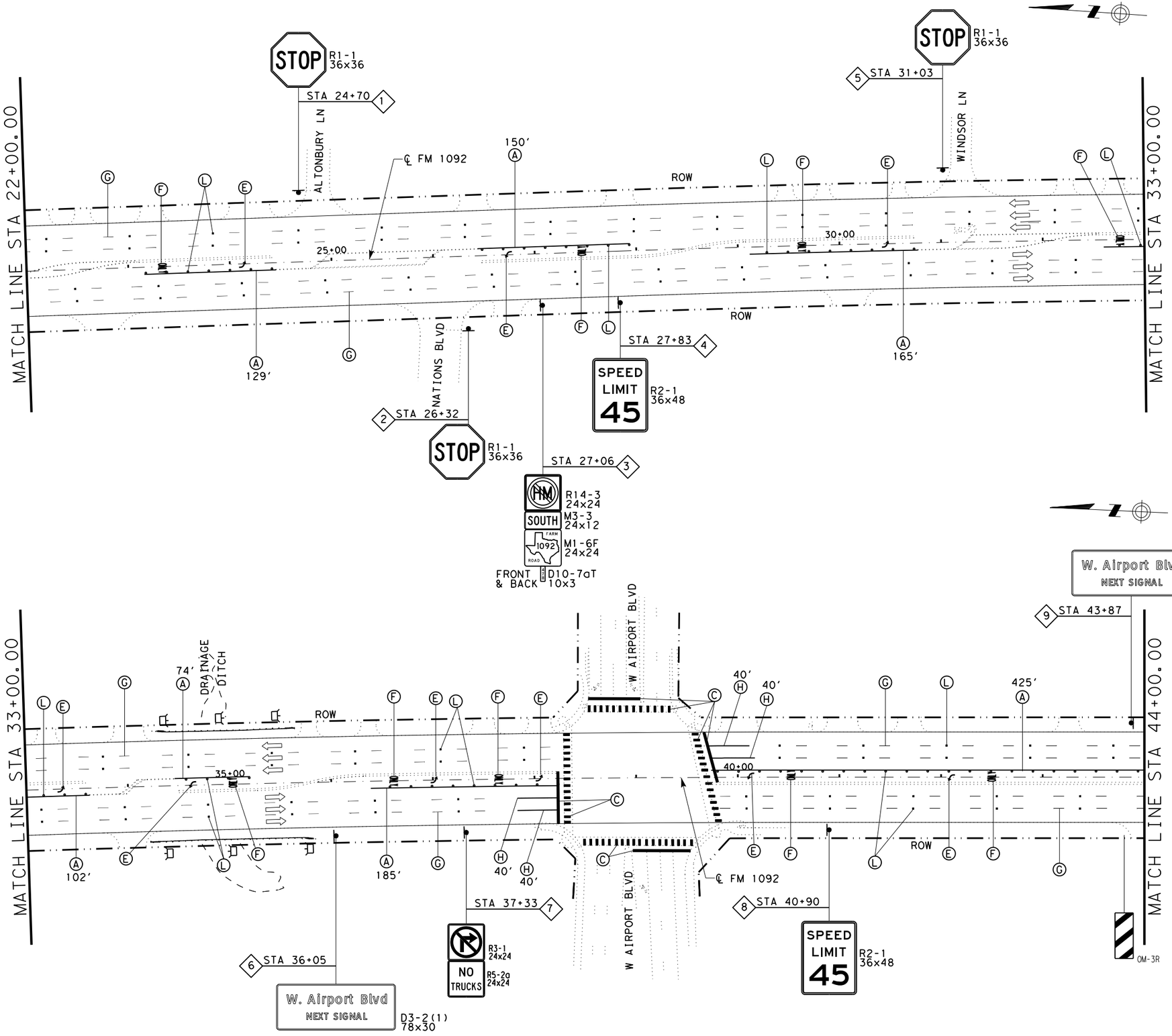
CSJ: 1257-02-006
CSJ: 1257-01-052

SHEET 1 OF 14

Texas Department of Transportation

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		91



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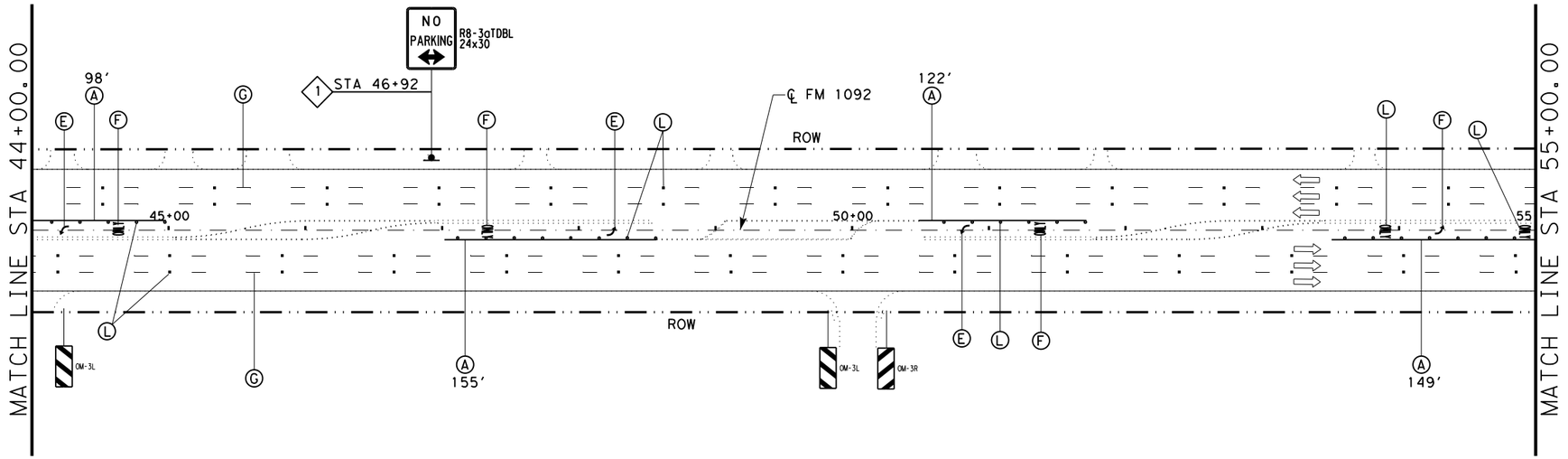
10-01-2021

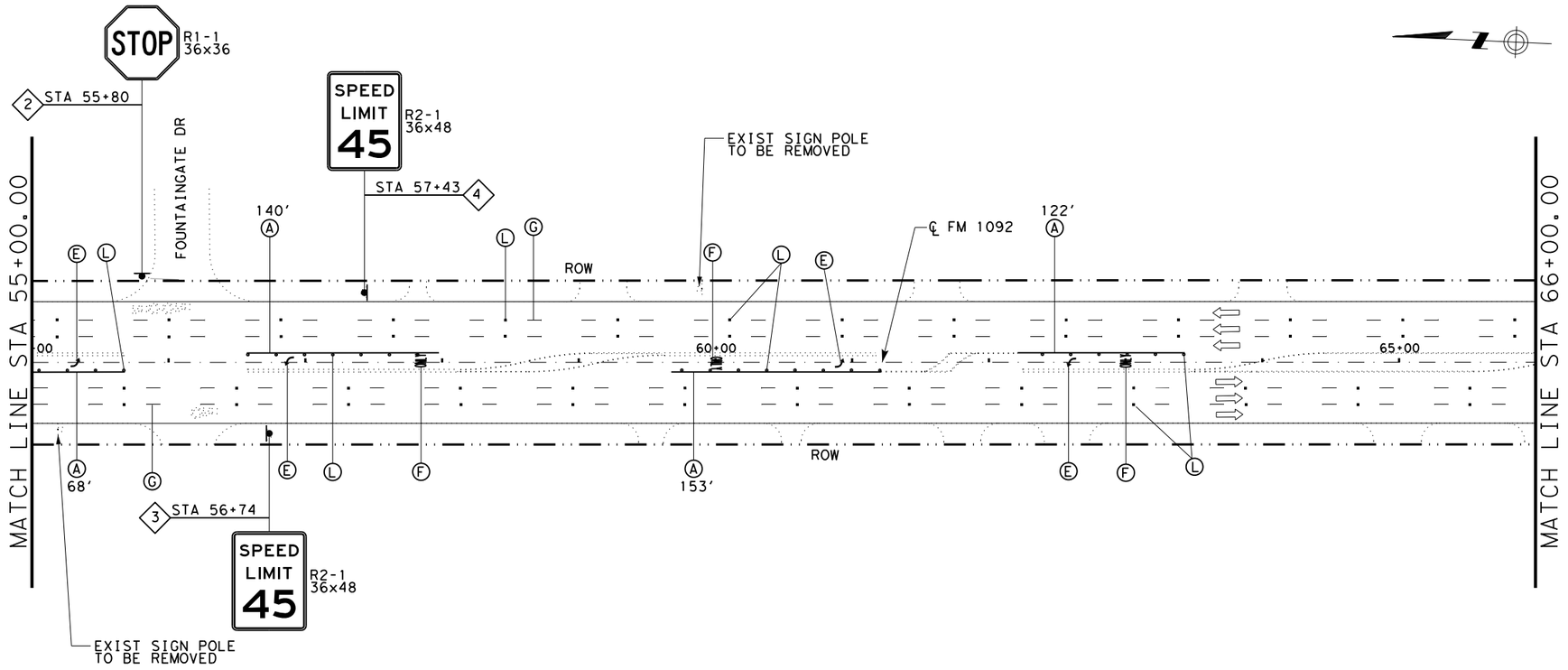
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 2 OF 14

SCALE: 1"=100′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		92





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PROPOSED SMALL SIGN

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INSTL DEL ASSM (D-SW)SZ 2(WC)GND

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OBJECT MARKER ASSM (OM-3)(TWT)GND

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PROFESSIONAL ENGINEER

P.E

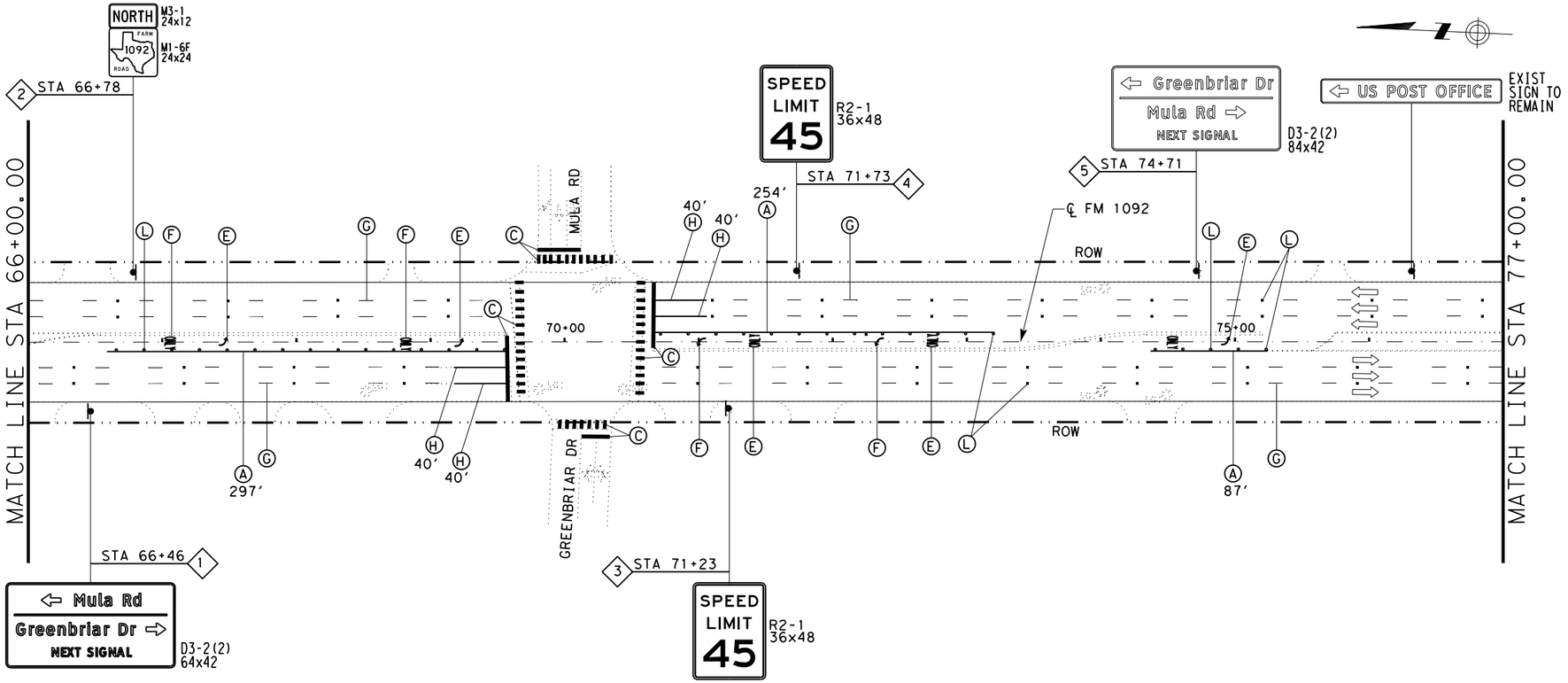
10-01-2021

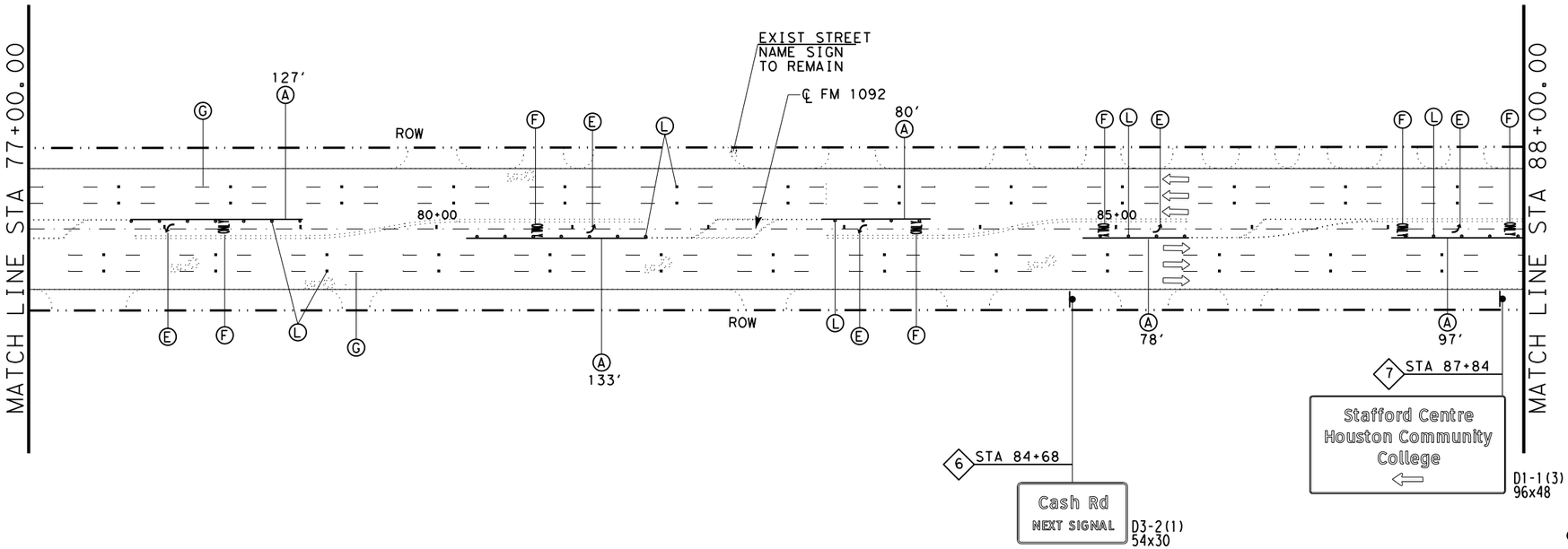
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 3 OF 14

SCALE: 1"=100′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		93





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PROPOSED SMALL SIGN

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INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

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P.E

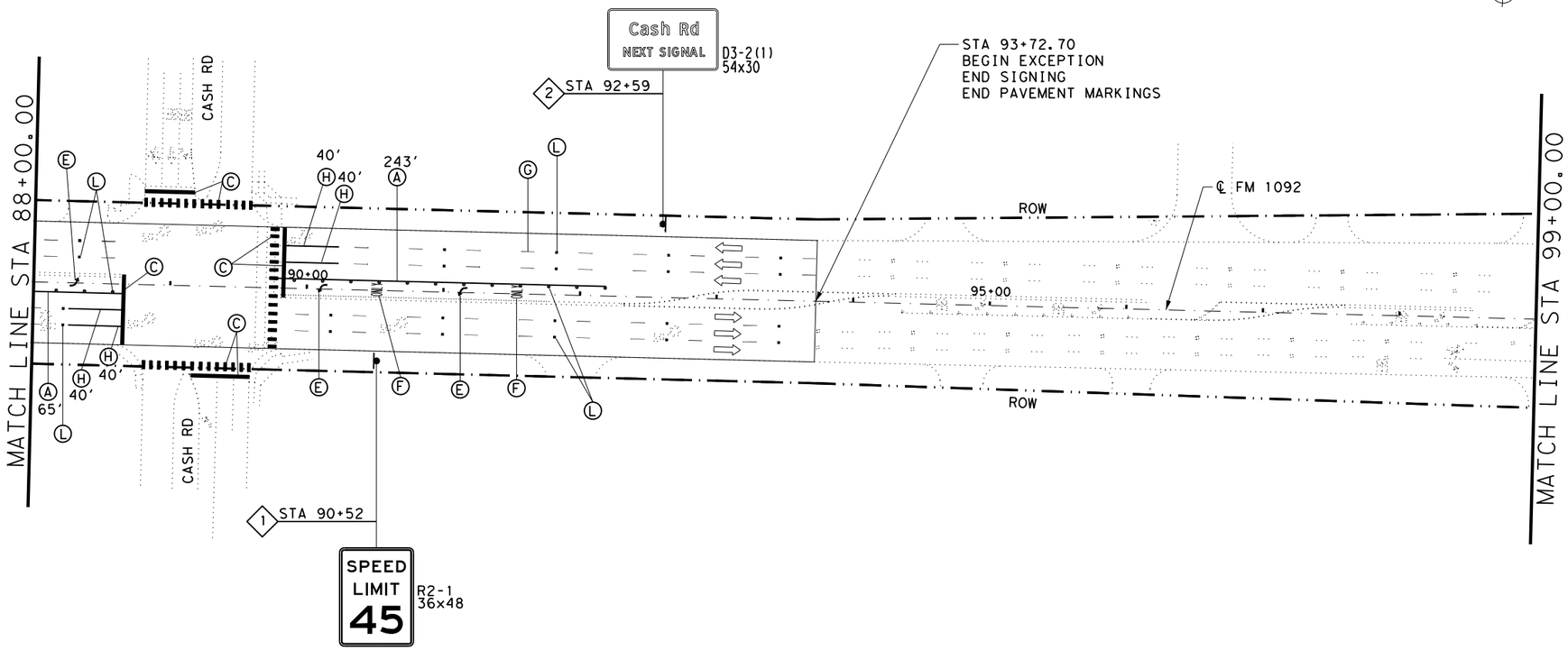
10-01-2021

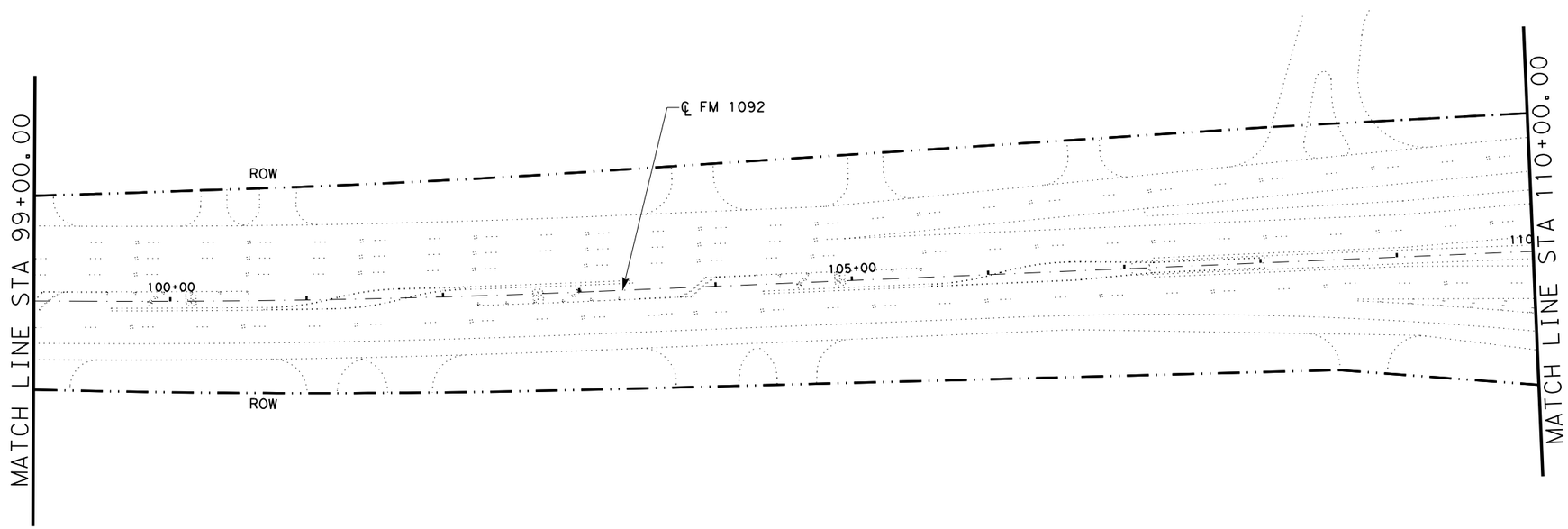
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 4 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		94





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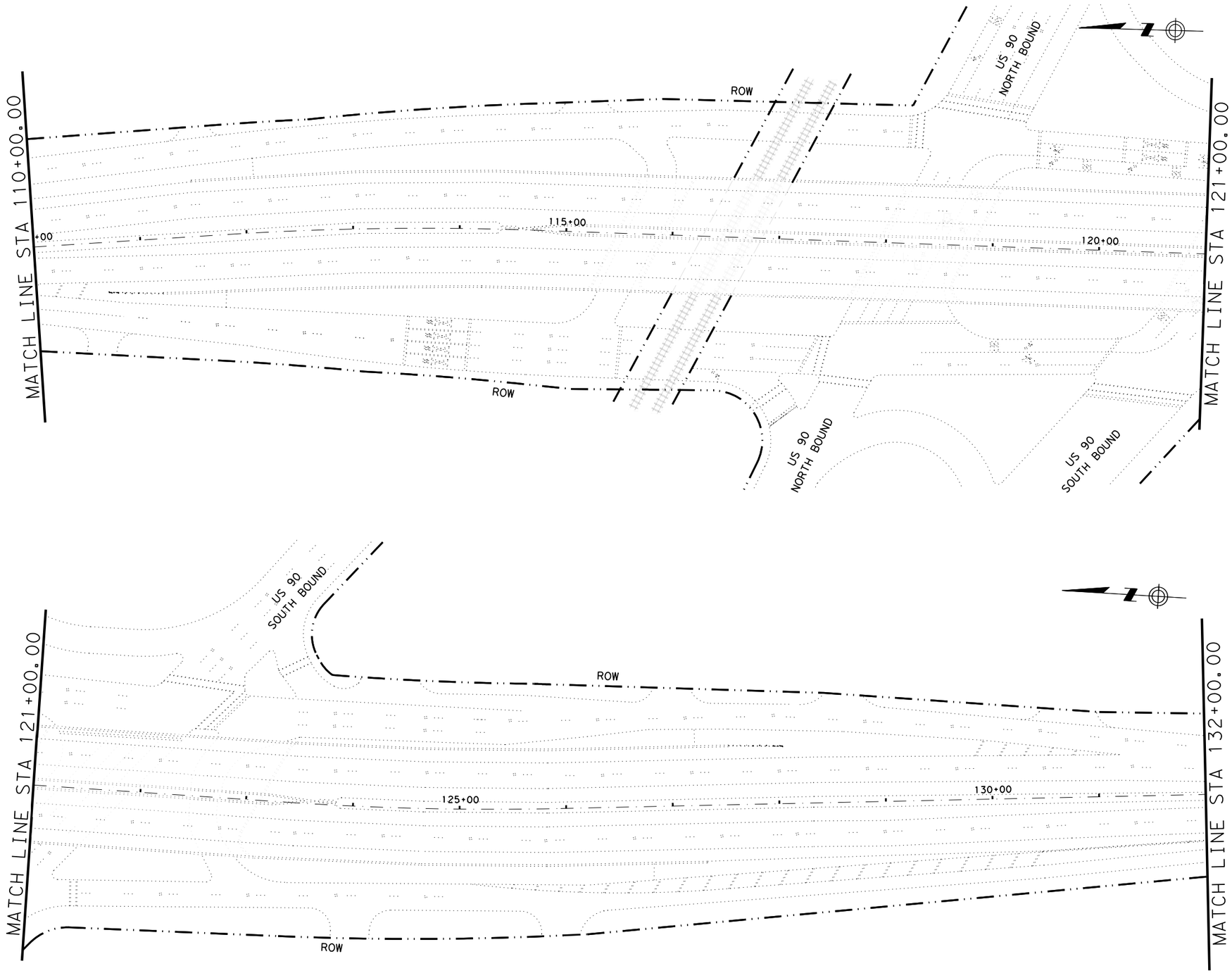
10-01-2021

SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 5 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		95



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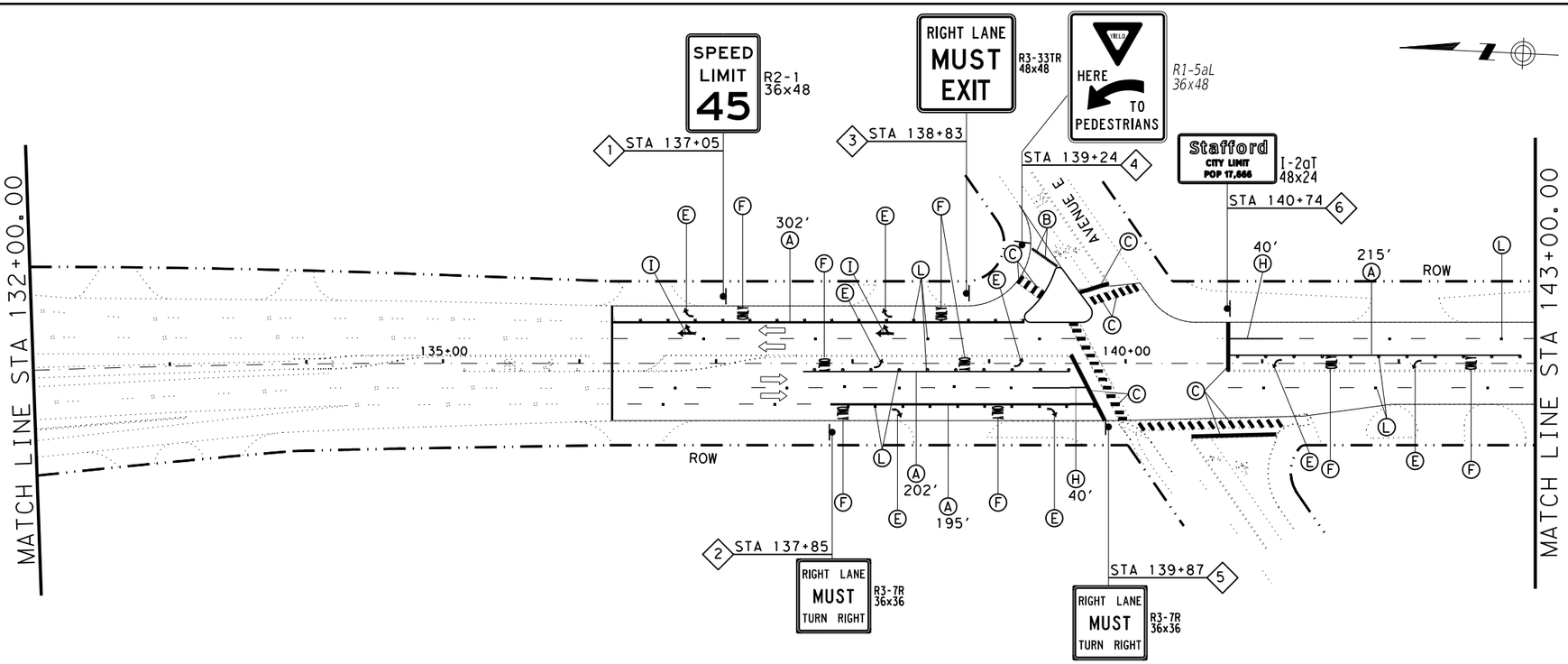
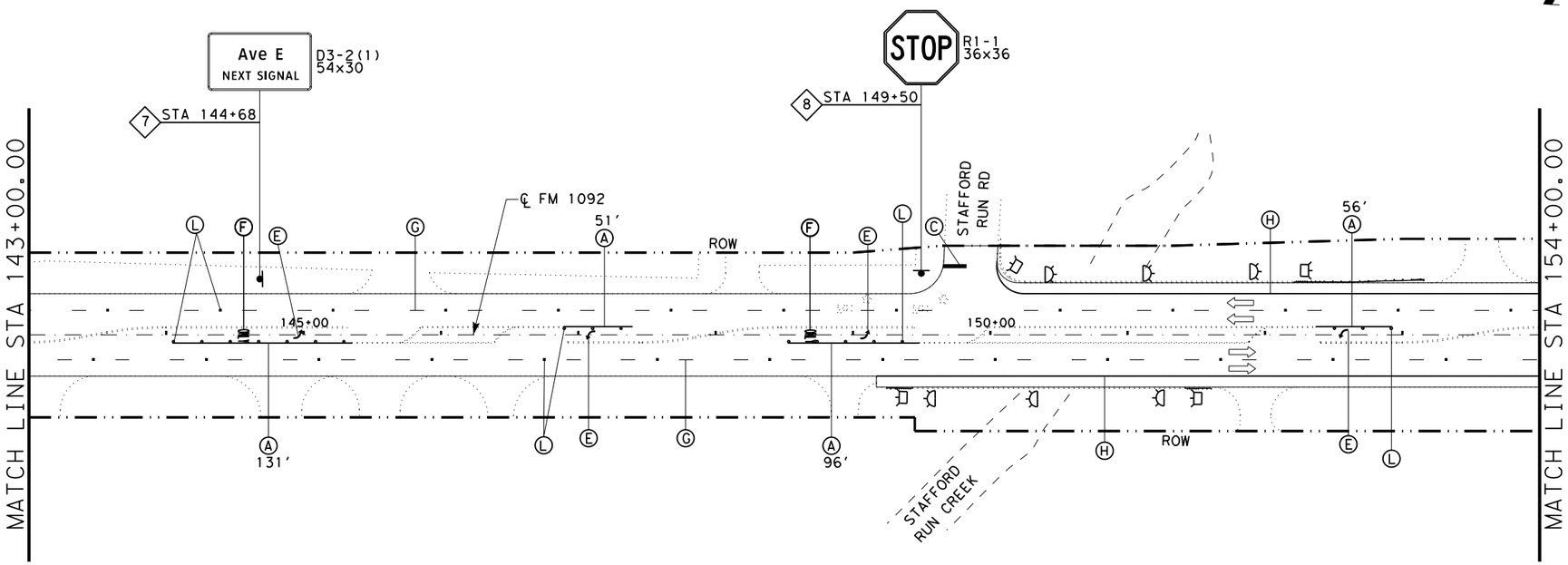
SHEET 6 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		96





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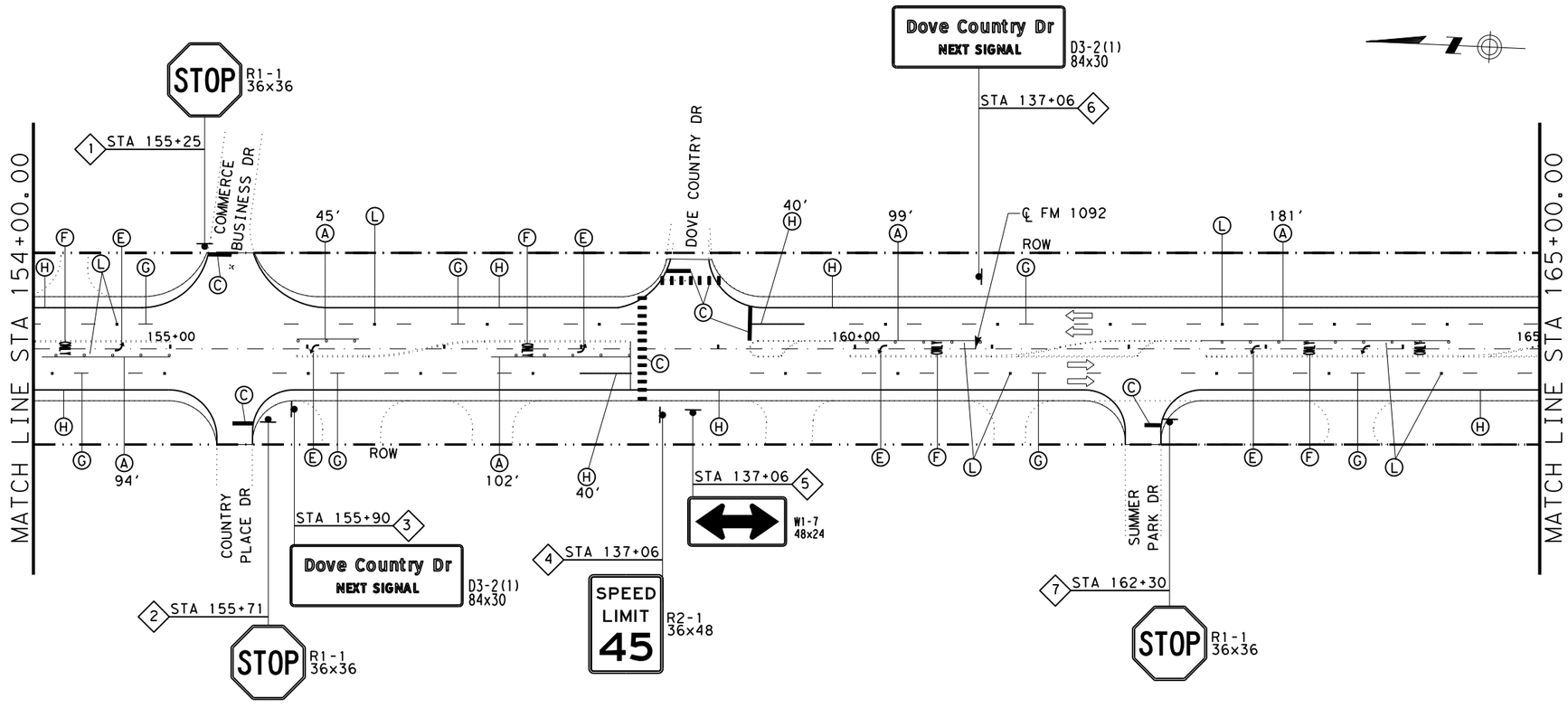
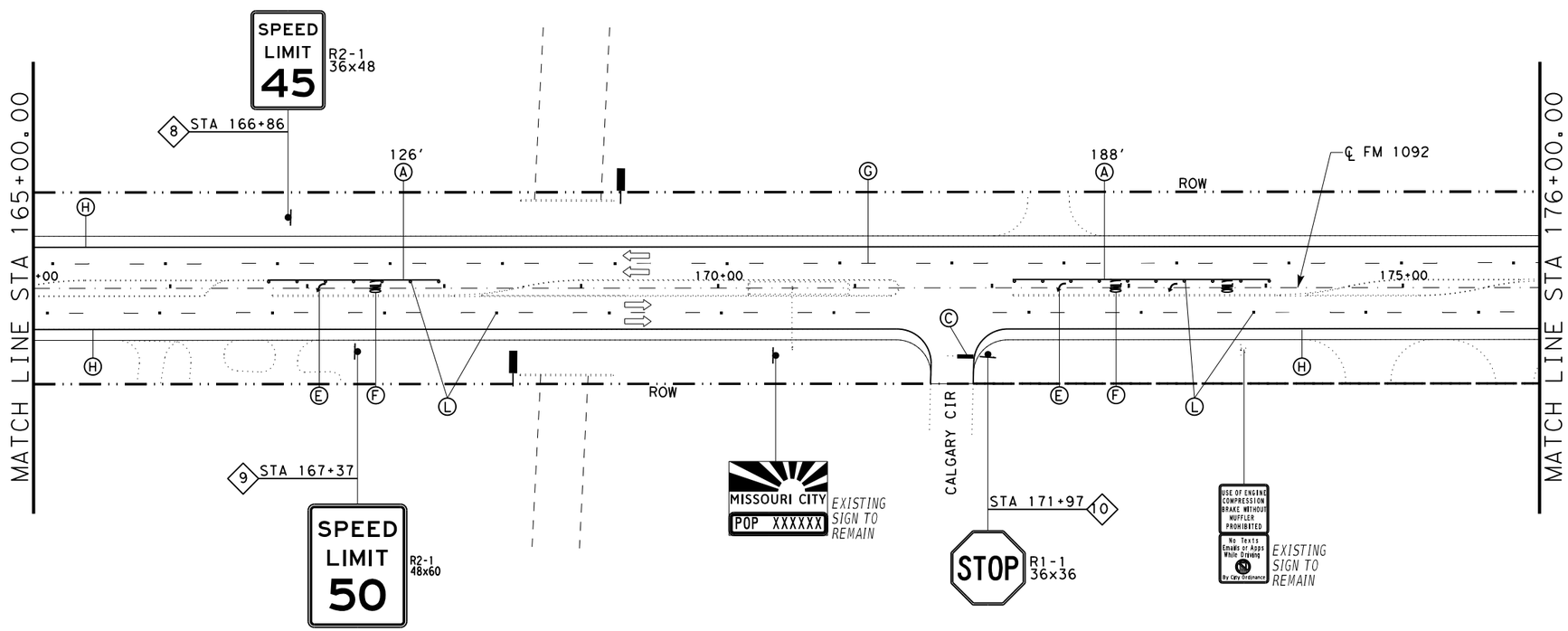
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 7 OF 14

SCALE: 1"=100′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		97





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- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

1. FOR CROSSWALK PAVEMENT MARKING AND PEDESTRIAN CURB RAMP REFER TO TRAFFIC SIGNAL LAYOUT AND CROSSWALK PAVEMENT MARKINGS PM(4)-20.
2. SEE TRAFFIC SUMMARY OF QUANTITIES AND SIGNAL LAYOUT SHEETS FOR ANY WORK RELATED TO TRAFFIC

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

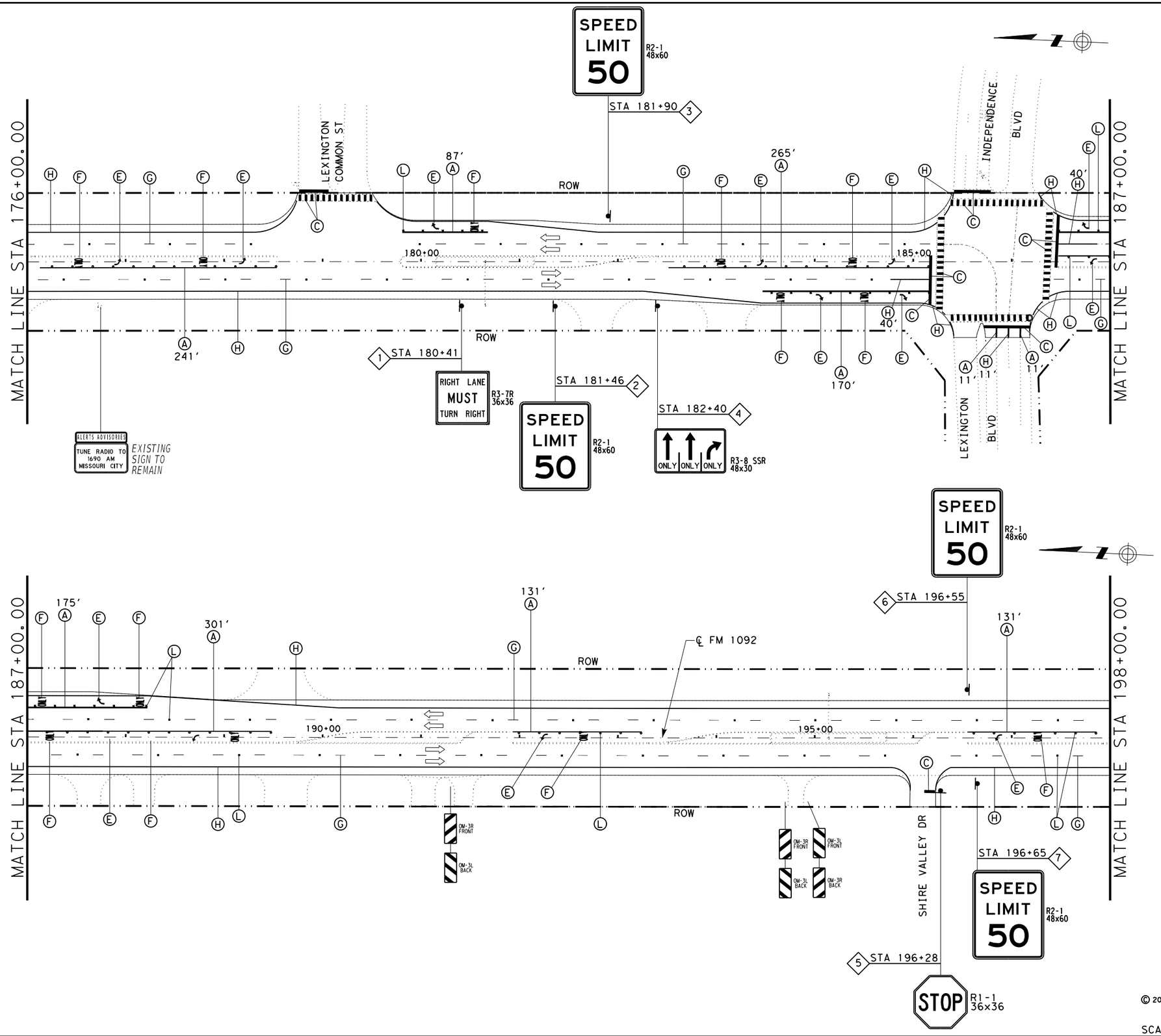
10-01-2021

SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 8 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		98



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

◇# PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

1. FOR CROSSWALK PAVEMENT MARKING AND PEDESTRIAN CURB RAMP REFER TO TRAFFIC SIGNAL LAYOUT AND CROSSWALK PAVEMENT MARKINGS PM(4)-20.
2. SEE TRAFFIC SUMMARY OF QUANTITIES AND SIGNAL LAYOUT SHEETS FOR ANY WORK RELATED TO TRAFFIC

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

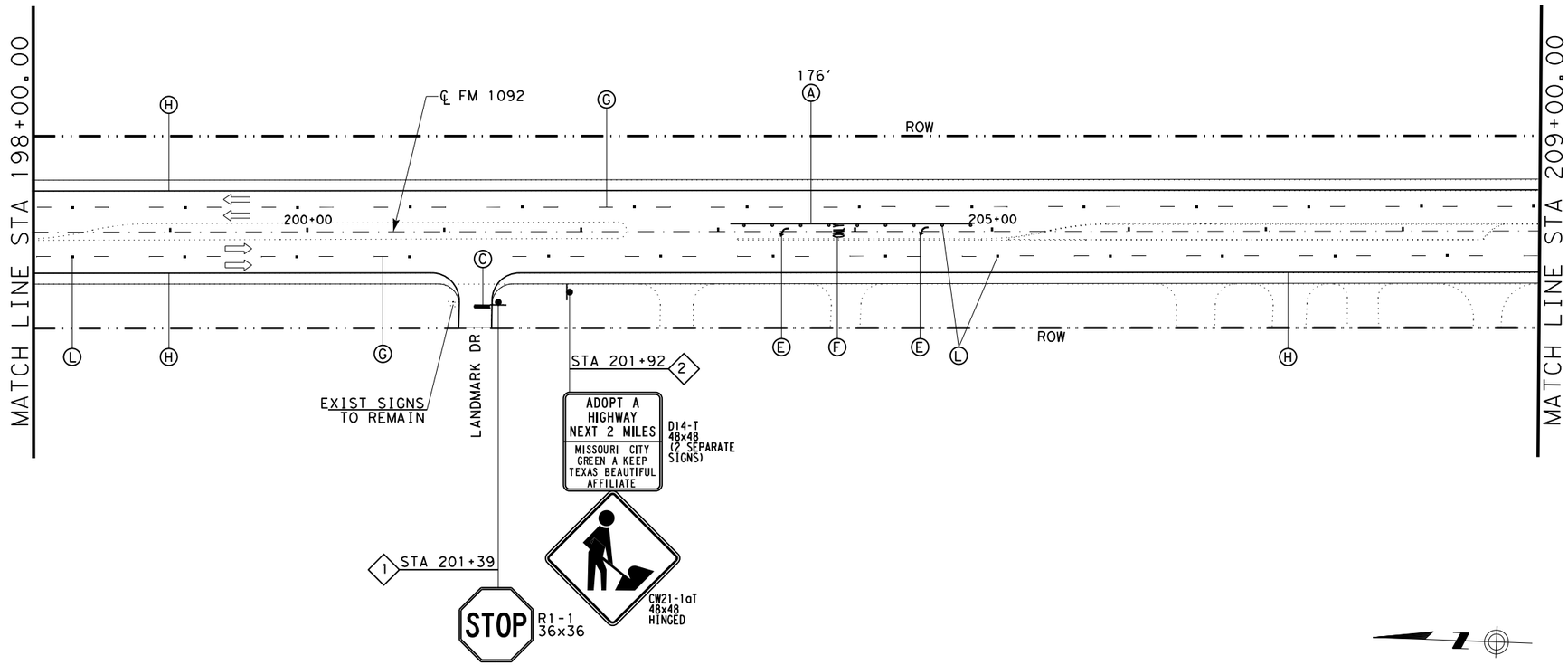
10-01-2021

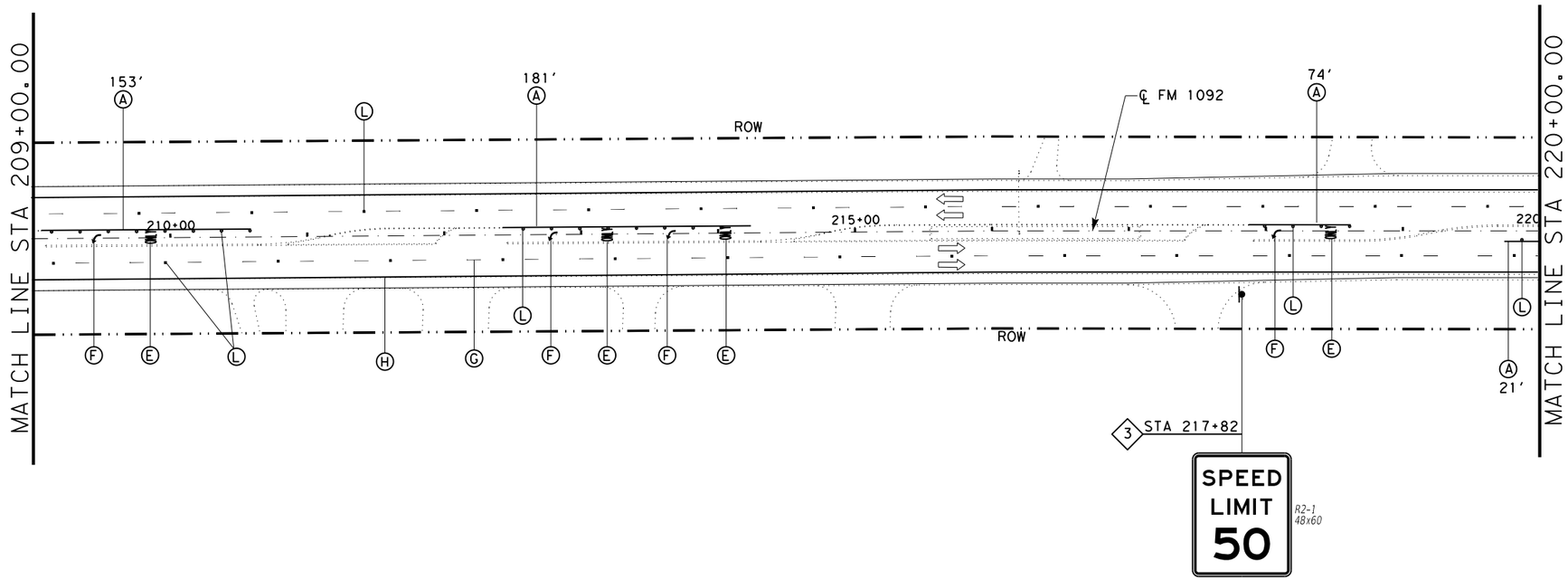
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 9 OF 14

SCALE: 1"=100′

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		99





LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

(#) PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

1. FOR CROSSWALK PAVEMENT MARKING AND PEDESTRIAN CURB RAMP REFER TO TRAFFIC SIGNAL LAYOUT AND CROSSWALK PAVEMENT MARKINGS PM(4)-20.
2. SEE TRAFFIC SUMMARY OF QUANTITIES AND SIGNAL LAYOUT SHEETS FOR ANY WORK RELATED TO TRAFFIC

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

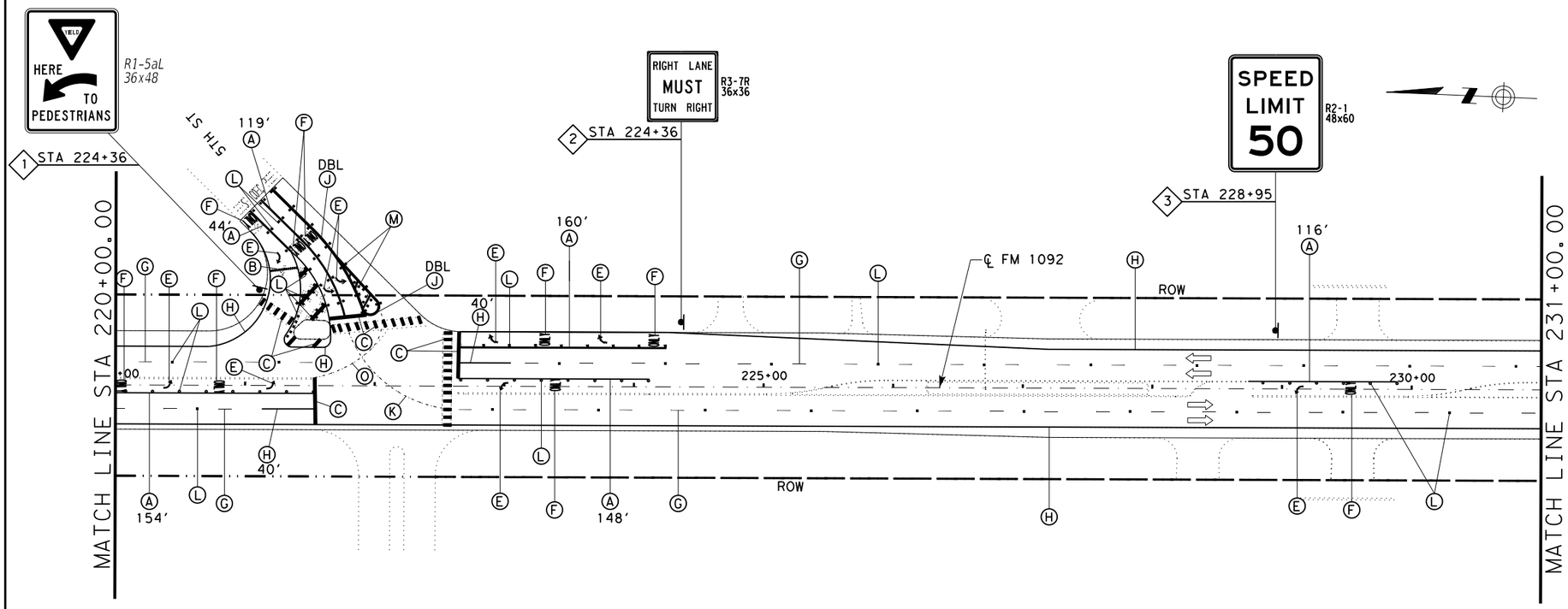
10-01-2021

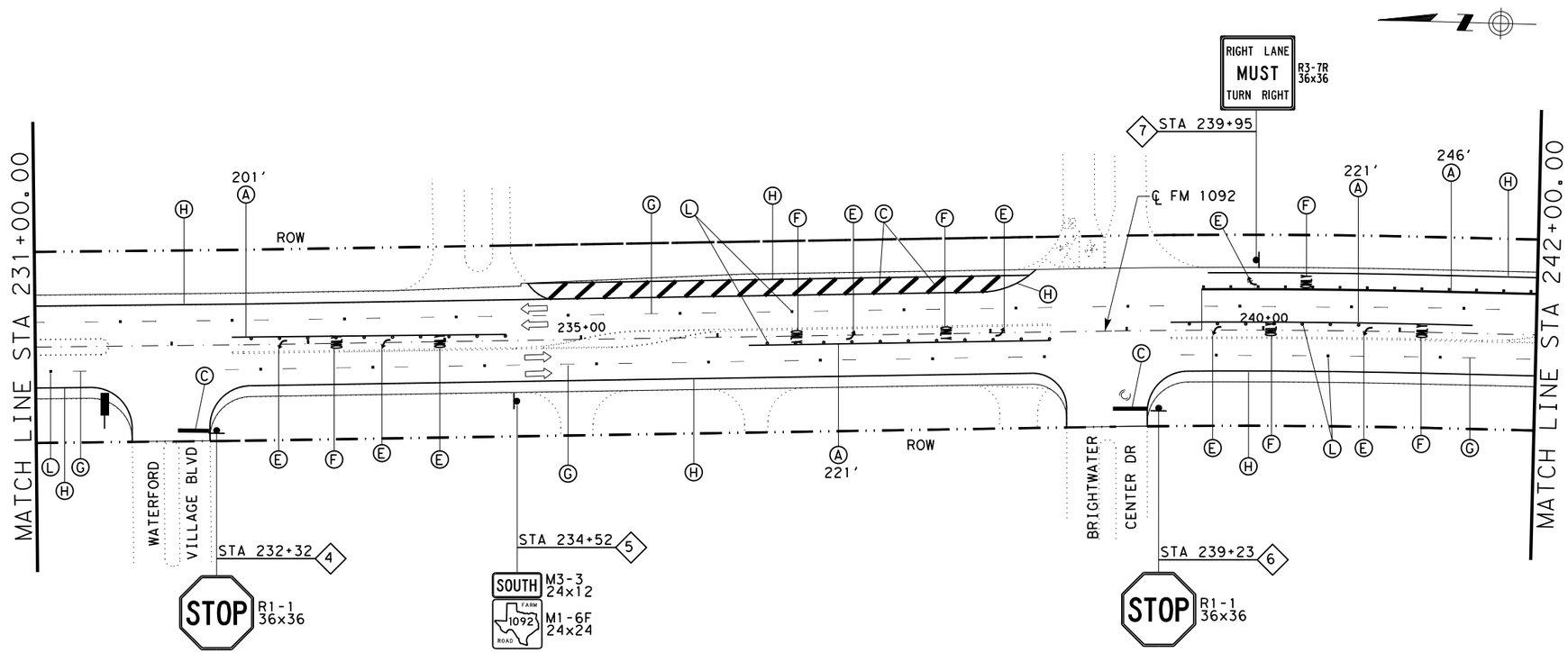
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 10 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		100





LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

(#) PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

1. FOR CROSSWALK PAVEMENT MARKING AND PEDESTRIAN CURB RAMP REFER TO TRAFFIC SIGNAL LAYOUT AND CROSSWALK PAVEMENT MARKINGS PM(4)-20.
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STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

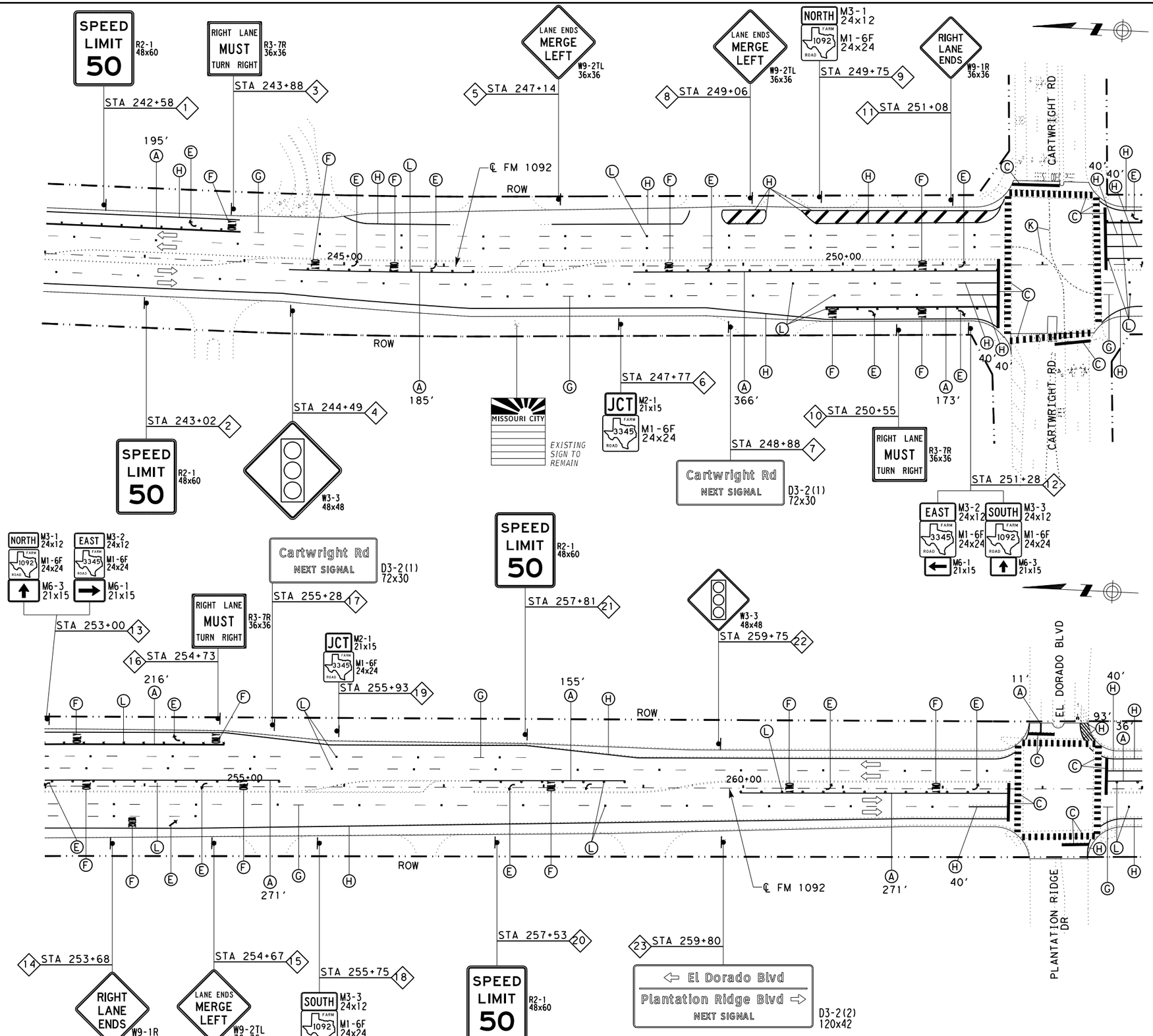
10-01-2021

SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 11 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		101



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

(#) PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

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STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

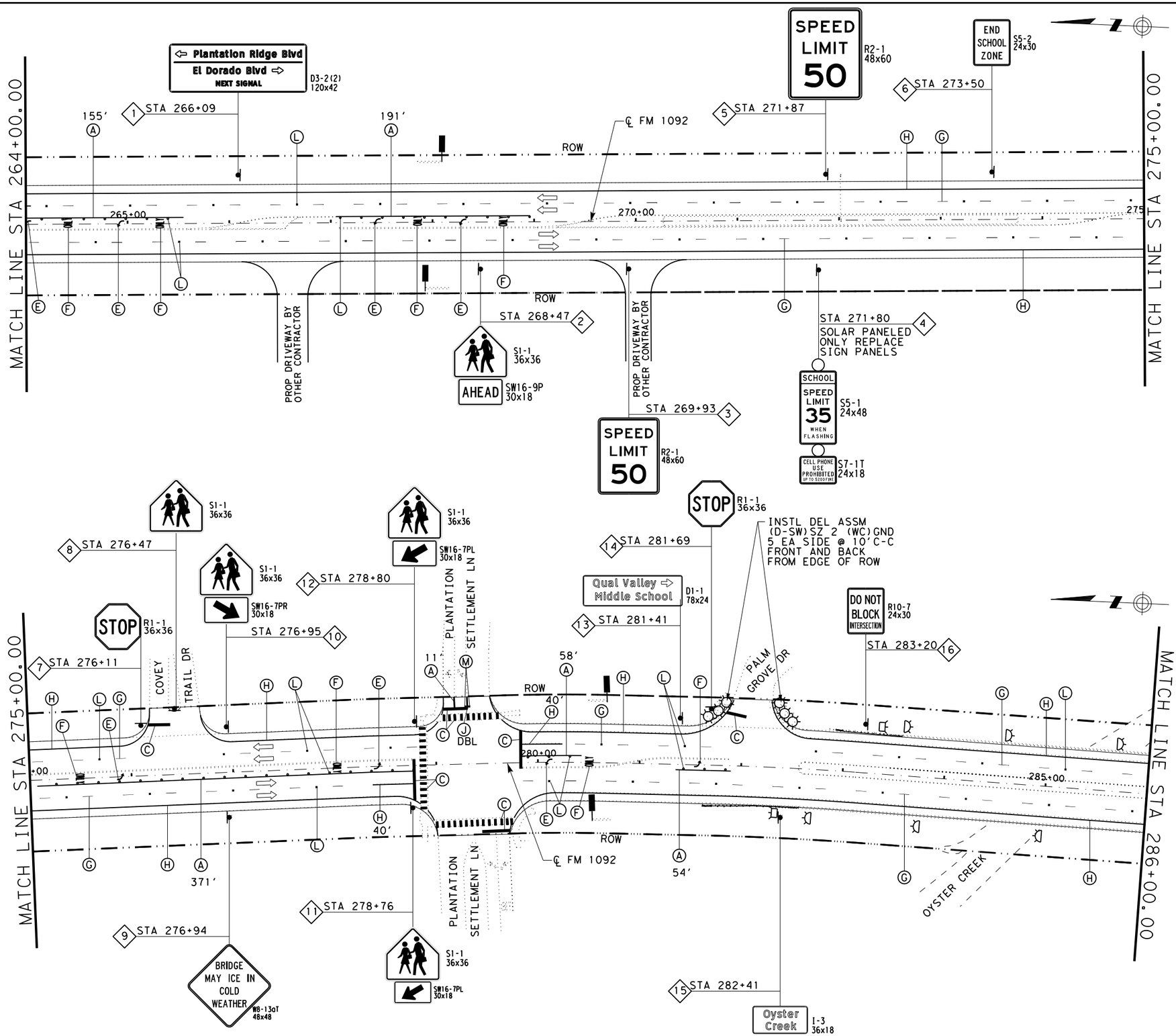
10-01-2021

SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 12 OF 14

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		102



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

(#) PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

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STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

P.E

10-01-2021

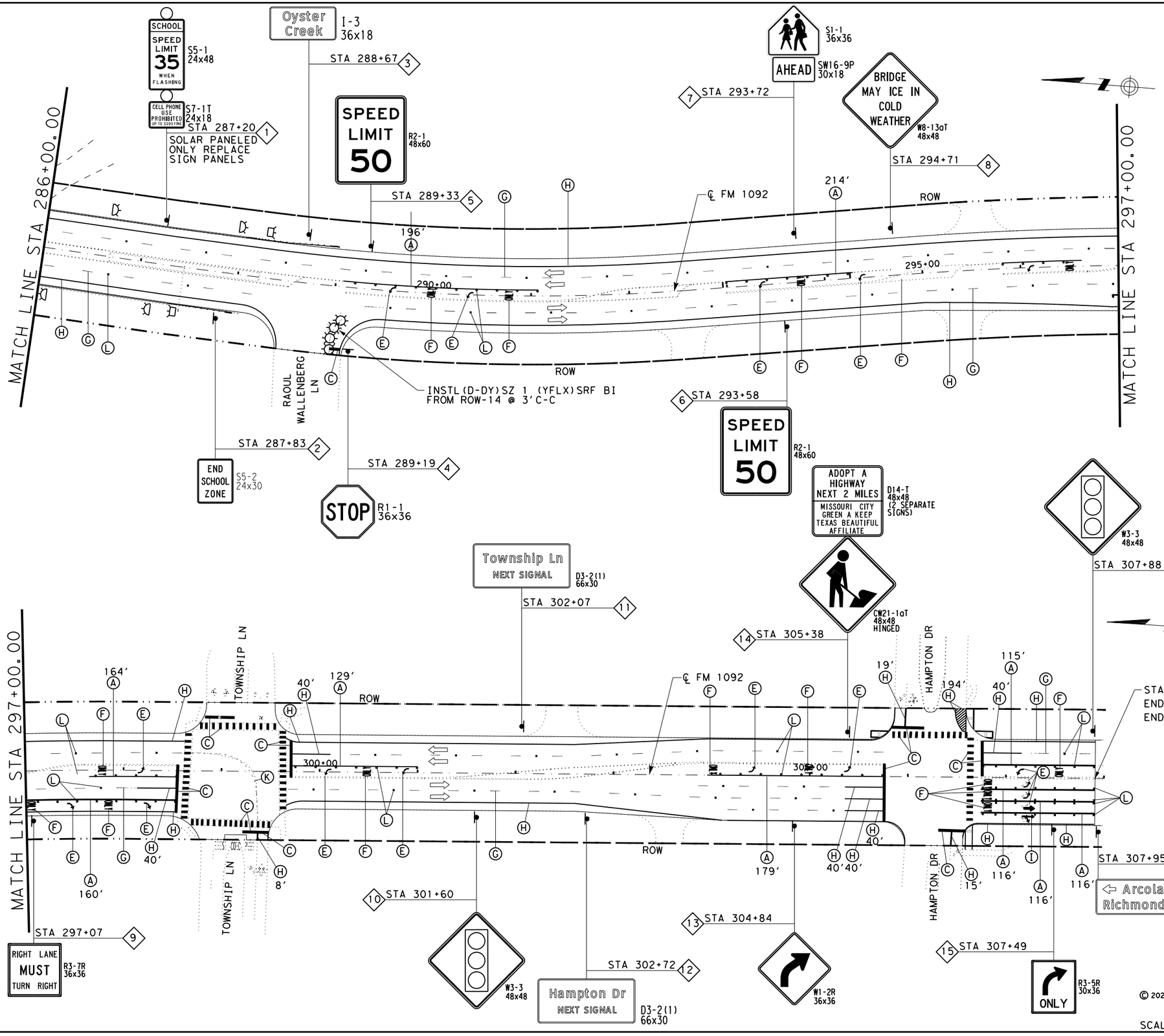
SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 13 OF 14

Texas Department of Transportation

SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		103



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)18"(YLD TRI)(100MIL)
- (C) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (D) REFL PAV MRK TY I (Y)24"(SLD)(100MIL)
- (E) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (F) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (G) RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)
  RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)
- (H) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (I) REFL PAV MRK TY I (W)(DBL ARROW)(100MIL)
- (J) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (K) REFL PAV MRK TY I (W)6"(DOT)(100MIL)
- (L) REFL PAV MRK TY I-C
- (M) REFL PAV MRK TY II-A-A

PROPOSED SMALL SIGN

PROPOSED SMALL SIGN NUMBER

DIRECTION OF TRAFFIC FLOW

INSTL DEL ASSM (D-SW)SZ (BRF)CTB

INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2

INSTL DEL ASSM (D-DY)SZ 1(YFLX)SRF BI
INSTL DEL ASSM (D-SW)SZ 2(WC)GND

OBJECT MARKER ASSM (OM-2Y)(WC)GND

OBJECT MARKER ASSM (OM-3)(TWT)GND

NOTES:

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STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

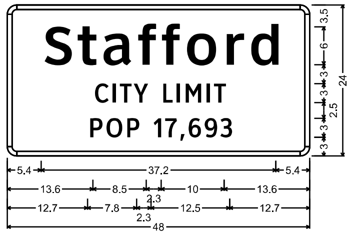
10-01-2021

SIGNING & PAVEMENT MARKING LAYOUT

CSJ: 1257-01-052
SHEET 14 OF 14

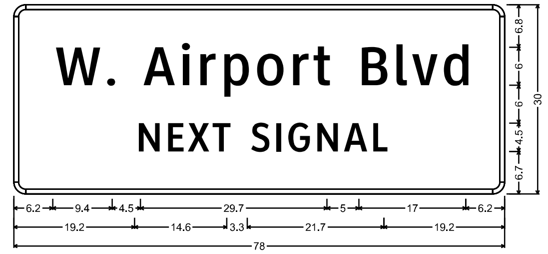
SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		104



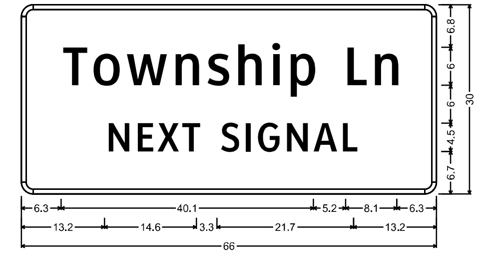
I-2aT 6In;
1.5" Radius, 0.8" Border, White on, None;
"Stafford", ClearviewHwy-5-W-R;
"CITY LIMIT", ClearviewHwy-3-W;
"POP 17,693", ClearviewHwy-3-W;
Table of widths and spaces

5.4	S 4.3	1.0	t 3.0	1.0	a 4.5	1.1	f 2.9	0.9	f 2.9	1.1	o 4.6	1.7	r 2.8	1.1	d 4.3	5.4
13.6	C 2.2	0.6	I 0.5	0.6	T 1.9	0.4	Y 2.3									
	2.3	L 1.6	0.6	I 0.5	0.9	M 2.5	0.9	I 0.5	0.6	T 1.9	13.6					
12.7	P 2.0	0.6	O 2.5	0.8	P 1.9											
	2.3	1 1.2	0.6	7 1.9	0.5	, 0.7	0.7	6 1.9	0.6	9 2.0	0.5	3 1.9	12.7			



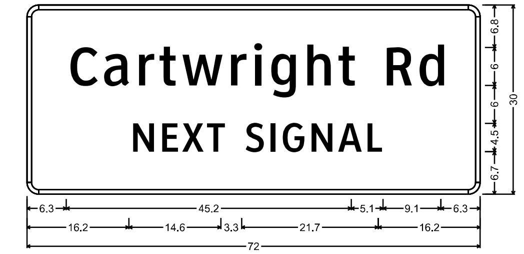
D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"W. Airport Blvd", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

6.2	W 7.0	1.1	. 1.3	4.5	A 5.0	1.2	i 1.2	1.7	r 2.4	1.4	p 3.9	1.3	o 4.2	1.5	r 2.5	0.8	t 2.6			
	5.0	B 4.1	1.4	l 1.7	0.8	v 4.2	0.9	d 3.9	6.2											
19.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	19.2



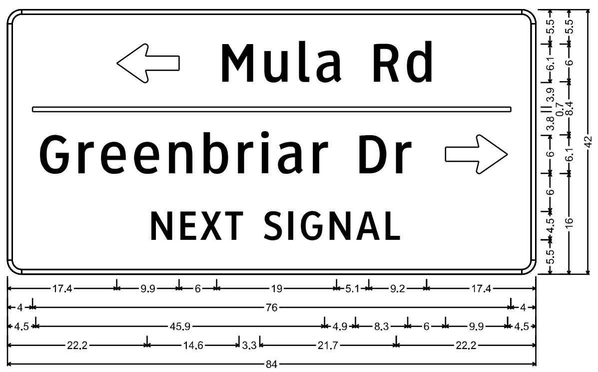
D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"Township Ln", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

6.3	T 3.8	1.0	o 4.2	1.1	w 6.4	1.4	n 3.8	1.3	s 3.4	1.5	h 3.8	1.6	i 1.3	1.6	p 3.9
	5.2	L 3.0	1.3	n 3.8	6.3										
13.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9								
	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	13.2		



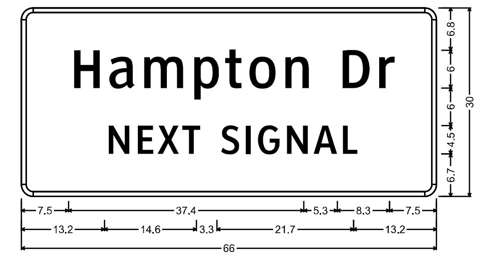
D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"Cartwright Rd", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

6.3	C 4.3	1.0	a 4.0	1.6	r 2.4	0.9	t 2.5	1.1	w 6.4	1.3	r 2.5	1.2	i 1.3	1.4	g 4.0	1.7	h 3.8	1.2	t 2.6	
	5.1	R 4.0	1.2	d 3.9	6.3															
16.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	16.2



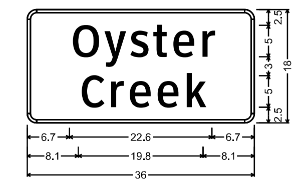
D3-2(2)_VARx42;
2.3" Radius, 0.8" Border, White on, None;
Standard Arrow Custom 9.9" X 6.1" 180'; "Mula Rd", ClearviewHwy-3-W;
"Greenbriar Dr", ClearviewHwy-3-W; Standard Arrow Custom 9.9" X 6.1" 0';
"NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

17.4	⇦ 9.9	6.0	M 4.9	1.8	u 3.7	1.8	l 1.7	1.1	a 4.0	5.1	R 4.1	1.2	d 3.9	17.4									
4.0	— 76.0	4.0																					
4.5	G 4.6	1.5	r 2.5	1.1	e 4.0	1.3	e 4.0	1.5	n 3.8	1.7	b 4.0	1.5	r 2.5	1.2	i 1.3	1.4	a 4.0	1.5	r 2.5	4.9	D 4.3	1.5	r 2.5
	6.0	⇨ 9.9	4.5																				
22.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	22.2			



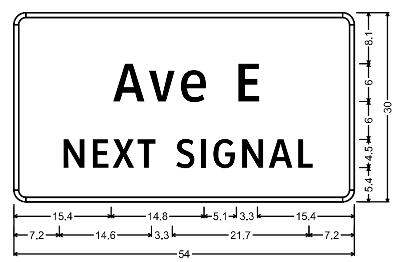
D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"Hampton Dr", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

7.5	H 4.1	1.5	a 4.0	1.6	m 6.3	1.6	p 4.0	1.0	t 2.6	1.2	o 4.2	1.5	n 3.8	5.3	D 4.3	1.6	r 2.4	7.5
13.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9											
	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	13.2					



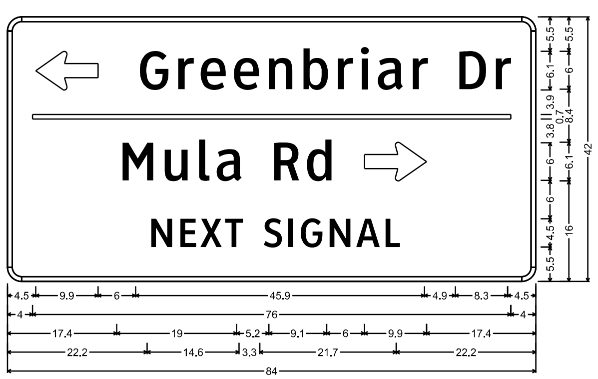
I-3 5in;
1.5" Radius, 0.5" Border, White on, None;
"Oyster", ClearviewHwy-3-W;
"Creek", ClearviewHwy-3-W;
Table of widths and spaces

6.7	O 4.2	0.8	y 3.5	0.6	s 2.9	0.8	t 2.1	1.0	e 3.4	1.2	r 2.1	6.7
8.1	C 3.6	1.1	r 2.0	0.9	e 3.4	1.0	e 3.4	1.2	k 3.2	8.1		



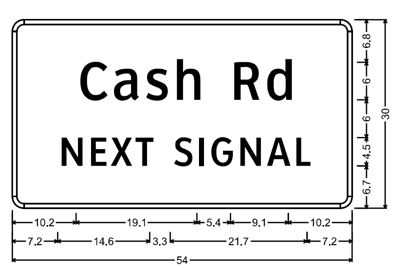
D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"Ave E", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

15.4	A 5.0	0.7	v 4.1	1.0	e 4.0	5.1	E 3.3	15.4					
7.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9						
	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	7.2



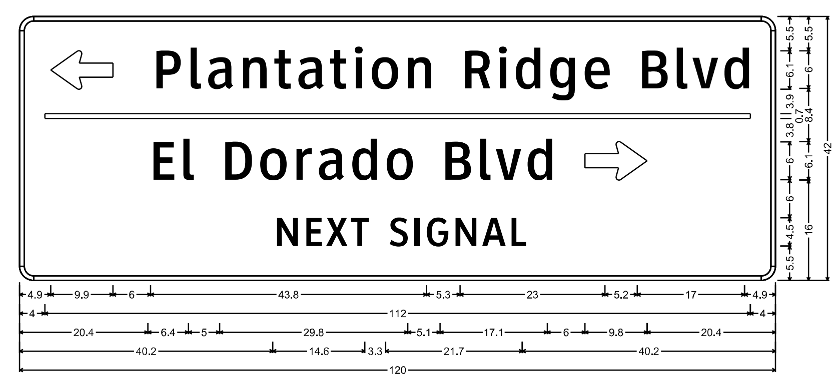
D3-2(2)_VARx42;
2.3" Radius, 0.8" Border, White on, None;
Standard Arrow Custom 9.9" X 6.1" 180'; "Greenbriar Dr", ClearviewHwy-3-W;
"Mula Rd", ClearviewHwy-3-W; Standard Arrow Custom 9.9" X 6.1" 0';
"NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

4.5	⇦ 9.9	6.0	G 4.6	1.5	r 2.5	1.1	e 4.0	1.3	e 4.0	1.5	n 3.8	1.7	b 3.9	1.6	r 2.4	1.3	i 1.3	1.3	a 4.1	1.5	r 2.5
	4.9	D 4.3	1.5	r 2.5	4.5																
4.0	— 76.0	4.0																			
17.4	M 4.9	1.8	u 3.7	1.8	l 1.7	1.1	a 4.0	5.2	R 4.0	1.2	d 3.9	6.0	⇨ 9.9	17.4							
22.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	22.2	



D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"Cash Rd", ClearviewHwy-3-W;
"NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

10.2	C 4.3	1.0	a 4.0	1.2	s 3.4	1.4	h 3.8	5.4	R 4.0	1.2	d 3.9	10.2	
7.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9						
	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	7.2



D3-2(2)_VARx42;
2.3" Radius, 0.8" Border, White on, None;
Standard Arrow Custom 9.9" X 6.1" 180'; "Plantation Ridge Blvd", ClearviewHwy-3-W; "El Dorado Blvd", ClearviewHwy-3-W;
Standard Arrow Custom 9.9" X 6.1" 0'; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

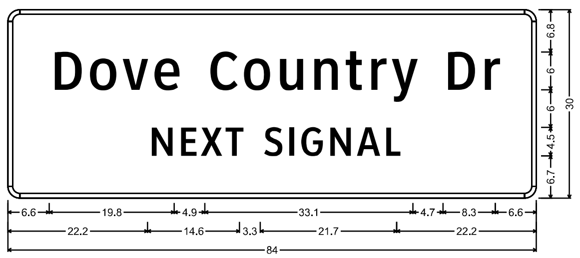
4.9	⇦ 9.9	6.0	P 3.9	1.5	l 1.7	1.1	a 4.1	1.5	n 3.8	1.2	t 2.6	1.2	a 4.0	1.1	t 2.5	1.4	i 1.3	1.4	o 4.2	1.5	n 3.8	5.3	R 4.1	1.3	i 1.3	1.4	d 3.9	1.5	g 4.0	1.5	e 4.0
	5.2	B 4.1	1.3	l 1.7	0.9	v 4.1	0.9	d 4.0	4.9																						
4.0	— 112.0	4.0																													
20.4	E 3.3	1.4	l 1.7	5.0	D 4.3	1.3	o 4.2	1.5	r 2.5	1.0	a 4.1	1.3	d 3.9	1.5	o 4.2	5.1	B 4.1	1.4	l 1.7	0.8	v 4.2	0.9	d 4.0	6.0	⇨ 9.8	20.4					
40.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	40.2											

09-27-2021

GUIDE SIGN DETAILS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		105

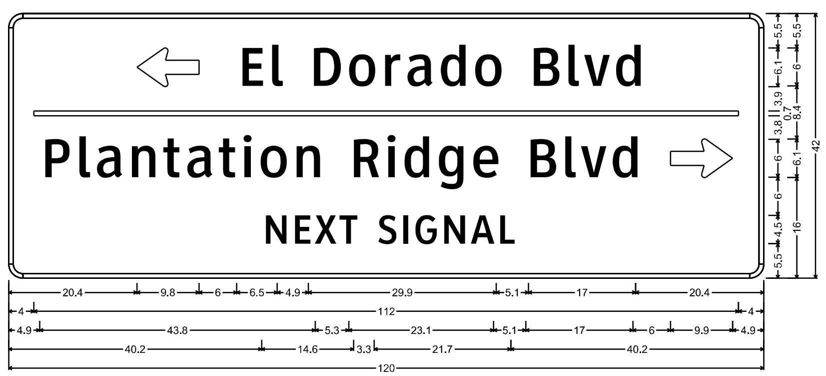


D3-2(1)_VARx30;
1.9" Radius, 0.8" Border, White on, None;
"Dove Country Dr", ClearviewHwy-3-W; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

6.6	D 4.3	1.3	o 4.2	0.9	v 4.2	0.9	e 4.0	4.9	C 4.3	1.1	o 4.2	1.5	u 3.7	1.8	n 3.8	1.2	t 2.6	1.4	r 2.5	0.8	y 4.2

4.7	D 4.3	1.6	r 2.4	6.6

22.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	22.2



D3-2(2)_VARx42;
2.3" Radius, 0.8" Border, White on, None;
Standard Arrow Custom 9.9" X 6.1" 180'; "El Dorado Blvd", ClearviewHwy-3-W; "Plantation Ridge Blvd", ClearviewHwy-3-W;
Standard Arrow Custom 9.9" X 6.1" 0'; "NEXT SIGNAL", ClearviewHwy-3-W;
Table of widths and spaces

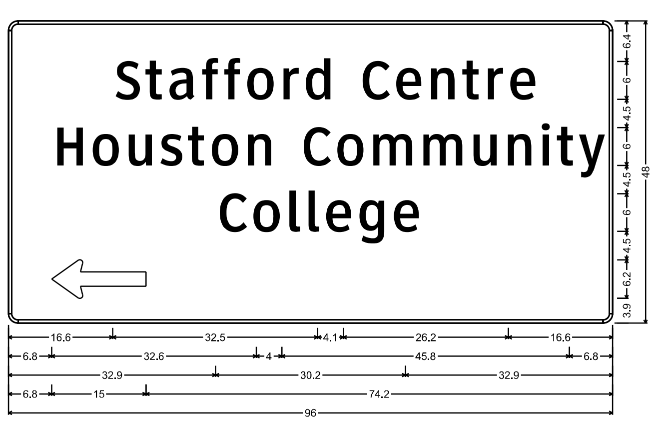
20.4	⇦ 9.8	6.0	E 3.4	1.4	l 1.7	4.9	D 4.3	1.3	o 4.2	1.6	r 2.4	1.1	a 4.0	1.3	d 4.0	1.5	o 4.2	5.1	B 4.1	1.4	l 1.7	0.8	v 4.2	0.9	d 3.9	20.4

4.0	— 112.0	4.0

4.9	P 3.9	1.6	l 1.6	1.2	a 4.0	1.5	n 3.8	1.2	t 2.6	1.2	a 4.1	1.0	t 2.6	1.3	i 1.3	1.4	o 4.2	1.5	n 3.8	5.3	R 4.1	1.3	i 1.3	1.4	d 3.9	1.6	g 3.9	1.6	e 4.0	

5.1	B 4.1	1.4	l 1.7	0.8	v 4.1	1.0	d 3.9	6.0	⇨ 9.9	4.9

40.2	N 3.3	1.3	E 2.5	0.7	X 3.4	0.5	T 2.9	3.3	S 2.9	1.1	I 0.8	1.1	G 3.4	1.2	N 3.3	0.9	A 3.8	0.9	L 2.3	40.2



D1-1 6in LT;
1.5" Radius, 0.5" Border, White on, None;
"Stafford Centre", ClearviewHwy-3-W 80% spacing; "Houston Community", ClearviewHwy-3-W 80% spacing;
"College", ClearviewHwy-3-W 80% spacing; Standard Arrow Custom 15.0" X 6.1" 180';
Table of widths and spaces

16.6	S 3.8	0.7	t 2.6	1.0	a 4.0	1.0	f 2.5	0.8	f 2.6	0.8	o 4.2	1.2	r 2.5	0.9	d 3.9

4.1	C 4.4	0.8	e 4.0	1.2	n 3.8	1.0	t 2.5	1.2	r 2.5	0.8	e 4.0	16.6

6.8	H 4.1	1.3	o 4.2	1.2	u 3.7	1.1	s 3.5	0.7	t 2.6	0.9	o 4.2	1.3	n 3.8

4.0	C 4.4	0.8	o 4.2	1.2	m 6.3	1.4	m 6.2	1.4	u 3.7	1.4	n 3.8	1.3	i 1.3	0.9	t 2.6	0.7	y 4.2	6.8

32.9	C 4.4	0.8	o 4.2	1.2	l 1.7	1.1	l 1.7	0.9	e 4.0	1.0	g 4.0	1.2	e 4.0	32.9

6.8	⇦ 15.0	74.2

D14-4T-4_48x48;

3.0" Radius, 1.0" Border, White on, Blue;
"ADOPT A", C; "HIGHWAY", C; "NEXT 2 MILES", C;

3.0" Radius, 1.0" Border, White on, Blue;
"MISSOURI CITY", C; "GREEN A KEEP", C;
"TEXAS BEAUTIFUL", C specified length;
"AFFILIATE", C;
Table of widths and spaces

11.2	A 3.1	0.8	D 2.8	0.8	O 2.9	1.0	P 2.8	0.8	T 2.5	5.0	A 3.1	11.2

12.3	H 2.7	1.0	I 0.8	1.0	G 2.7	1.1	H 2.7	0.9	W 3.7	0.3	A 3.1	0.3	Y 3.1	12.3

3.3	N 2.8	1.0	E 2.5	0.9	X 2.9	0.6	T 2.5	5.0	2 2.7

5.0	M 3.2	1.1	I 0.7	1.0	L 2.5	0.9	E 2.5	0.8	S 2.8	3.3

7.4	M 2.6	0.9	I 0.5	0.9	S 2.1	0.7	S 2.2	0.7	O 2.3	0.8	U 2.2	0.9	R 2.2	0.8	I 0.6

4.0	C 2.1	0.7	I 0.6	0.7	T 2.0	0.2	Y 2.5	7.4

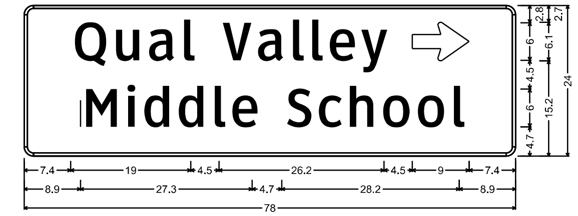
6.8	G 2.1	0.9	R 2.2	0.8	E 2.0	0.7	E 2.0	0.7	N 2.1	4.0	A 2.5

4.0	K 2.2	0.7	E 2.0	0.7	E 2.0	0.7	P 2.1	6.8

6.9	T 2.0	0.1	E 2.0	0.2	X 2.3	0.1	A 2.5	0.1	S 2.2

4.0	B 2.2	0.1	E 2.0	0.1	A 2.5	0.2	U 2.1	0.2	T 2.0	0.1	I 0.6	0.1	F 2.0	0.1	U 2.2	0.2	L 2.0	6.9

13.4	A 2.5	0.7	F 2.0	0.6	F 2.0	0.7	I 0.6	0.8	L 2.0	0.7	I 0.5	0.7	A 2.5	0.2	T 2.0	0.7	E 2.0	13.4

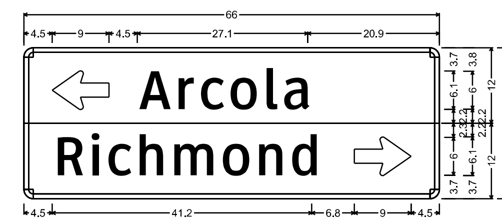


D1-1 6in RT;
1.5" Radius, 0.5" Border, White on, None;
"Qual Valley", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0';
"Middle School", ClearviewHwy-3-W;
Table of widths and spaces

7.4	Q 5.0	1.5	u 3.8	1.5	a 4.0	1.5	l 1.7	4.5	V 4.6	1.0	a 4.1	1.5	l 1.7	1.3	l 1.7	1.2	e 4.0	0.9	y 4.2	4.5	⇨ 9.0	7.4

8.9	M 5.0	1.6	i 1.3	1.4	d 4.0	1.5	d 3.9	1.8	l 1.7	1.1	e 4.0

4.7	S 3.8	1.2	c 3.7	1.3	h 3.8	1.5	o 4.2	1.2	o 4.2	1.6	l 1.7	8.9



D1-2 6in LT-RT;

1.5" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 9.0" X 6.1" 180'; "Arcola", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on, Green;
"Richmond", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0';
Table of widths and spaces

4.5	⇦ 9.0	4.5	A 5.0	1.2	r 2.5	1.1	c 3.7	1.0	o 4.2	1.5	l 1.7	1.2	a 4.0	20.9

4.5	R 4.0	1.4	i 1.3	1.4	c 3.6	1.3	h 3.8	1.8	m 6.2	1.5	o 4.2	1.5	n 3.8	1.5	d 3.9	6.8	⇨ 9.0	4.5

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED
PROFESSIONAL ENGINEER

P.E

09-27-2021

GUIDE SIGN DETAILS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		106

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				FM 1092 AT ROARK RD	FM 1092 AT AIRPORT BLVD	FM 1092 AT GREENBRIAR DR / MULA RD	FM 1092 AT CASH RD	FM 1092 AT AVENUE E	FM 1092 AT DOVE COUNTRY DR	FM 1092 AT INDEPENDENCE BLVD / LEXINGTON BLVD
ITEM	DESC CODE	DESCRIPTION	UNIT	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
0104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY			60	20			
0529	6011	CONC CURB (DOWEL)	LF			50	50			
0529	6012	CONC CURB (SLOTTED)	LF						100	
0531	6001	CONC SIDEWALKS (4")	SY			25	25		40	
0531	6004	CURB RAMPS (TY 1)	EA			4	1			
0531	6005	CURB RAMPS (TY 2)	EA				1			
0531	6008	CURB RAMPS (TY 5)	EA			2				
0531	6010	CURB RAMPS (TY 7)	EA				4			
0618	6046	CONDT (PVC) (SCH 80) (2")	LF	230		570	710		65	
0618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	170		200	55			
0618	6053	CONDT (PVC) (SCH 80) (3")	LF			25	30		25	
0618	6070	CONDT (RM) (2")	LF			65	65		65	
0618	6074	CONDT (RM) (3")	LF			25	25			
0620	6009	ELEC CONDR (NO.6) BARE	LF	395		875	875		150	
0624	6010	GROUND BOX TY D (162922)W/APRON	EA	3		6	7			
0625	6004	ZINC-COAT STL WIRE STRAND (5/16")	LF			350	380		200	
0666	6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	380	840	580	500	530	280	780
0666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	155	375	425	350	220	110	350
0666	6228	PAVEMENT SEALER 12"	LF	380	840	580	500	530	280	780
0666	6230	PAVEMENT SEALER 24"	LF	155	375	425	350	220	110	350
0677	6005	ELIM EXT PAV MRK & MRKS (12")	LF			590	200			
0677	6007	ELIM EXT PAV MRK & MRKS (24")	LF			175	135			
0678	6006	PAV SURF PREP FOR MRK (12")	LF	380	840	580	500	530	280	780
0678	6008	PAV SURF PREP FOR MRK (24")	LF	155	375	425	350	220	110	350
0682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA			8	6		4	
0684	6007	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	LF			1500	1360		770	
0684	6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF			1525	1385		790	
0684	6080	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF	1545		3540	3560			
0687	6001	PED POLE ASSEMBLY	EA			5	4		4	
	****	SCREW-IN TYPE ANCHOR FOUNDATION	EA			5	4		4	
	****	SIGN - R10-3EL (9"X15") [.9375 SQFT]	EA			4	3		2	
	****	SIGN - R10-3ER (9"X15") [.9375 SQFT]	EA			4	3		2	
0688	6001	PED DETECT PUSH BUTTON (APS)	EA			8	6		4	
0688	6003	PED DETECTOR CONTROLLER UNIT	EA			2	1		1	
0688	6004	VEH LP DETECT (SAWCUT)	LF	510		1330	1330			
	****	CONDT (PVC) (SCH 80) (1 1/4")	LF	35		120	120			
	****	ELEC CONDR (NO.14) INSULATED	LF	1155		3005	3005			

**** MATERIALS SUBSIDIARY TO PERTINENT ITEM

DATE: 9/23/2021 10:06:29 AM
FILE: H:\Trf Signals\Hou Trans\1257-01-052\FM1092.dgn

FM 1092
AT VARIOUS LOCATIONS
TRAFFIC SIGNAL
SUMMARY OF QUANTITIES

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		107

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				FM 1092 AT 5TH STREET	FM 1092 AT CARTWRIGHT RD	FM 1092 AT EL DORADO BLVD / PLANTATION RIDGE DR	FM 1092 AT PLANTATION SETTLEMENT LN	FM 1092 AT TOWNSHIP LN	FM 1092 AT HAMPTON DR	
ITEM	DESC CODE	DESCRIPTION	UNIT	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	TOTAL
0104	6036	REMOVING CONC (SIDEWALK OR RAMP)	SY							80
0529	6011	CONC CURB (DOWEL)	LF							100
0529	6012	CONC CURB (SLOTTED)	LF						125	225
0531	6001	CONC SIDEWALKS (4")	SY						50	140
0531	6004	CURB RAMPS (TY 1)	EA							5
0531	6005	CURB RAMPS (TY 2)	EA							1
0531	6008	CURB RAMPS (TY 5)	EA							2
0531	6010	CURB RAMPS (TY 7)	EA							4
0618	6046	CONDT (PVC) (SCH 80) (2")	LF						80	1655
0618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF							425
0618	6053	CONDT (PVC) (SCH 80) (3")	LF							80
0618	6070	CONDT (RM) (2")	LF						85	280
0618	6074	CONDT (RM) (3")	LF							50
0620	6009	ELEC CONDR (NO.6) BARE	LF						165	2460
0624	6010	GROUND BOX TY D (162922)W/APRON	EA							16
0625	6004	ZINC-COAT STL WIRE STRAND (5/16")	LF						350	1280
0666	6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	370	910	660	460	710	390	7390
0666	6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	150	400	290	210	300	250	3585
0666	6228	PAVEMENT SEALER 12"	LF	370	910	660	460	710	390	7390
0666	6230	PAVEMENT SEALER 24"	LF	150	400	290	210	300	250	3585
0677	6005	ELIM EXT PAV MRK & MRKS (12")	LF						50	840
0677	6007	ELIM EXT PAV MRK & MRKS (24")	LF						70	380
0678	6006	PAV SURF PREP FOR MRK (12")	LF	370	910	660	460	710	390	7390
0678	6008	PAV SURF PREP FOR MRK (24")	LF	150	400	290	210	300	250	3585
0682	6018	PED SIG SEC (LED)(COUNTDOWN)	EA						4	22
0684	6007	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	LF						1065	4695
0684	6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF						1085	4785
0684	6080	TRF SIG CBL (TY C)(14 AWG)(2 CONDR)	LF							8645
0687	6001	PED POLE ASSEMBLY	EA						4	17
	****	SCREW-IN TYPE ANCHOR FOUNDATION	EA						4	17
	****	SIGN - R10-3EL (9"X15") [.9375 SQFT]	EA						2	11
	****	SIGN - R10-3ER (9"X15") [.9375 SQFT]	EA						2	11
0688	6001	PED DETECT PUSH BUTTON (APS)	EA						4	22
0688	6003	PED DETECTOR CONTROLLER UNIT	EA						1	5
0688	6004	VEH LP DETECT (SAWCUT)	LF							3170
	****	CONDT (PVC) (SCH 80) (1 1/4")	LF							275
	****	ELEC CONDR (NO.14) INSULATED	LF							7165

**** MATERIALS SUBSIDIARY TO PERTINENT ITEM

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FM 1092
AT VARIOUS LOCATIONS
TRAFFIC SIGNAL
SUMMARY OF QUANTITIES

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		108

NOTES

1. LOCATE DETECTORS , ETC., AS APPROVED.

2. REPAIR OR REPLACE PAVEMENT AND SIDEWALKS DAMAGED BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE DEPARTMENT.

3. FURNISH AND INSTALL URETHANE FOAM TO ENCLOSE THE ENDS OF EACH CONDUIT CONTAINING SIGNAL CABLE.

4. INSTALL EACH LOOP DETECTOR IN A SEPARATE SAW CUT FROM THE DETECTOR TO THE EDGE OF ROADWAY. INSTALL EACH LOOP DETECTOR RUN IN A SEPARATE CONDUIT (SIZE AS REQUIRED) FROM THE EDGE OF ROADWAY TO A GROUND BOX AS SHOWN ON THE PLAN LAYOUT.

5. PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED OPERATION IS COMPLETED.

6. ONCE THE INTEGRITY AND/OR FUNCTION OF THE EXISTING TRAFFIC SIGNAL(S) IS ALTERED BY THE CONTRACTOR, MAINTAIN AND OPERATE THE EXISTING TRAFFIC SIGNAL(S) UNTIL THE TRAFFIC SIGNAL WORK IS ACCEPTED BY THE DEPARTMENT. DURING THE CONSTRUCTION OF THE PROPOSED TRAFFIC SIGNAL WORK, MAINTAIN THE EXISTING TRAFFIC SIGNAL(S) AND/OR TEMPORARY CONSTRUCTION TRAFFIC SIGNAL(S) IN CONFORMANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

7. DURING CONSTRUCTION OF THE PROPOSED SIGNAL WORK, IF THE EXISTING TRAFFIC SIGNAL EQUIPMENT REQUIRES REPLACEMENT DUE TO WEAR, DETERIORATION, OR ANY CIRCUMSTANCE OVER WHICH THE CONTRACTOR HAS NO CONTROL, THE EQUIPMENT WILL BE FURNISHED BY THE STATE OR CITY OF HOUSTON AT NO COST TO THE CONTRACTOR AND SHALL BE INSTALLED BY THE CONTRACTOR. NO EXTRA COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR THIS WORK.

8. MAINTAIN THE INTEGRITY AND FUNCTION OF EACH EXISTING SIGNALIZED INTERSECTION. ONCE THE INTEGRITY OR FUNCTION OF THE SIGNAL HAS BEEN ALTERED, PURSUE THE WORK AT THAT LOCATION WITHOUT DELAY OR INTERRUPTION TO RESTORE OPERATION TO ITS ORIGINAL OR FINAL OPERATIONAL DESIGN.

9. ONLY NEW CONDUIT AND CABLE SHALL BE INSTALLED.

10. CONDUIT INSTALLED UNDER EXISTING PAVED DRIVEWAYS, ROADWAYS OR SIDEWALKS, WHICH ARE NOT SCHEDULED TO BE RECONSTRUCTED AS PART OF THIS PROJECT, SHALL BE INSTALLED BY MEANS OF BORING. THE CONTRACTOR SHALL NOT CUT OPEN ANY STREET OR DRIVEWAY FOR CONDUIT INSTALLATION WITHOUT THE PRIOR APPROVAL OF THE ENGINEER AND/OR THE APPROVED CITY OF HOUSTON REPRESENTATIVE.

11. CONDUIT NOT PLACED UNDER PAVED DRIVEWAYS, ROADWAY PAVEMENT OR SIDEWALK MAY BE PLACED BY CUTTING A TRENCH, INSTALLING THE CONDUIT AND BACKFILLING. ANY TRENCHING FOR CONDUIT WIDER THAN THREE (3) INCHES SHALL BE RESODDED.

12. PULL BOXES SHALL NOT BE INSTALLED WITHIN CONCRETE CURB ACCESS RAMPS. IN ADDITION, ANY PULL BOXES INSTALLED BEHIND CURBS SHALL BE INSTALLED BETWEEN THE CURB AND THE PROPOSED/FUTURE SIDEWALK OR BEYOND THE PROPOSED/FUTURE SIDEWALK. AN EXCEPTION TO THIS NOTE WOULD BE PULL BOXES INSTALLED IN A MEDIAN. ANY PULL BOXES INSTALLED ALONG AN UNCURBED ROADWAY SHALL BE INSTALLED ADJACENT TO, BUT NOT WITHIN, THE SHOULDER.

13. ALL CONDUITS SHALL BE CLEANED BY COMPRESSED AIR AND A PROPERLY SIZED CONDUIT PISTON OR MANDREL SHALL BE PULLED THROUGH THE CONDUIT PRIOR TO CABLE INSTALLATION.

14. WHEN PULLING TRAFFIC SIGNAL SYSTEM CABLES THROUGH CONDUIT, THE CABLES SHALL BE LUBRICATED WITH A LUBRICANT NORMALLY USED FOR THIS PURPOSE. ANY ABRASION TO ANY CONDUCTOR INSULATION WHICH OCCURS WHILE PULLING CABLE FOR THE TRAFFIC SIGNAL SYSTEM WILL BE CAUSE FOR THE IMMEDIATE REJECTION OF THE CABLE. IF THIS OCCURS, THE CONTRACTOR SHALL REMOVE AND REPLACE THE ENTIRE CABLE RUN AT THEIR EXPENSE.

15. LEAVE 3 FT. MINIMUM, 4 FT. MAXIMUM LENGTH OF CONDUCTOR IN GROUND BOXES AND AT EACH POLE BASE.

16. NO LOOP DETECTOR SHALL BE CUT IN PARALLEL EXPANSION JOINT. LOOPS CUT ACROSS EXPANSION JOINTS SHALL HAVE A SLACK IN THE CABLE FOR EXPANSION.

17. DETECTION LOOP SAW CUTS SHALL BE FLUSHED WITH WATER UNDER PRESSURE AND THEN DRIED WITH AIR UNDER PRESSURE.

18. THERE SHALL BE NO SPLICING IN CONDUCTORS EXCEPT FOR THE NECESSARY SPLICE BETWEEN ROADWAY LOOP WIRE AND DETECTOR LEAD-IN CABLE IN THE PULL BOX ADJACENT TO THE DETECTOR. THESE SPLICES SHALL BE WATERPROOF AND SHALL BE MADE BY THE CONTRACTOR. DO NOT GROUND THE CABLE SHIELD AT THE PULL BOX.

19. THE LOCATION OF EACH NEW PULL BOX SHALL BE MARKED IN THE FIELD AS SHOWN ON THE PLANS. THE EXACT LOCATION SHALL BE APPROVED BY THE ENGINEER AND/OR THE APPROVED CITY OF HOUSTON REPRESENTATIVE PRIOR TO BEGINNING INSTALLATION OF THE FOUNDATION.

20. THE HIGH VOLTAGE CABLES SHOULD BE SEPARATED FROM THE LOW VOLTAGE CABLES AS MUCH AS POSSIBLE.

21. ALL VEHICLE ROADWAY DETECTION LOOP CABLES SHALL BE #14 AWG IMSA 51-5-1985 CABLE. LEAD-IN CABLES SHALL BE #14 AWG IMSA 50-2-1984 CABLE. NO SPLICES SHALL BE ALLOWED IN THE ROADWAY DETECTION LOOP CABLE EXCEPT AT THE PULL BOX ADJACENT TO THE LOOP. THE DETECTOR LEAD-IN CABLE SHALL NOT BE SPLICED.

22. ALL ELECTRICAL WORK DONE SHALL BE IN CONFORMANCE WITH CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE (NEC).

23. UNLESS OTHERWISE SHOWN ON THE PLANS, UNDERGROUND CONDUIT SHALL BE INSTALLED A MINIMUM OF 24 INCHES DEEP. INSTALLATION OF CONDUIT SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE (NEC). CONDUIT PLACED UNDER DRIVEWAYS AND/OR ROADWAYS SHALL BE PLACED A MINIMUM OF 24 INCHES BELOW PAVEMENT SURFACE.

24. THE CONTRACTOR SHALL PERMIT THE ELECTRICAL WORK TO BE INSPECTED BY THE STATE AND CITY FOR COMPLIANCE WITH THE PLANS AND SPECIFICATIONS.

25. FURNISH PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.

26. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACCORDANCE WITH THE LATEST TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

27. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN SIGNAL UNITS AND SIGNS AS SHOWN IN THE PLANS. INSTALL AT 3 FT. - 6 IN. TO 4 FT. - 0 IN. ABOVE THE SIDEWALK OR CONCRETE WALKWAY.

28. SEAL ENDS OF ALL CONDUITS WITH DUCT SEAL, EXPANDABLE FOAM, OR BY OTHER METHODS APPROVED BY THE ENGINEER. SEAL CONDUIT IMMEDIATELY AFTER COMPLETION OF CONDUCTOR INSTALLATION AND PULL TESTS. DO NOT USE DUCT TAPE AS A PERMANENT CONDUIT SEALANT. DO NOT USE SILICONE CAULK AS A CONDUIT SEALANT.

29. REMOVE THE EXISTING PAVEMENT MARKINGS AS DIRECTED. REMOVE THE PAVEMENT MARKINGS TO THE EXTENT THAT THEY ARE EITHER COMPLETELY REMOVED OR OBLITERATED TO THE SATISFACTION OF THE ENGINEER.

30. PLACE PAVEMENT MARKINGS AS SHOWN ON THE PLANS OR AS DIRECTED.

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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

09/23/2021

FM 1092
AT VARIOUS LOCATIONS
TRAFFIC SIGNAL
NOTES FOR PROPOSED LAYOUT

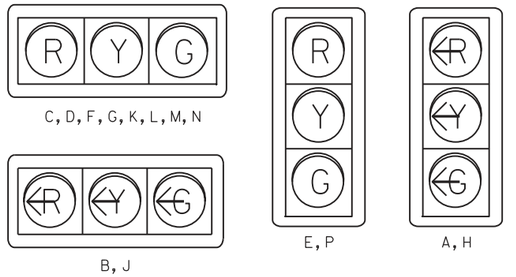
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		109

LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. LOOP DETECTOR

EXISTING TRAFFIC SIGNAL HEADS



CALLOUTS

- (A) EXIST. PEDESTAL POLE W/TRAFFIC SIGNAL HEAD, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON
- (B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND VIVDS CAMERA
- (C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON
- (D) EXIST. TRAFFIC SIGNAL POLE W/DUAL MAST ARMS, VIVDS CAMERAS, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON
- (E) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON
- (F) EXIST. PEDESTAL POLE W/TRAFFIC SIGNAL HEAD
- (G) EXIST. TRAFFIC SIGNAL CONTROLLER

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

-PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETED.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

09/23/2021

FM 1092 AT ROARK RD TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		110

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LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- PROP. LOOP DETECTOR (6'x 30')
- PROP. LOOP DETECTOR (6'x 6')
- PROP. CONDUIT (BORE)
- PROP. CONDUIT (TRENCH)
- PROP. GROUND BOX TY D

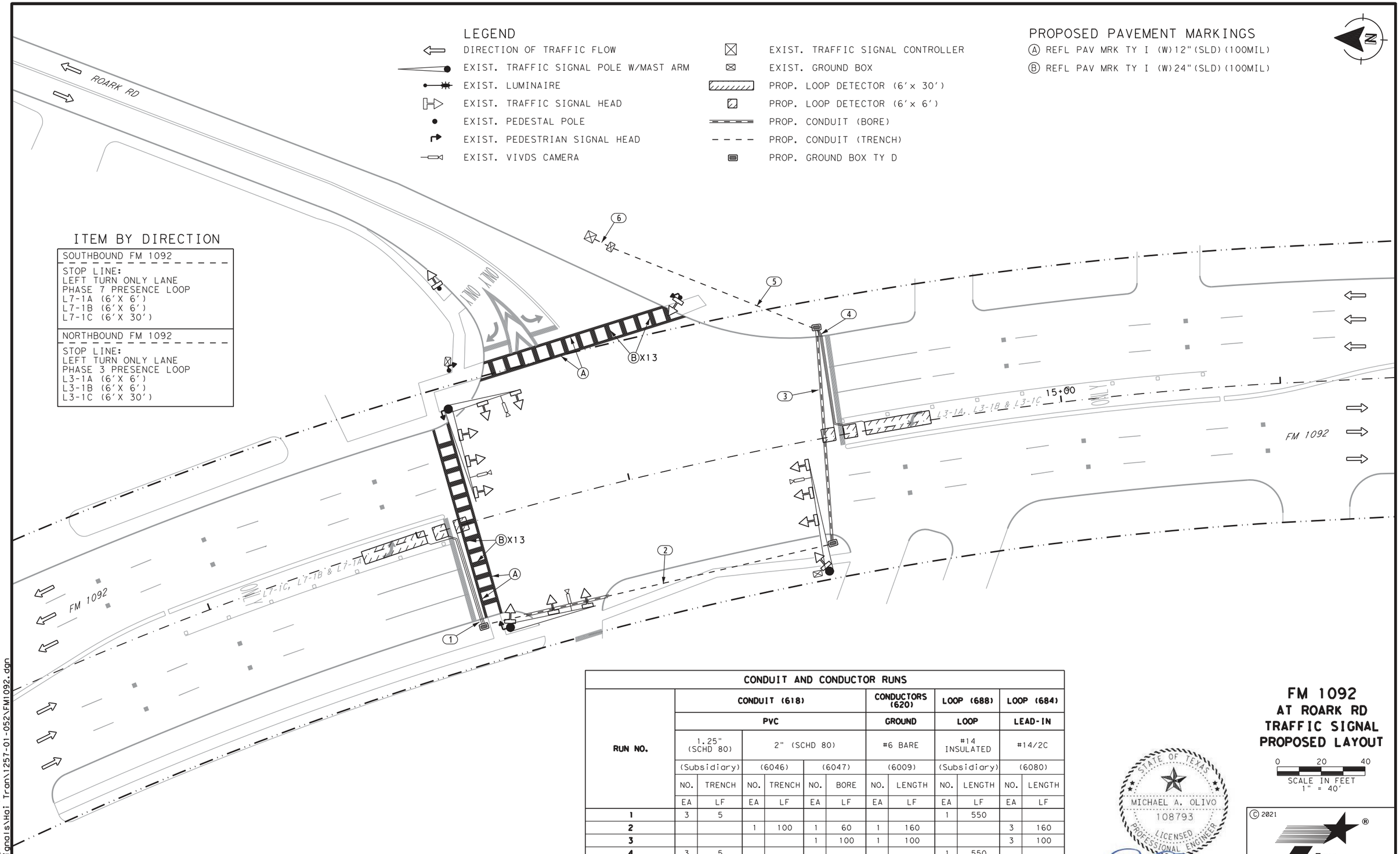
PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)

ITEM BY DIRECTION

SOUTHBOUND FM 1092
STOP LINE: LEFT TURN ONLY LANE PHASE 7 PRESENCE LOOP L7-1A (6'X 6') L7-1B (6'X 6') L7-1C (6'X 30')
NORTHBOUND FM 1092
STOP LINE: LEFT TURN ONLY LANE PHASE 3 PRESENCE LOOP L3-1A (6'X 6') L3-1B (6'X 6') L3-1C (6'X 30')



CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)						CONDUCTORS (620)		LOOP (688)		LOOP (684)	
	PVC						GROUND		LOOP		LEAD-IN	
	1.25" (SCHD 80)		2" (SCHD 80)				#6 BARE		#14 INSULATED		#14/2C	
	(Subsidiary)		(6046)		(6047)		(6009)		(Subsidiary)		(6080)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	3	5							1	550		
2			1	100	1	60	1	160			3	160
3					1	100	1	100			3	100
4	3	5							1	550		
5			1	100			1	100			6	100
6			1	15			1	15			6	15
TOTAL (LF)		30		215		160		375		1100		1470
EST. TOTAL		**35**		**230**		**170**		**395**		**1155**		**1545**

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT ROARK RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		111

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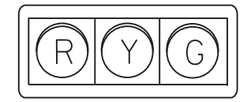
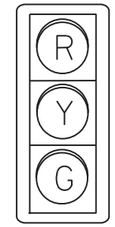
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

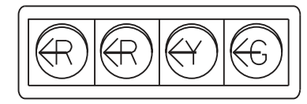
EXISTING TRAFFIC SIGNAL HEADS



B, C, F, G, H, K, L, M, P, Q, R



D



A, E, J, N

CALLOUTS

- (A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND PEDESTRIAN PUSH BUTTON
- (B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND PEDESTRIAN PUSH BUTTON
- (C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND PEDESTRIAN PUSH BUTTON
- (D) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND PEDESTRIAN PUSH BUTTON
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER
- (F) TO (J) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTON

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

-PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETED.

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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT W AIRPORT BLVD
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		112

LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

Ⓐ REFL PAV MRK TY I (W)12"(SLD)(100MIL)

Ⓑ REFL PAV MRK TY I (W)24"(SLD)(100MIL)

N

W AIRPORT BLVD

ONLY

FM 1092

PP

Ⓐ

ⒷX13

ⒷX14

40+00

ⒷX18

ⒷX16

MERGE

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FM 1092
AT W AIRPORT BLVD
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		113

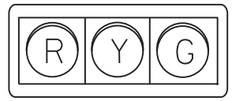
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. LOOP DETECTOR

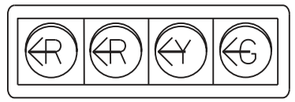
CALLOUTS

- (A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- (B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE
- (C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- (D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE, ELECTRICAL SERVICE METER AND SERVICE DISCONNECT
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER

EXISTING TRAFFIC SIGNAL HEADS



B, D, E, G, J, K



A, C, F, H

EXISTING PAVEMENT MARKINGS (TO BE REMOVED):

(A) ELIM EXT PAV MRK & MRKS (12")

(B) ELIM EXT PAV MRK & MRKS (24")

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

-PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETED.

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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT GREENBRIAR DR/ MULA RD
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		114

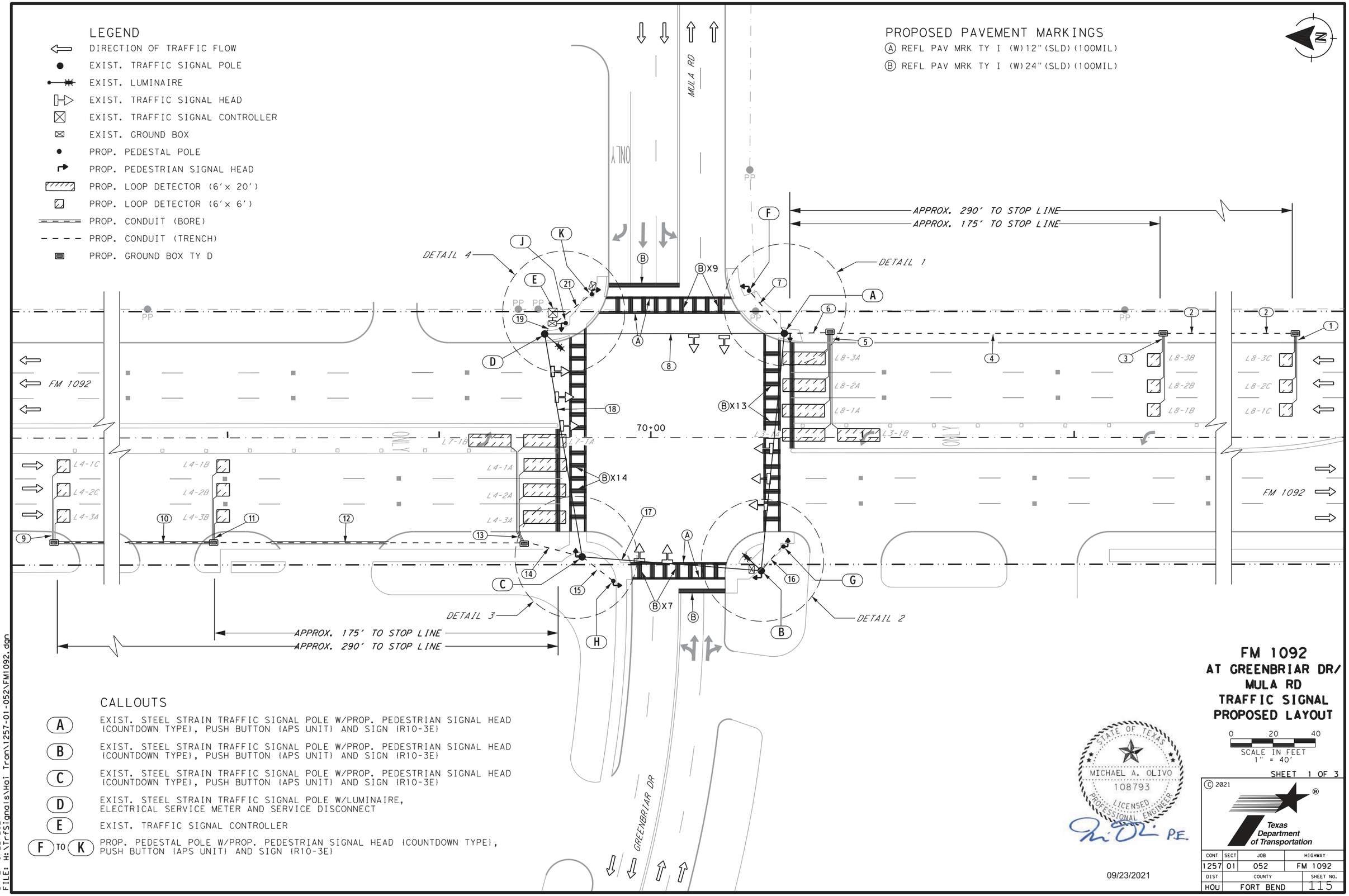
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. LOOP DETECTOR (6'x 20')
- PROP. LOOP DETECTOR (6'x 6')
- PROP. CONDUIT (BORE)
- PROP. CONDUIT (TRENCH)
- PROP. GROUND BOX TY D

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)



CALLOUTS

(A)	EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)
(B)	EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)
(C)	EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)
(D)	EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE, ELECTRICAL SERVICE METER AND SERVICE DISCONNECT
(E)	EXIST. TRAFFIC SIGNAL CONTROLLER
(F) TO (K)	PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

DATE: 9/22/2021 3:20:53 PM
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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT GREENBRIAR DR/ MULA RD
TRAFFIC SIGNAL PROPOSED LAYOUT

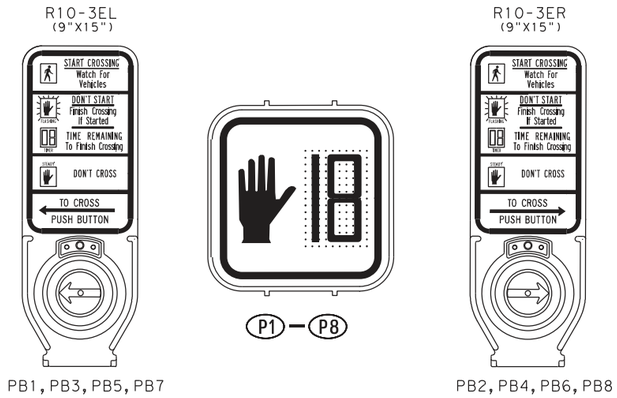
0 20 40
SCALE IN FEET
1" = 40'

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		115

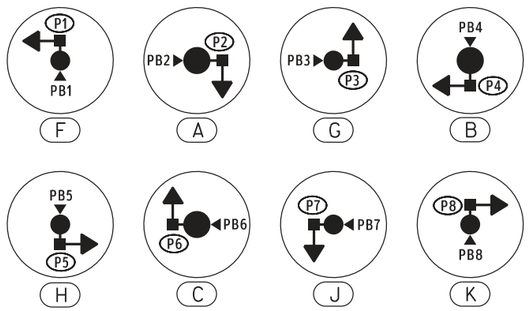
PROPOSED PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS (APS UNITS) WITH SIGNS



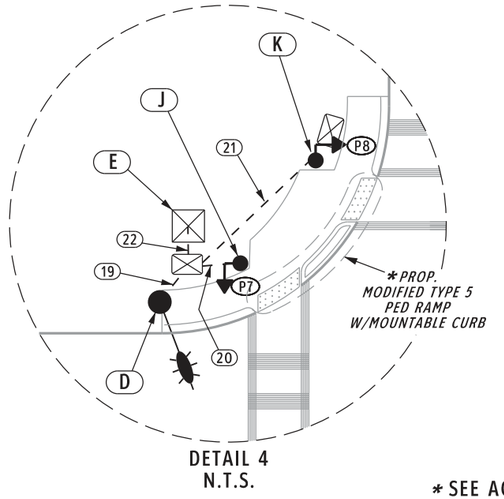
PB1, PB3, PB5, PB7

PB2, PB4, PB6, PB8

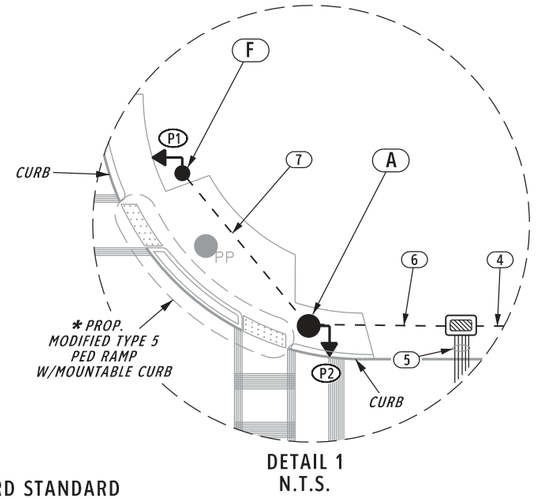
PROPOSED DIRECTION OF PEDESTRIAN SIGNAL HEADS AND LOCATION OF PUSH BUTTONS (APS UNITS)



- EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. PEDESTRIAN PUSH BUTTON (APS UNITS)

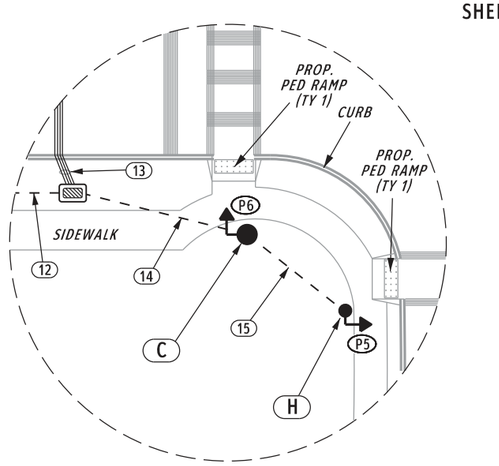


DETAIL 4
N.T.S.

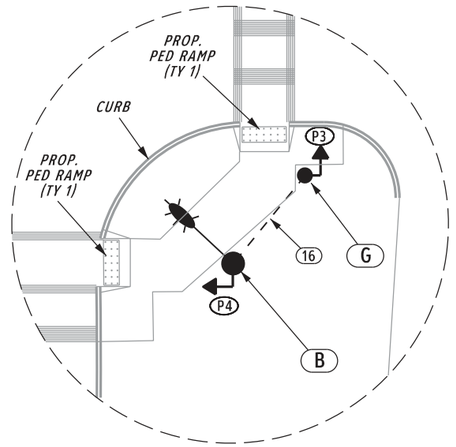


DETAIL 1
N.T.S.

* SEE ACCRD STANDARD SHEET FOR DETAILS



DETAIL 3
N.T.S.



DETAIL 2
N.T.S.

ITEM BY DIRECTION

NORTHBOUND FM 1092	SOUTHBOUND FM 1092
STOP LINE: LEFT TURN ONLY LANE PHASE 3 PRESENCE LOOP L3-1A (6'X 20') L3-1B (6'X 20')	STOP LINE: LEFT TURN ONLY LANE PHASE 7 PRESENCE LOOP L7-1A (6'X 20') L7-1B (6'X 20')
STOP LINE: THROUGH LANES PHASE 8 PRESENCE LOOP L8-1A (6'X 20') L8-2A (6'X 20') L8-3A (6'X 20')	STOP LINE: THROUGH LANES PHASE 4 PRESENCE LOOP L4-1A (6'X 20') L4-2A (6'X 20') L4-3A (6'X 20')
APPROX. 175' FROM STOP LINE: PHASE 8 ADVANCE LOOP L8-1B (6'X 6') L8-2B (6'X 6') L8-3B (6'X 6')	APPROX. 175' FROM STOP LINE: PHASE 4 ADVANCE LOOP L4-1B (6'X 6') L4-2B (6'X 6') L4-3B (6'X 6')
APPROX. 290' FROM STOP LINE: PHASE 8 ADVANCE LOOP L8-1C (6'X 6') L8-2C (6'X 6') L8-3C (6'X 6')	APPROX. 290' FROM STOP LINE: PHASE 4 ADVANCE LOOP L4-1C (6'X 6') L4-2C (6'X 6') L4-3C (6'X 6')

09/23/2021

FM 1092
AT GREENBRIAR DR/ MULA RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		116

DATE: 9/22/2021 3:20:59 PM
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CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)												CONDUCTORS (620)		CABLES (684)				LOOP (688)		LOOP (684)		SPAN WIRE (625)	
	PVC								RM				GROUND		PEDESTRIAN				LOOP		LEAD-IN		WIRE STRAND	
	1.25" (SCHD 80)		2" (SCHD 80)				3" (SCHD 80)		2"		3"		#6 BARE		#12/2C		#12/4C		#14 INSULATED		#14/2C		5/16" GUY	
	(Subsidiary)		(6046)		(6047)		(6053)		(6070)		(6074)		(6009)		(6007)		(6009)		(Subsidiary)		(6080)		(6004)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	3	5																	1	285				
2			1	100	1	20							1	120							1	120		
3	3	5																	1	285				
4			1	175									1	175							2	175		
5	5	5																	1	860				
6			1	20									1	20							6	20		
7					1	30							1	30	1	30	1	30						
8															2	120	2	120			6	120	1	120
9	3	5																	1	285				
10			1	40	1	80							1	120							1	120		
11	3	5																	1	285				
12			1	115	1	60							1	175							2	175		
13	5	5																	1	860				
14			1	25									1	25							6	25		
15			1	20									1	20	1	20	1	20						
16			1	20									1	20	1	20	1	20						
17															2	90	2	90					1	90
18															4	120	4	120			6	120	1	120
19							1	10					1	10	6	10	6	10			12	10		
20			1	5									1	5	1	5	1	5						
21			1	20									1	20	1	20	1	20						
22							1	10					1	10	8	10	8	10			12	10		
SIGNAL POLE A									1	20			1	20	2	20	2	20			6	20		
SIGNAL POLE B									1	20			1	20	2	20	2	20						
SIGNAL POLE C									1	20			1	20	2	20	2	20			6	20		
SIGNAL POLE D											1	20	1	20	6	20	6	20			12	20		
PED POLE F															1	10	1	15						
PED POLE G															1	10	1	15						
PED POLE H															1	10	1	15						
PED POLE J															1	10	1	15						
PED POLE K															1	10	1	15						
TOTAL (LF)		110		540		190		20		60		20		830		1425		1450		2860		3370		330
EST. TOTAL		**120**		**570**		**200**		**25**		**65**		**25**		**875**		**1500**		**1525**		**3005**		**3540**		**350**

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FM 1092
AT GREENBRIAR DR/
MULA RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		117

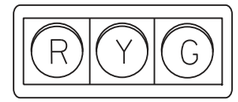
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. LOOP DETECTOR

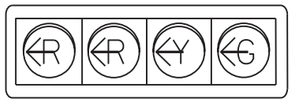
CALLOUTS

- (A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- (B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE
- (C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- (D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE, ELECTRICAL SERVICE METER AND SERVICE DISCONNECT
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER

EXISTING TRAFFIC SIGNAL HEADS



B, C, E, F, H, J, L, M



A, D, G, K

EXISTING PAVEMENT MARKINGS (TO BE REMOVED):

- (A) ELIM EXT PAV MRK & MRKS (12")
- (B) ELIM EXT PAV MRK & MRKS (24")

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

-PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETED.

DATE: 9/22/2021 3:21:20 PM
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09/23/2021

FM 1092 AT CASH RD TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		118

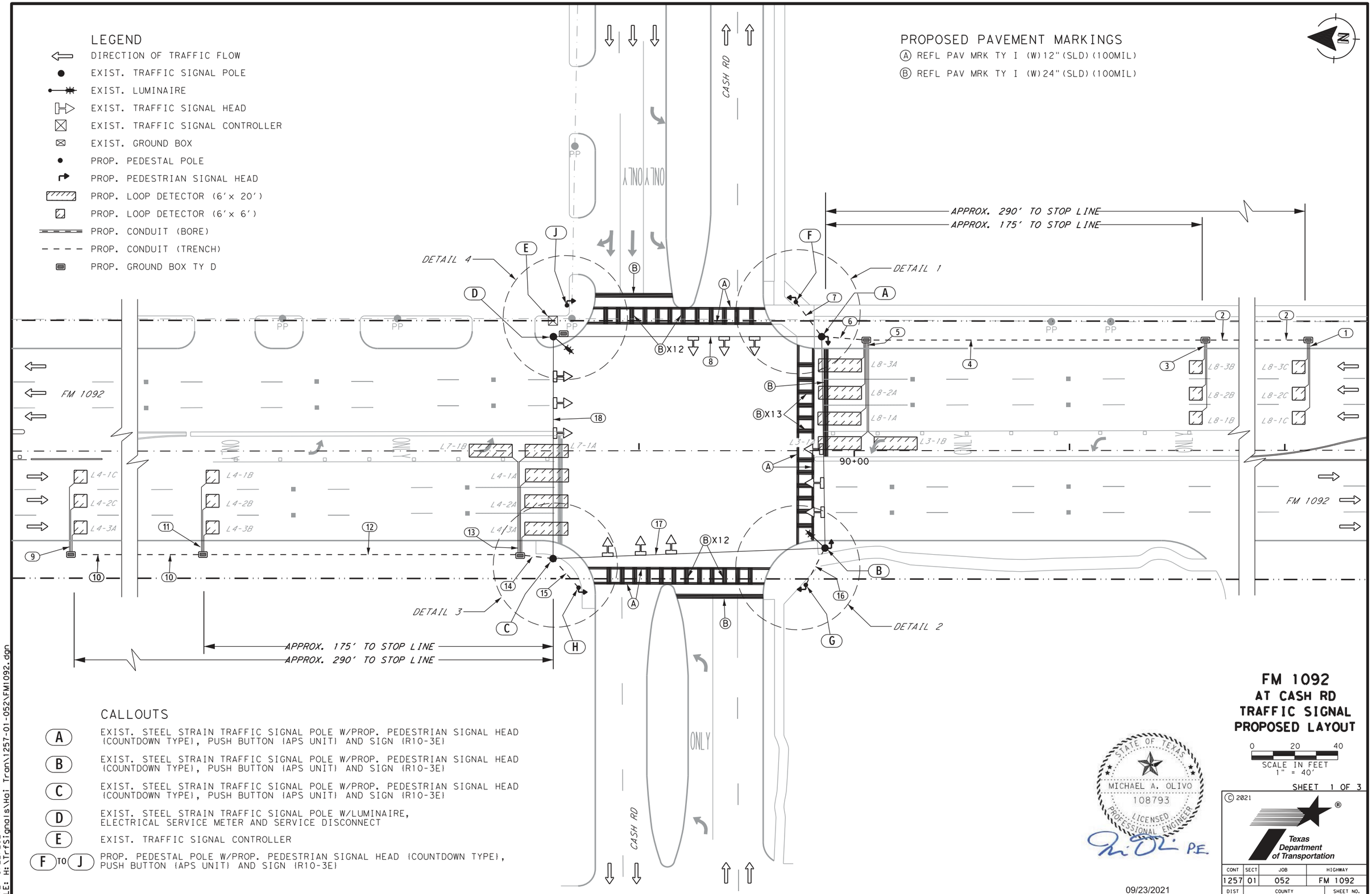
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. LOOP DETECTOR (6'× 20')
- PROP. LOOP DETECTOR (6'× 6')
- PROP. CONDUIT (BORE)
- PROP. CONDUIT (TRENCH)
- PROP. GROUND BOX TY D

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)



CALLOUTS

- (A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)
- (B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)
- (C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)
- (D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE, ELECTRICAL SERVICE METER AND SERVICE DISCONNECT
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER
- (F) TO (J) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092 AT CASH RD TRAFFIC SIGNAL PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

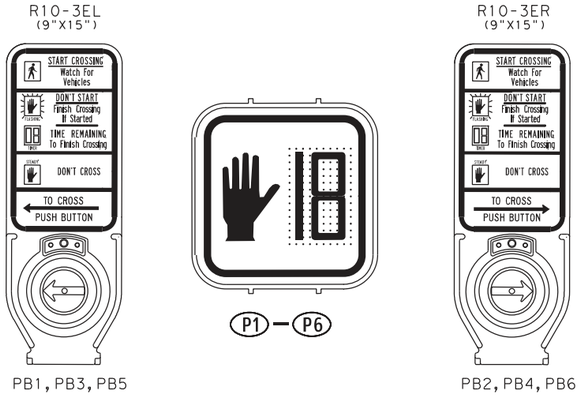
SHEET 1 OF 3

Texas Department of Transportation

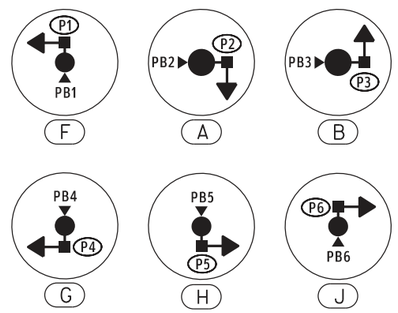
CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		119

DATE: 9/22/2021 3:21:26 PM
FILE: H:\TrfSignals\Hoi Tran\1257-01-052\FM1092.dgn

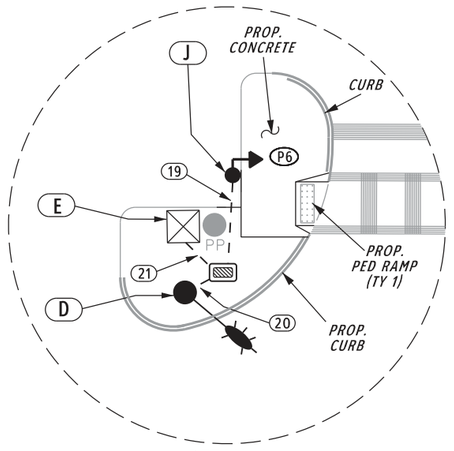
PROPOSED PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS (APS UNITS) WITH SIGNS



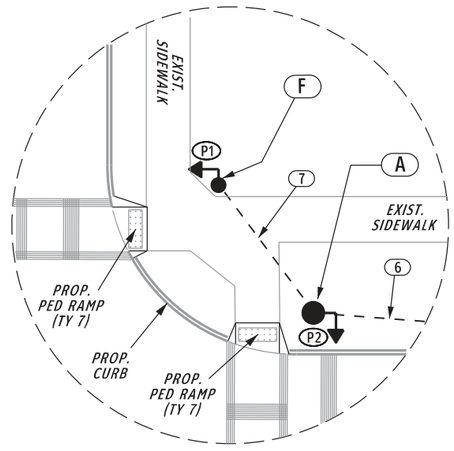
PROPOSED DIRECTION OF PEDESTRIAN SIGNAL HEADS AND LOCATION OF PUSH BUTTONS (APS UNITS)



- EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. PEDESTRIAN PUSH BUTTON (APS UNITS)



DETAIL 4
N.T.S.



DETAIL 1
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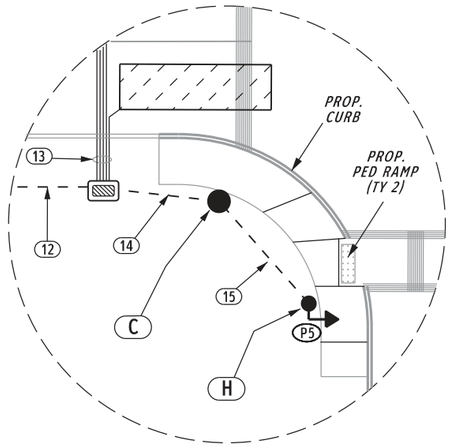
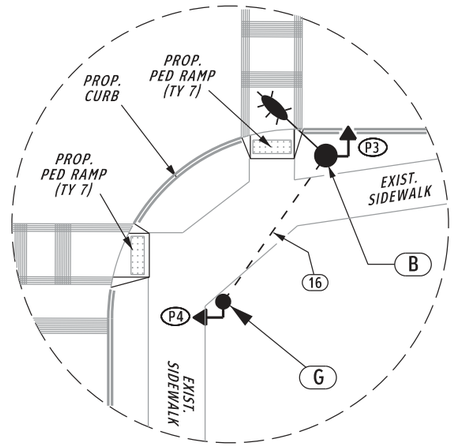


DETAIL 3
N.T.S.



DETAIL 2
N.T.S.

ITEM BY DIRECTION

NORTHBOUND FM 1092	SOUTHBOUND FM 1092
STOP LINE: LEFT TURN ONLY LANE PHASE 3 PRESENCE LOOP L3-1A (6'X 20') L3-1B (6'X 20')	STOP LINE: LEFT TURN ONLY LANE PHASE 7 PRESENCE LOOP L7-1A (6'X 20') L7-1B (6'X 20')
STOP LINE: THROUGH LANES PHASE 8 PRESENCE LOOP L8-1A (6'X 20') L8-2A (6'X 20') L8-3A (6'X 20')	STOP LINE: THROUGH LANES PHASE 4 PRESENCE LOOP L4-1A (6'X 20') L4-2A (6'X 20') L4-3A (6'X 20')
APPROX. 175' FROM STOP LINE: PHASE 8 ADVANCE LOOP L8-1B (6'X 6') L8-2B (6'X 6') L8-3B (6'X 6')	APPROX. 175' FROM STOP LINE: PHASE 4 ADVANCE LOOP L4-1B (6'X 6') L4-2B (6'X 6') L4-3B (6'X 6')
APPROX. 290' FROM STOP LINE: PHASE 8 ADVANCE LOOP L8-1C (6'X 6') L8-2C (6'X 6') L8-3C (6'X 6')	APPROX. 290' FROM STOP LINE: PHASE 4 ADVANCE LOOP L4-1C (6'X 6') L4-2C (6'X 6') L4-3C (6'X 6')

09/23/2021

FM 1092
AT CASH RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		120

DATE: 9/22/2021 3:21:33 PM
FILE: H:\Trfsignals\Hou Tran\1257-01-052\FM1092.dgn

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)												CONDUCTORS (620)		CABLES (684)				LOOP (688)		LOOP (684)		SPAN WIRE (625)	
	PVC								RM				GROUND		PEDESTRIAN				LOOP		LEAD-IN		WIRE STRAND	
	1.25" (SCHD 80)		2" (SCHD 80)				3" (SCHD 80)		2"		3"		#6 BARE		#12/2C		#12/4C		#14 INSULATED		#14/2C		5/16" GUY	
	(Subsidiary)		(6046)		(6047)		(6053)		(6070)		(6074)		(6009)		(6007)		(6009)		(Subsidiary)		(6080)		(6004)	
	NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	TRENCH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	3	5																	1	285				
2			1	115									1	115							1	115		
3	3	5																	1	285				
4			1	175									1	175							2	175		
5	5	5																	1	860				
6			1	25									1	25							6	25		
7			1	25									1	25	1	25	1	25						
8															2	130	2	130			6	130	1	130
9	3	5																	1	285				
10			1	65	1	50							1	115							1	115		
11	3	5																	1	285				
12			1	175									1	175							2	175		
13	5	5																	1	860				
14			1	25									1	25							6	25		
15			1	25									1	25	1	25	1	25						
16			1	25									1	25	1	25	1	25						
17															2	130	2	130					1	130
18															3	100	3	100			6	100	1	100
19			1	20									1	20	1	20	1	20						
20							1	10					1	10	5	10	5	10			12	10		
21							1	15					1	15	6	15	6	15			12	15		
SIGNAL POLE A									1	20			1	20	2	20	2	20			6	20		
SIGNAL POLE B									1	20			1	20	2	20	2	20						
SIGNAL POLE C									1	20			1	20	1	20	1	20			6	20		
SIGNAL POLE D											1	20	1	20	5	20	5	20			12	20		
PED POLE F															1	10	1	15						
PED POLE G															1	10	1	15						
PED POLE H															1	10	1	15						
PED POLE J															1	10	1	15						
TOTAL (LF)		110		675		50		25		60		20		830		1295		1315		2860		3390		360
EST. TOTAL		**120**		**710**		**55**		**30**		**65**		**25**		**875**		**1360**		**1385**		**3005**		**3560**		**380**

DATE: 9/22/2021 3:21:40 PM
FILE: H:\Trf\Signals\Hai Tran\1257-01-052\FM1092.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT CASH RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 3 OF 3

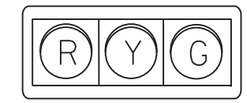
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		121

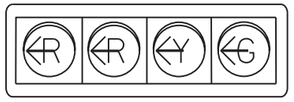
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. LOOP DETECTOR

EXISTING TRAFFIC SIGNAL HEADS



B, C, E, F, H, J, L, M



A, D, G, K

CALLOUTS

(A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON

(B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON

(C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD (2 EA.) AND PUSH BUTTON (2 EA.)

(D) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD (2 EA.) AND PUSH BUTTON (2 EA.)

(E) EXIST. TRAFFIC SIGNAL CONTROLLER

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

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DATE: 9/22/2021 3:21:53 PM
FILE: H:\Traffic Signals\Hal Tran\1257-01-052\FM1092.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092 AT AVENUE E TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		122

LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)

N

AVENUE E

FM 1092

ONLY

(B)X4

(B)X7

(B)X11

(B)X14

(A)

140+00

PP

AVENUE E

FM 1092

DATE: 9/22/2021 3:36:54 PM
FILE: H:\TrfSignals\Hou Tran\1257-01-052\FM1092.dgn

FM 1092
AT AVENUE E
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

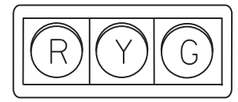
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		123

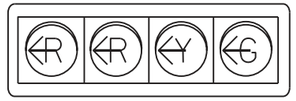
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- EXIST. LOOP DETECTOR

EXISTING TRAFFIC SIGNAL HEADS



A, B, D, E, F, G



C

CALLOUTS

- (A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE
- (B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERAS
- (C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/ELECTRICAL SERVICE METER AND SERVICE DISCONNECT
- (D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER

NOTES

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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT DOVE COUNTRY DR
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		124

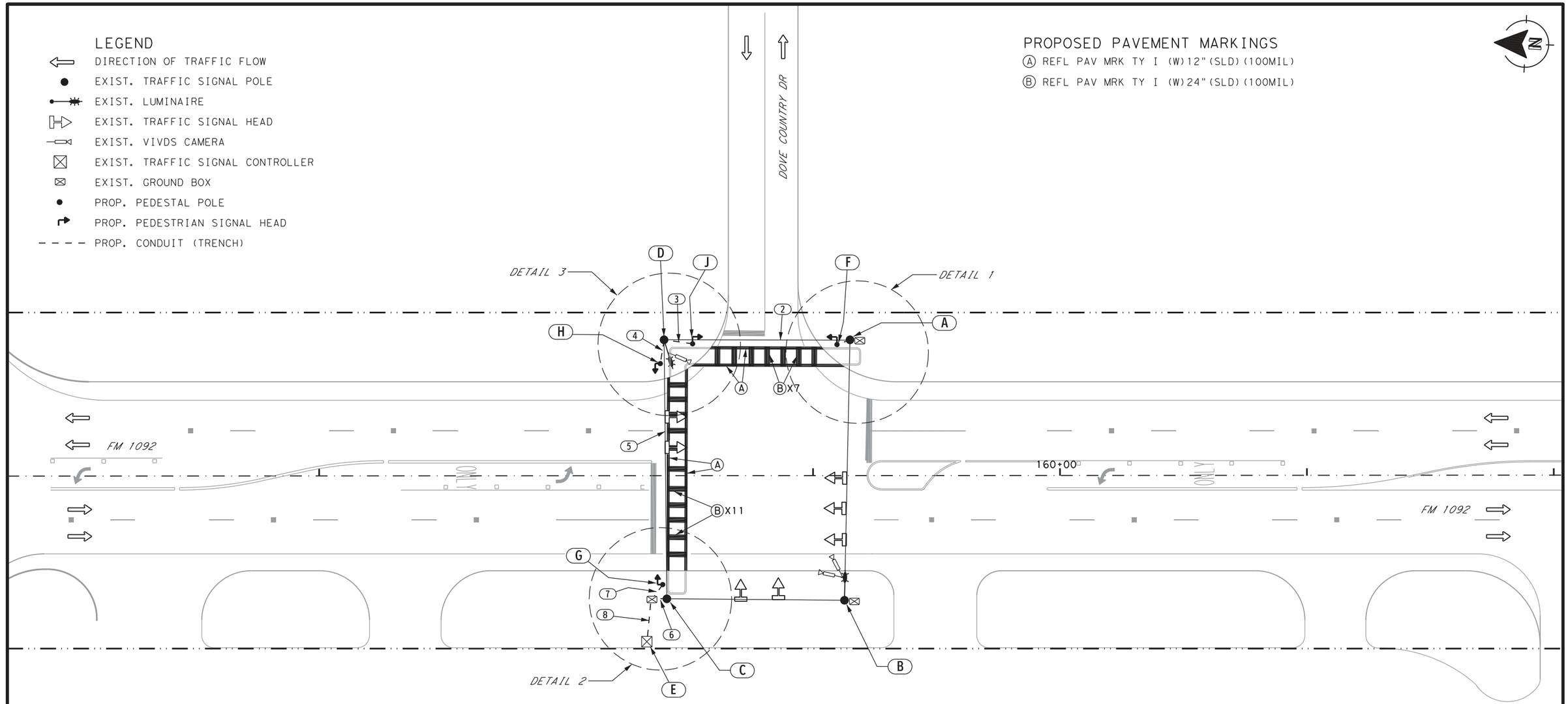
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. CONDUIT (TRENCH)

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)



CALLOUTS

(A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE

(B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERAS

(C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/ELECTRICAL SERVICE METER AND SERVICE DISCONNECT

(D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA

(E) EXIST. TRAFFIC SIGNAL CONTROLLER

(F) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

(G) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

(H) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

(J) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

DATE: 9/22/2021 3:22:16 PM
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STATE OF TEXAS
MICHAEL A. OLIVO
108793
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PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT DOVE COUNTRY DR
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		125

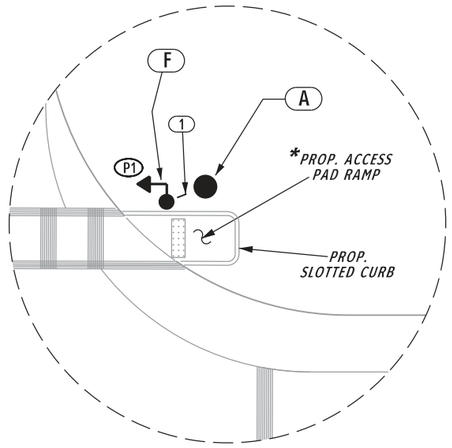
PROPOSED PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS (APS UNITS) WITH SIGNS:

R10-3EL (9"X15")

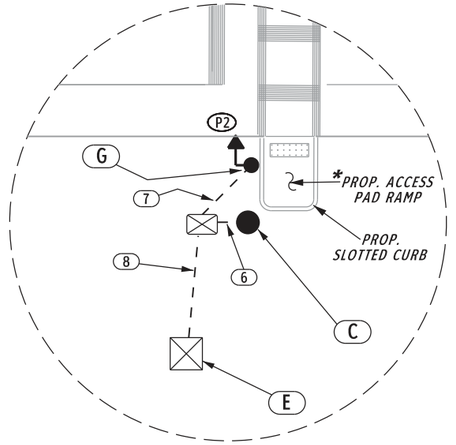
PB1, PB3

R10-3ER (9"X15")

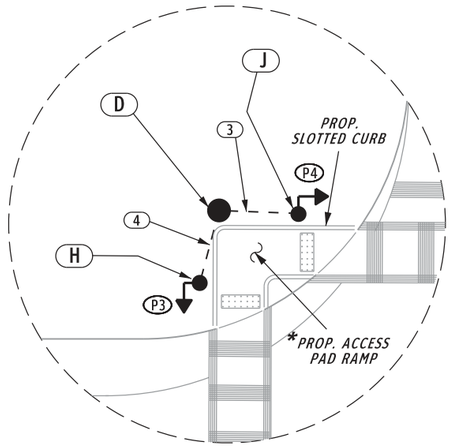
PB2, PB4



DETAIL 1
N.T.S.



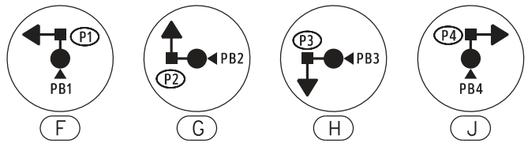
DETAIL 2
N.T.S.



DETAIL 3
N.T.S.

* SEE ACCRD STANDARD SHEET FOR ACCESS PAD RAMP DETAILS

PROPOSED DIRECTION OF PEDESTRIAN SIGNAL HEADS AND LOCATION OF PUSH BUTTONS (APS UNITS):



● PROP. PEDESTAL POLE

PROP. PEDESTRIAN SIGNAL HEAD

◀ PROP. PEDESTRIAN PUSH BUTTON (APS UNITS)

CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)						CONDUCTORS (620)		CABLES (684)				SPAN WIRE (625)	
	PVC				RM		GROUND		PEDESTRIAN				WIRE STRAND	
	2" (SCHD (6046)		3" (SCHD (6053)		2" (6070)		#6 BARE (6009)		#12/2C (6007)		#12/4C (6009)		5/16" GUY (6004)	
	NO. EA	TRENCH LF	NO. EA	TRENCH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF
1	1	10					1	10	1	10	1	10		
2									1	80	1	80	1	80
3	1	15					1	15	1	15	1	15		
4	1	15					1	15	1	15	1	15		
5									3	110	3	110	1	110
6	1	10					1	10	3	10	3	10		
7	1	10					1	10	1	10	1	10		
8			1	20			1	20	4	20	4	20		
SIGNAL POLE A					1	20	1	20	1	20	1	20		
SIGNAL POLE C					1	20	1	20	3	20	3	20		
SIGNAL POLE D					1	20	1	20	2	20	2	20		
PED POLE F									1	10	1	15		
PED POLE G									1	10	1	15		
PED POLE H									1	10	1	15		
PED POLE J									1	10	1	15		
TOTAL (LF)		60		20		60		140		730		750		190
EST. TOTAL		**65**		**25**		**65**		**150**		**770**		**790**		**200**

STATE OF TEXAS
MICHAEL A. OLIVO
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LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT DOVE COUNTRY DR
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

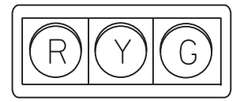
CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		126

DATE: 9/22/2021 3:22:23 PM
FILE: H:\Traffic Signals\Hot Tran\1257-01-052\FM1092.dgn

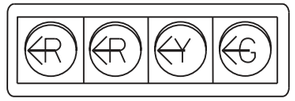
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

EXISTING TRAFFIC SIGNAL HEADS



B, C, E, F, H, J, L, M



A, D, G, K

CALLOUTS

- (A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND VIVDS CAMERA
- (B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND VIVDS CAMERA
- (D) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER
- (F) TO (J) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTON (2 EA.)

NOTES

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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT INDEPENDENCE BLVD/ LEXINGTON BLVD TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		127

LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)

N

INDEPENDENCE BLVD

ONLY

FM 1092

185+00

(B)X14

(A)

(B)X15

LEXINGTON BLVD

DATE: 9/22/2021 3:22:38 PM
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FM 1092
AT INDEPENDENCE BLVD/ LEXINGTON BLVD TRAFFIC SIGNAL PROPSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

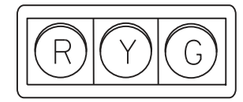
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		128

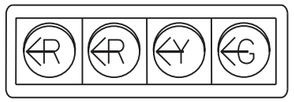
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

EXISTING TRAFFIC SIGNAL HEADS



A, B, D, E, F, G, H, J



C

CALLOUTS

(A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINARIE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTONS (2 EA.)

(B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON

(C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA

(D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON

(E) EXIST. TRAFFIC SIGNAL CONTROLLER

NOTES

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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT 5TH STREET
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		129

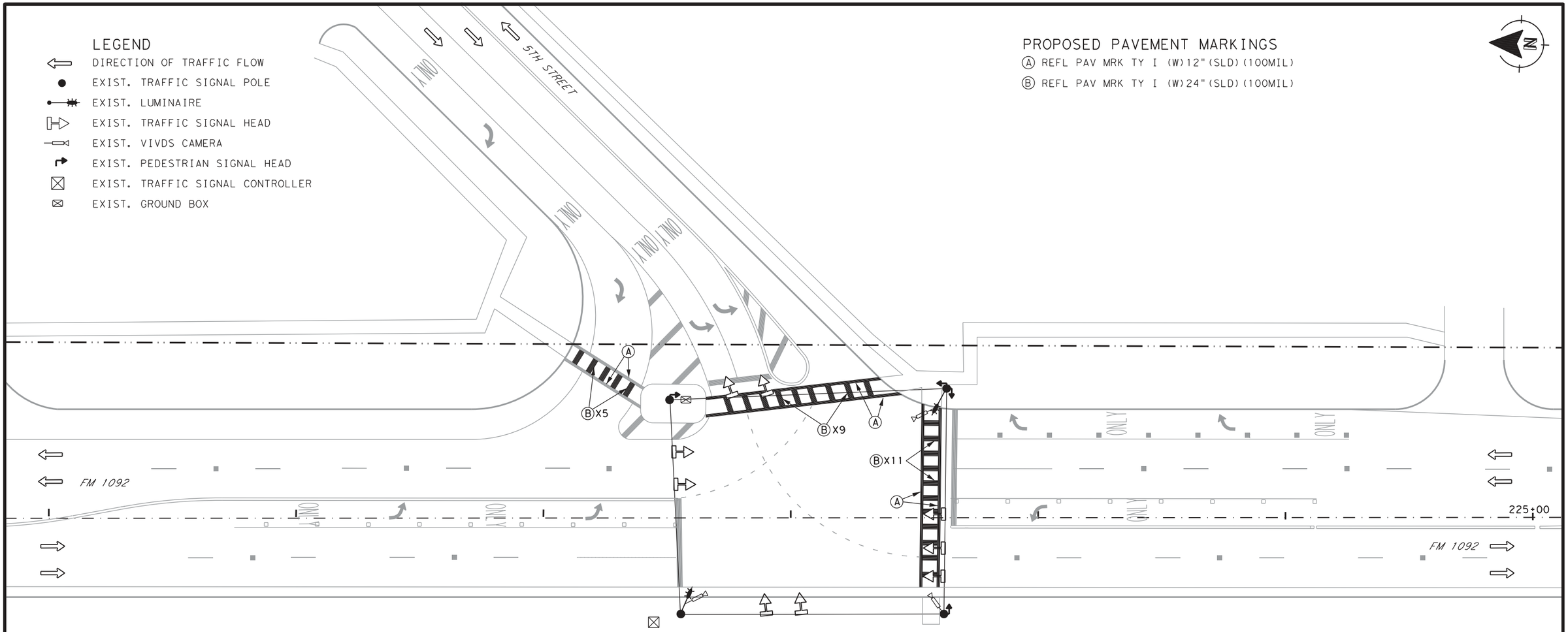
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)



DATE: 9/22/2021 3:22:51 PM
FILE: H:\TrfSignals\Hai Tran\1257-01-052\FM1092.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

09/23/2021

FM 1092
AT 5TH STREET
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

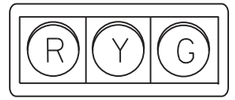
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		130

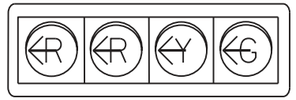
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

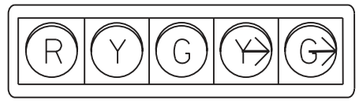
EXISTING TRAFFIC SIGNAL HEADS



B, C, E, F, H, L, M



A, D, G, K



J, N

CALLOUTS

- (A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND VIVDS CAMERA
- (B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND VIVDS CAMERA
- (D) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER
- (F)-(J) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTON (2 EA.)

NOTES

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-PROVIDE CONTINUED OPERATION OF THE EXISTING SIGNAL(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETED.

DATE: 9/22/2021 3:23:03 PM
FILE: H:\Traffic Signals\Hou Tran\1257-01-052\FM1092.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT CARTWRIGHT RD
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		131

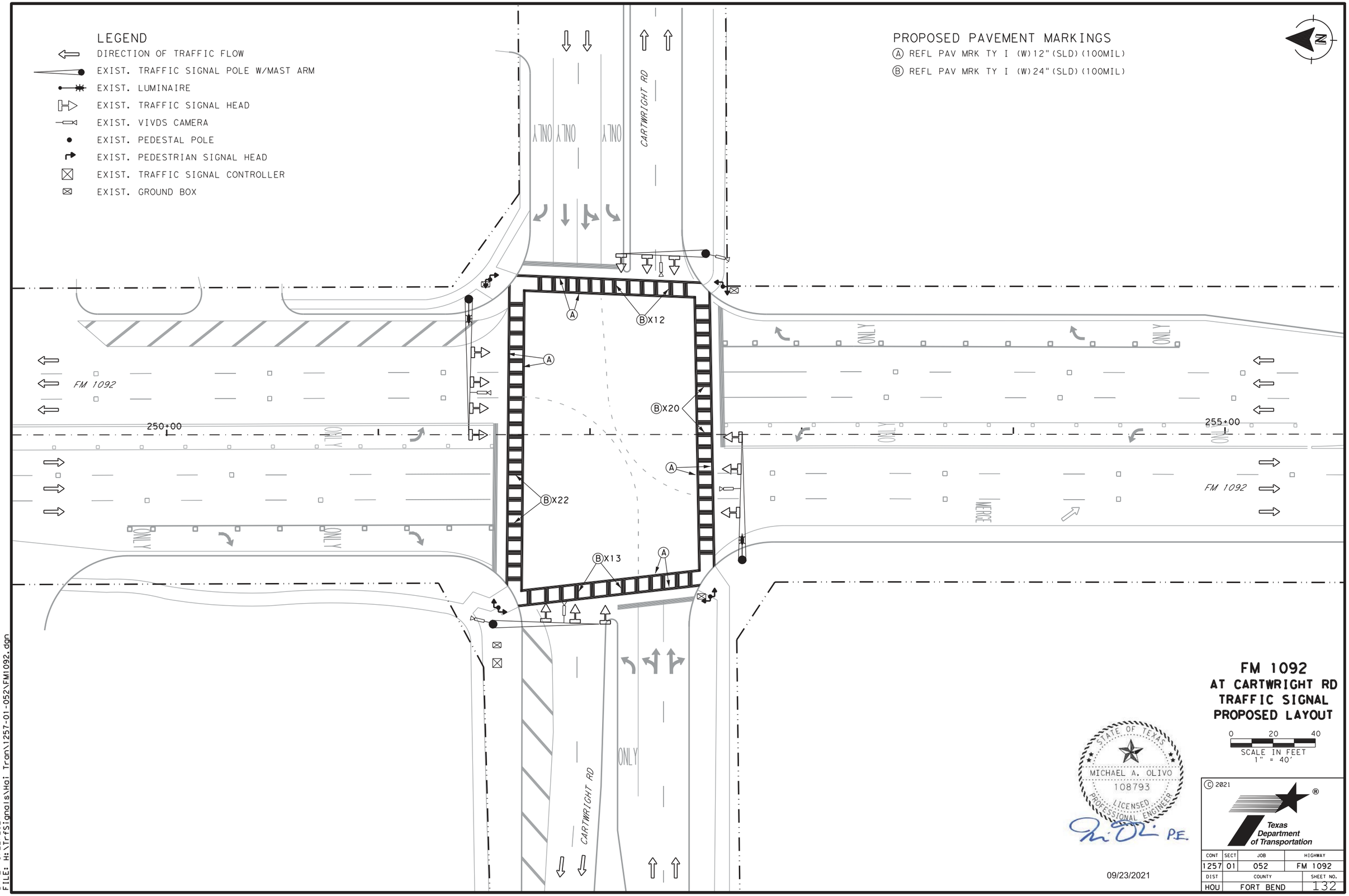
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

Ⓐ REFL PAV MRK TY I (W)12"(SLD)(100MIL)

Ⓑ REFL PAV MRK TY I (W)24"(SLD)(100MIL)



DATE: 9/22/2021 3:23:24 PM
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FM 1092
AT CARTWRIGHT RD
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

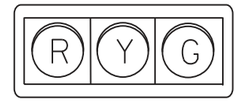
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		132

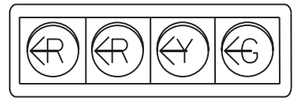
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

EXISTING TRAFFIC SIGNAL HEADS



A, B, D, E, F, G, J, K



C, H

CALLOUTS

(A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINARIE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTONS (2 EA.)

(B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERAS, PEDESTRIAN SIGNAL HEAD (2 EA.) AND PUSH BUTTON (2 EA.)

(C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINARIE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTONS (2 EA.)

(D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERAS, PEDESTRIAN SIGNAL HEAD (2 EA.) AND PUSH BUTTON (2 EA.)

(E) EXIST. TRAFFIC SIGNAL CONTROLLER

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

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DATE: 9/22/2021 3:23:34 PM
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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT EL DORADO BLVD/ PLANTATION RIDGE DR TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		133

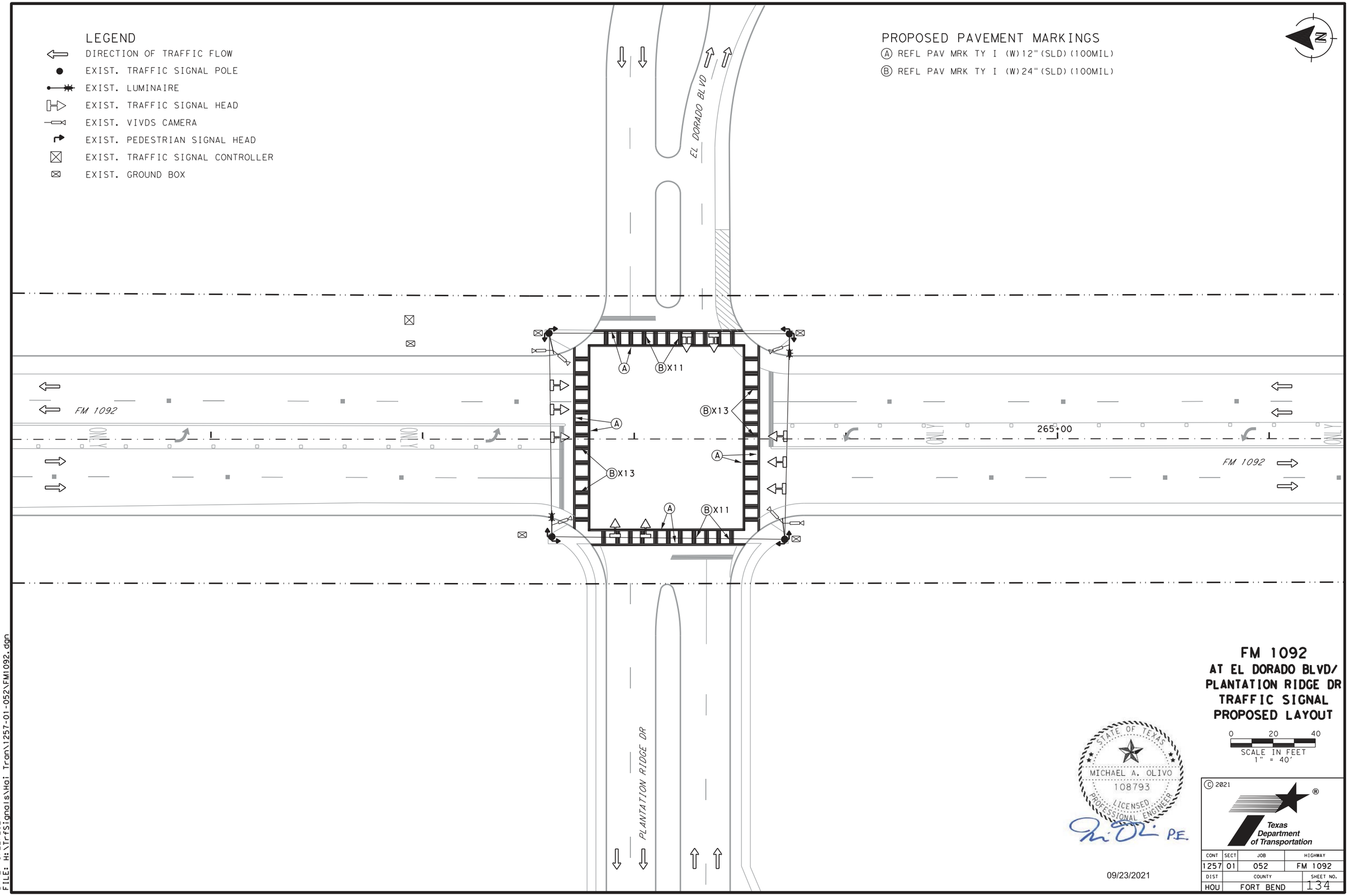
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)



DATE: 9/22/2021 3:23:42 PM
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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT EL DORADO BLVD/ PLANTATION RIDGE DR TRAFFIC SIGNAL PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

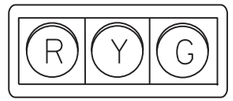
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		134

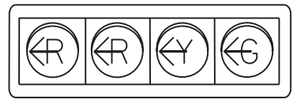
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

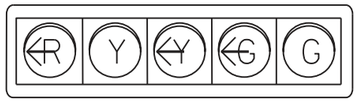
EXISTING TRAFFIC SIGNAL HEADS



A, B, D, E, G, J, K



C, H



F

CALLOUTS

- (A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON
- (B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD AND PUSH BUTTON
- (C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD (2 EA.) AND PUSH BUTTON (2 EA.)
- (D) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, VIVDS CAMERA, PEDESTRIAN SIGNAL HEAD (2 EA.) AND PUSH BUTTON (2 EA.)
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

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DATE: 9/22/2021 3:23:50 PM
FILE: H:\TrfSignals\Hal Tran\1257-01-052\FM1092.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092 AT PLANTATION SETTLEMENT LN TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		135

LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

Ⓐ REFL PAV MRK TY I (W)12"(SLD)(100MIL)

Ⓑ REFL PAV MRK TY I (W)24"(SLD)(100MIL)

N

PLANTATION SETTLEMENT LN

ONLY

FM 1092

280+00

Ⓐ Ⓑ X10

Ⓑ X13

Ⓐ

Ⓐ Ⓑ X11

PLANTATION SETTLEMENT LN

ONLY

FM 1092

FM 1092 AT PLANTATION SETTLEMENT LN TRAFFIC SIGNAL PROPOSED LAYOUT

0 20 40

SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER

P.E.

09/23/2021

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		136

DATE: 9/22/2021 3:24:03 PM
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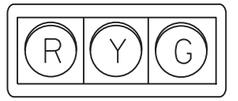
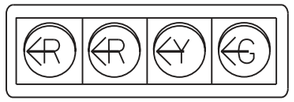
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

EXISTING TRAFFIC SIGNAL HEADS



A, B, D, E, F, G, J, K



C, H

CALLOUTS

- (A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (B) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (C) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (D) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM, LUMINAIRE AND VIVDS CAMERA
- (E) EXIST. TRAFFIC SIGNAL CONTROLLER
- (F)-(J) EXIST. PEDESTAL POLE W/PEDESTRIAN SIGNAL HEADS (2 EA.) AND PUSH BUTTON (2 EA.)

NOTES

-UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.

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DATE: 9/22/2021 3:24:15 PM
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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT TOWNSHIP LN
TRAFFIC SIGNAL
EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		137

LEGEND

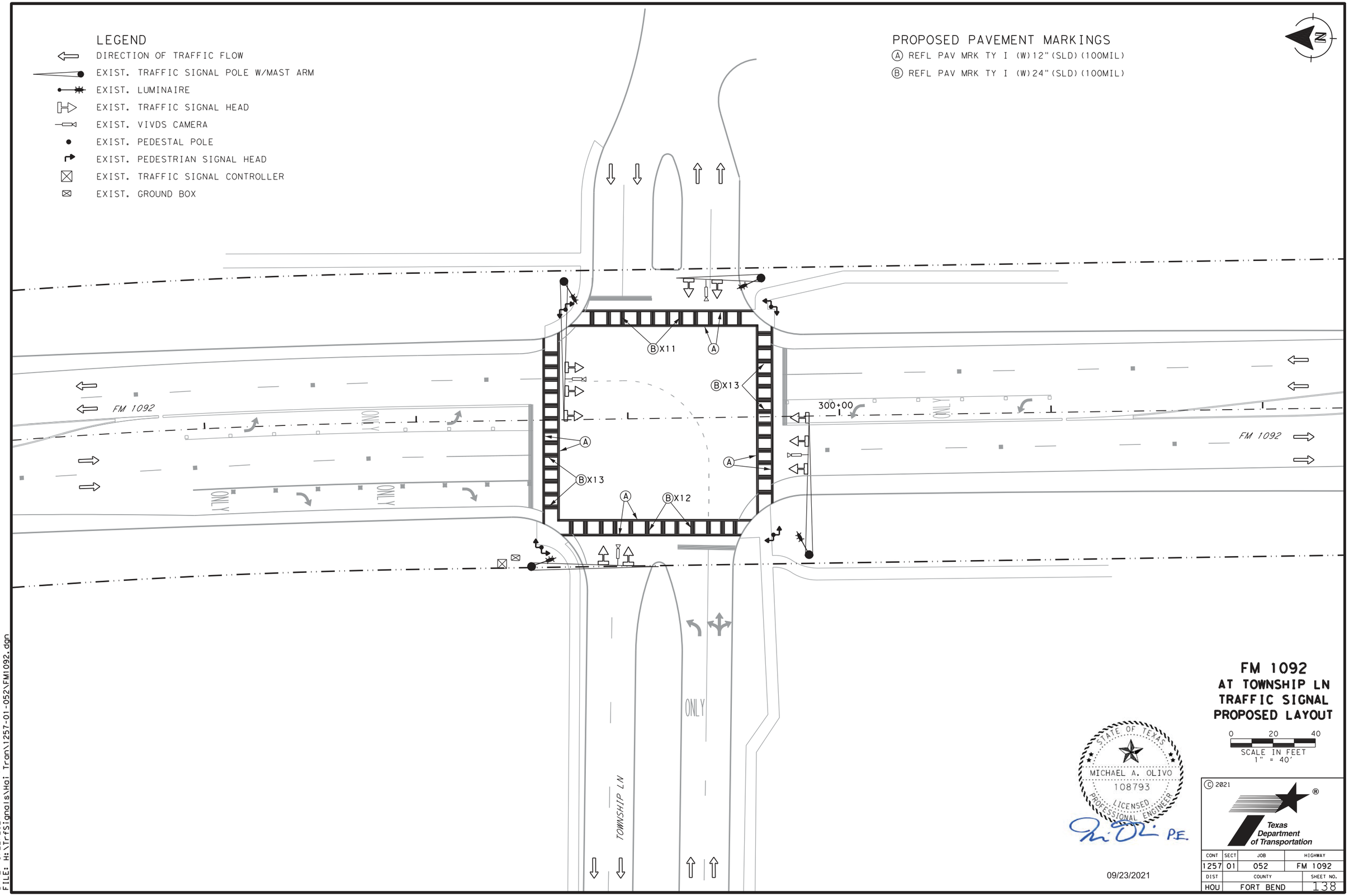
- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTAL POLE
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)

N



DATE: 9/22/2021 3:24:23 PM
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FM 1092
AT TOWNSHIP LN
TRAFFIC SIGNAL
PROPOSED LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

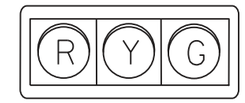
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		138

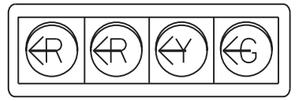
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX

EXISTING TRAFFIC SIGNAL HEADS



A, B, D, E, F, G, J, K



C, H

CALLOUTS

(A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERAS

(B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA

(C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERAS

(D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA

(E) EXIST. TRAFFIC SIGNAL CONTROLLER

EXISTING PAVEMENT MARKINGS (TO BE REMOVED)

(A) ELIM EXT PAV MRK & MRKS (12")

(B) ELIM EXT PAV MRK & MRKS (24")

NOTES

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DATE: 9/22/2021 3:24:41 PM
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STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092 AT HAMPTON DR TRAFFIC SIGNAL EXISTING LAYOUT

0 20 40
SCALE IN FEET
1" = 40'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		139

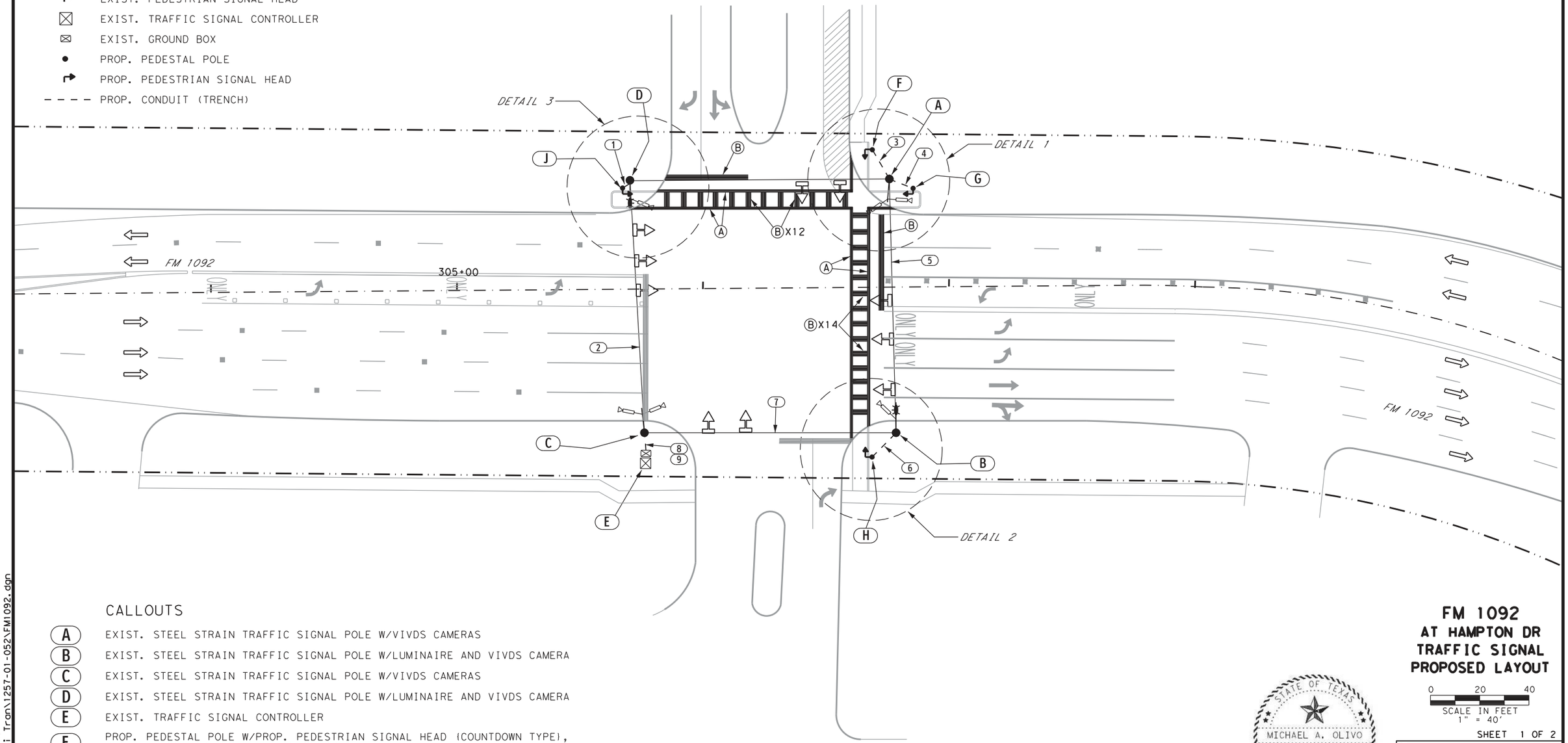
LEGEND

- DIRECTION OF TRAFFIC FLOW
- EXIST. TRAFFIC SIGNAL POLE
- EXIST. LUMINAIRE
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. VIVDS CAMERA
- EXIST. PEDESTRIAN SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER
- EXIST. GROUND BOX
- PROP. PEDESTAL POLE
- PROP. PEDESTRIAN SIGNAL HEAD
- PROP. CONDUIT (TRENCH)

PROPOSED PAVEMENT MARKINGS

(A) REFL PAV MRK TY I (W)12"(SLD)(100MIL)

(B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)



CALLOUTS

(A) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERAS

(B) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA

(C) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/VIVDS CAMERAS

(D) EXIST. STEEL STRAIN TRAFFIC SIGNAL POLE W/LUMINAIRE AND VIVDS CAMERA

(E) EXIST. TRAFFIC SIGNAL CONTROLLER

(F) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

(G) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

(H) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

(J) PROP. PEDESTAL POLE W/PROP. PEDESTRIAN SIGNAL HEAD (COUNTDOWN TYPE), PUSH BUTTON (APS UNIT) AND SIGN (R10-3E)

DATE: 9/22/2021 3:24:53 PM
FILE: H:\TrfSignals\Hou Tran\1257-01-052\FM1092.dgn

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT HAMPTON DR
TRAFFIC SIGNAL
PROPOSED LAYOUT

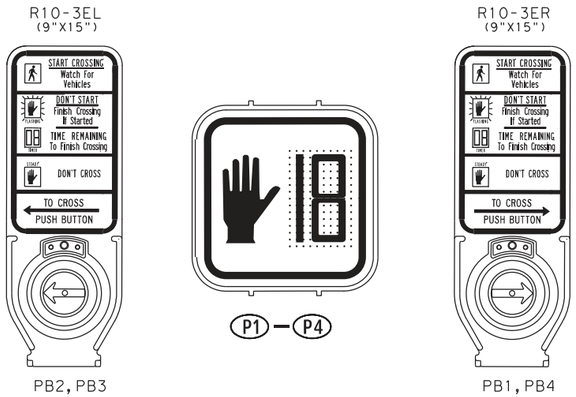
0 20 40
SCALE IN FEET
1" = 40'

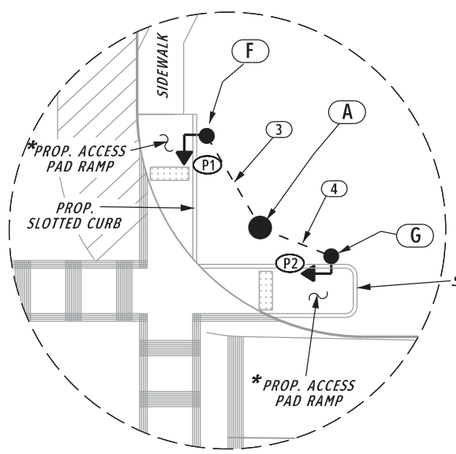
SHEET 1 OF 2

Texas Department of Transportation

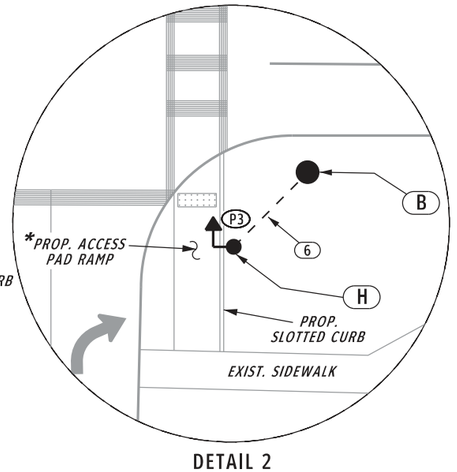
CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		140

PROPOSED PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS (APS UNITS) WITH SIGNS

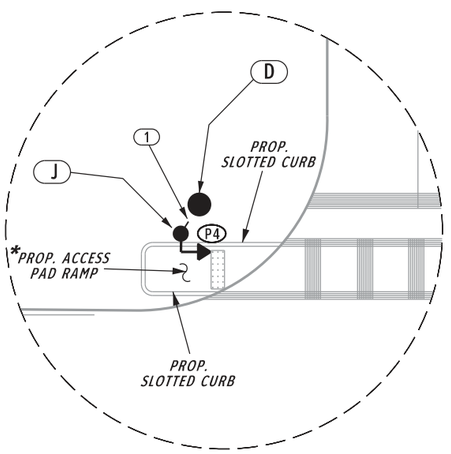




DETAIL 1
N.T.S.



DETAIL 2
N.T.S.

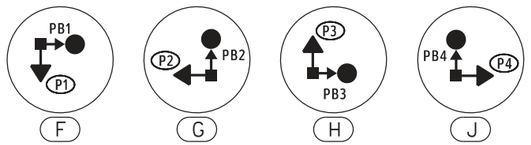


DETAIL 3
N.T.S.

PROP. SLOTTED CURB

* SEE "ACCRD" STANDARD SHEET FOR ACCESS PAD RAMP DETAILS

PROPOSED DIRECTION OF PEDESTRIAN SIGNAL HEADS AND LOCATION OF PUSH BUTTONS (APS UNITS)



● PROP. PEDESTAL POLE

PROP. PEDESTRIAN SIGNAL HEAD

◄ PROP. PEDESTRIAN PUSH BUTTON (APS UNITS)

CONDUIT AND CONDUCTOR RUNS												
RUN NO.	CONDUIT (618)				CONDUCTORS (620)		CABLES (684)				SPAN WIRE (625)	
	PVC		RM		GROUND		PEDESTRIAN				WIRE STRAND	
	2" (SCHD 80) (6046)		2" (6070)		#6 BARE (6009)		#12/2C (6007)		#12/4C (6009)		5/16" GUY (6004)	
	NO. EA	TRENCH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF	NO. EA	LENGTH LF
1	1	5			1	5	1	5	1	5		
2							1	110	1	110	1	110
3	1	15			1	15	1	15	1	15		
4	1	15			1	15	1	15	1	15		
5							2	110	2	110	1	110
6	1	15			1	15	1	15	1	15		
7							3	110	3	110	1	110
8	1	15			1	15	4	15	4	15		
9	1	10			1	10	4	10	4	10		
SIGNAL POLE A			1	20	1	20	2	20	2	20		
SIGNAL POLE B			1	20	1	20	1	20	1	20		
SIGNAL POLE C			1	20	1	20	4	20	4	20		
SIGNAL POLE D			1	20	1	20	1	20	1	20		
PED POLE F							1	10	1	15		
PED POLE G							1	10	1	15		
PED POLE H							1	10	1	15		
PED POLE J							1	10	1	15		
TOTAL (LF)		75		80		155		1010		1030		330
EST. TOTAL		**80**		**85**		**165**		**1065**		**1085**		**350**

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

09/23/2021

FM 1092
AT HAMPTON DR
TRAFFIC SIGNAL
PROPOSED LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

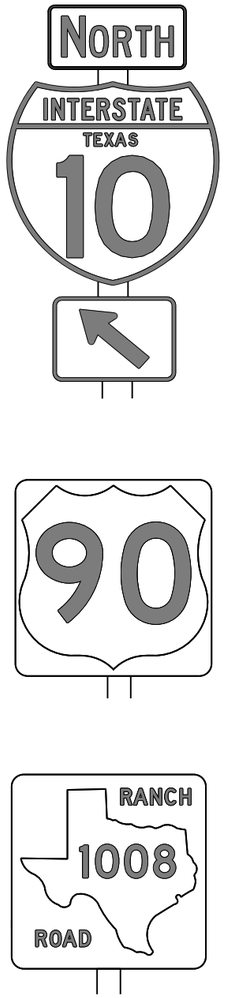
CONT	SECT	JOB	HIGHWAY
1257	01	052	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		141

DATE: 9/22/2021 3:25:05 PM
FILE: H:\Traffic Signals\Hai Tran\1257-01-052\FM1092.dgn

DATE: 09/10/2021 11:37 AM
FILE: DOCUMENT NAME

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

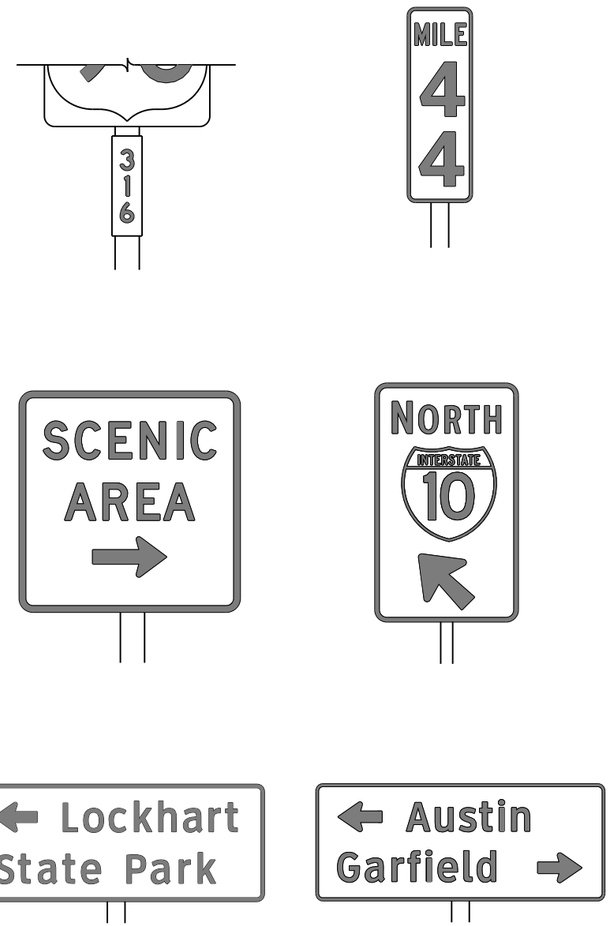
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

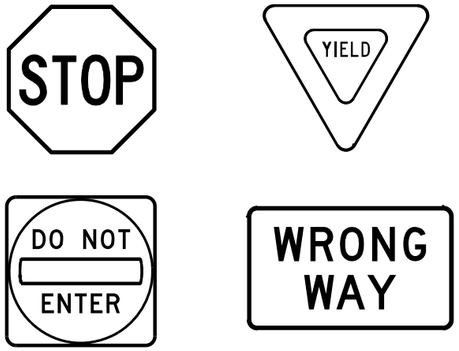
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	FORT BEND		142

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

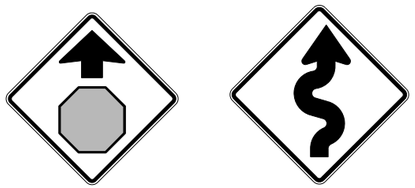
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	FT BEND		143

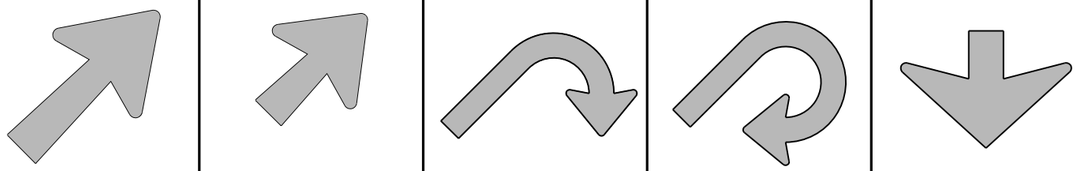
DATE:
FILE:

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.

DATE:
FILE:

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

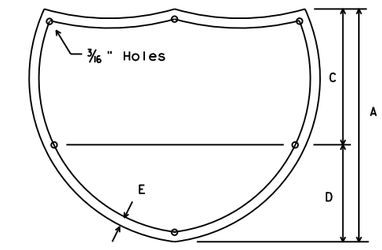
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

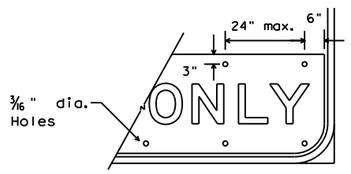
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

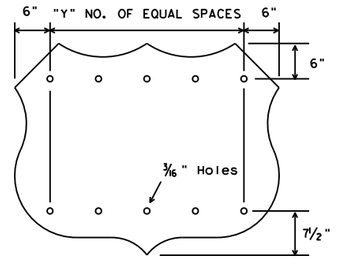


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

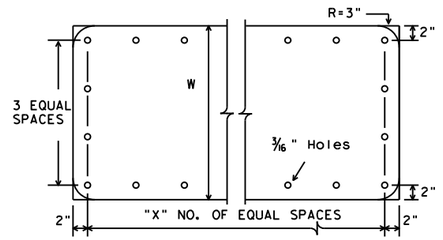


EXIT ONLY PANEL



U.S. ROUTE MARKERS

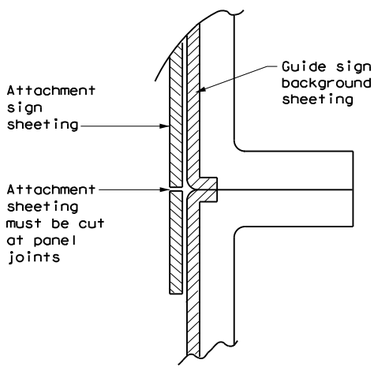
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

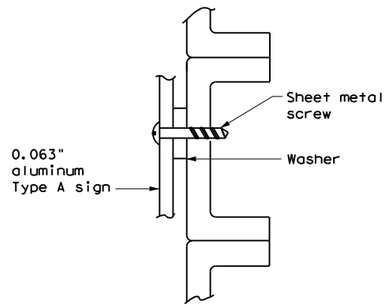
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



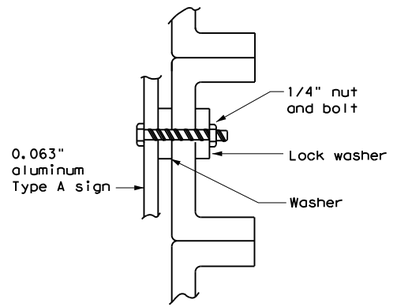
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



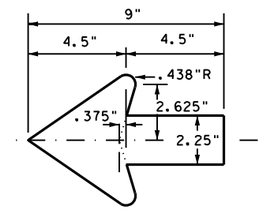
NUT/BOLT ATTACHMENT

NOTE:

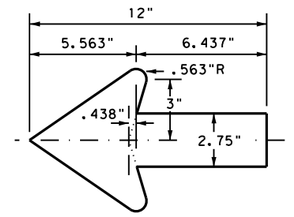
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1257	01	052, ETC.	FM 1092
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	FT BEND		144

5

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

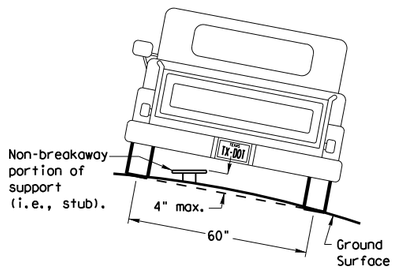
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

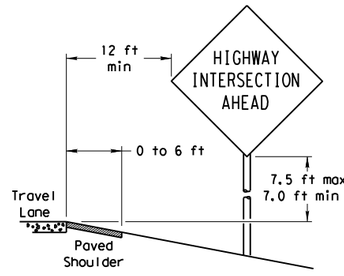
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

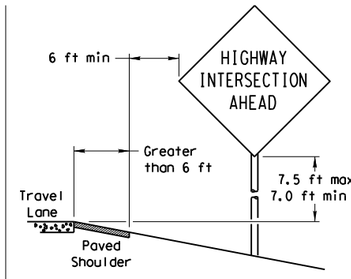
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

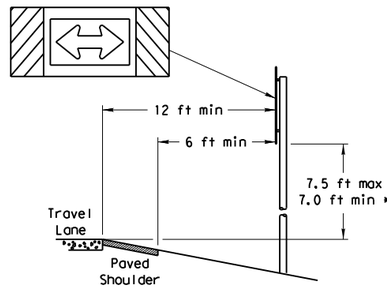
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



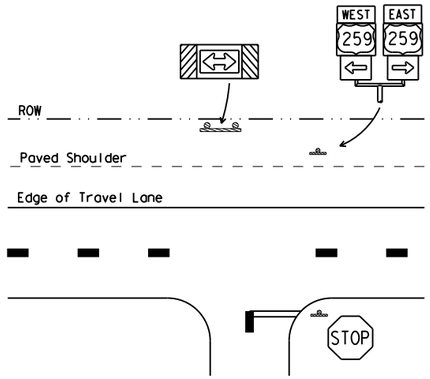
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

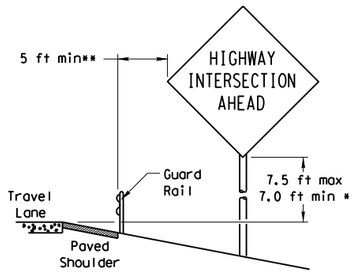
T-INTERSECTION



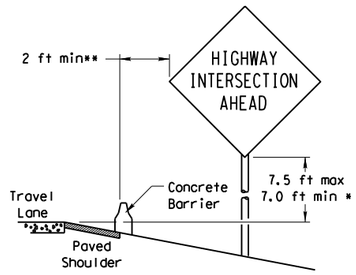
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



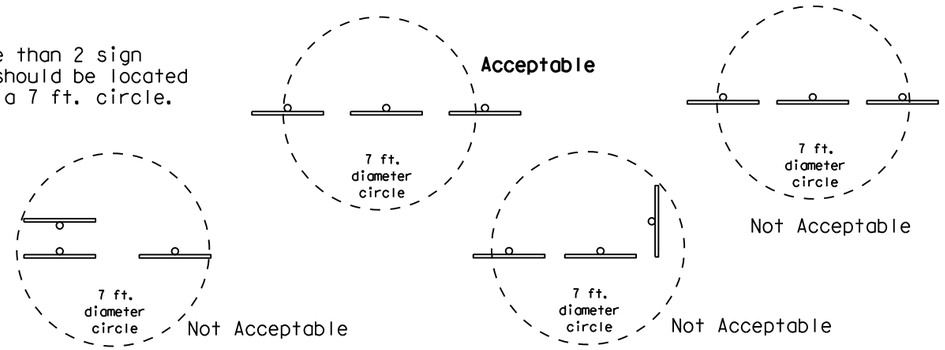
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

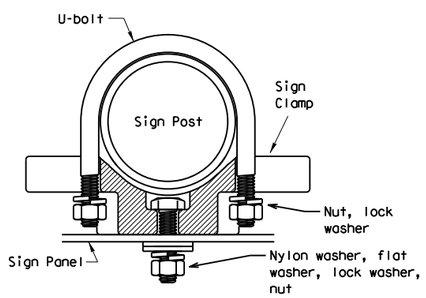
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

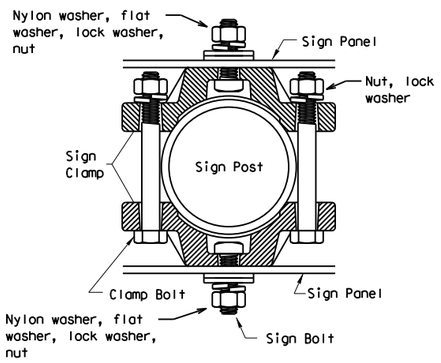


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

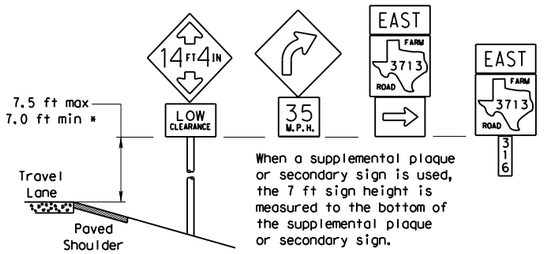
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



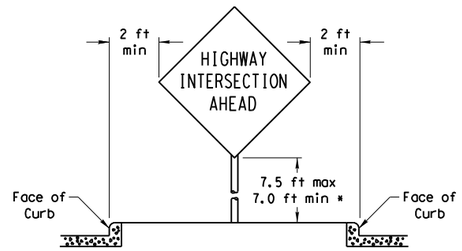
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



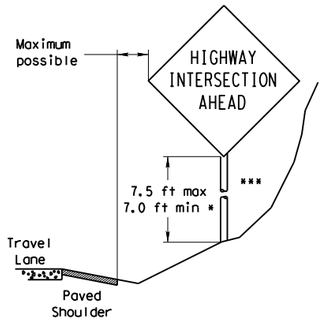
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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

9-08 REVISIONS

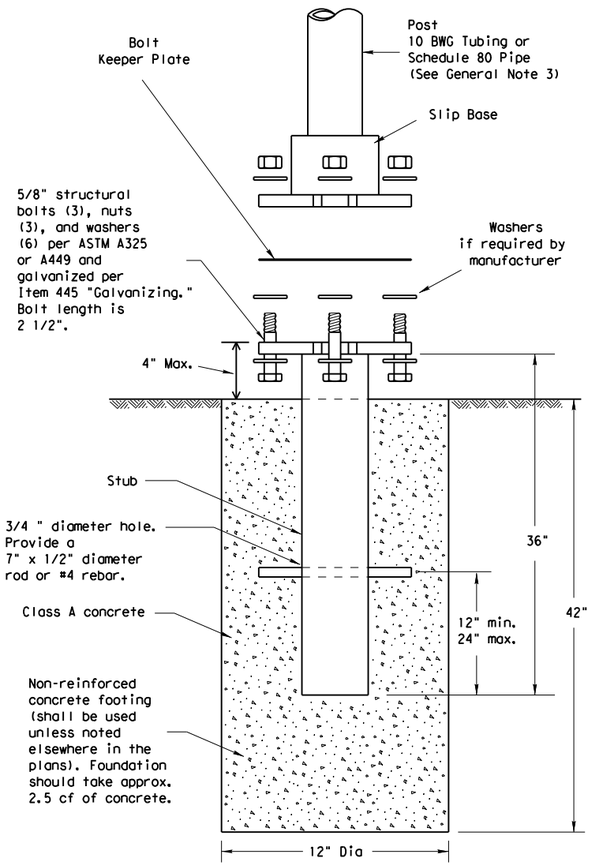
CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092

DIST	COUNTY	SHEET NO.
HOU	FORT BEND	145

26A

DATE: 09/10/2021 11:29 AM
FILE: DOCUMENT NAME

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

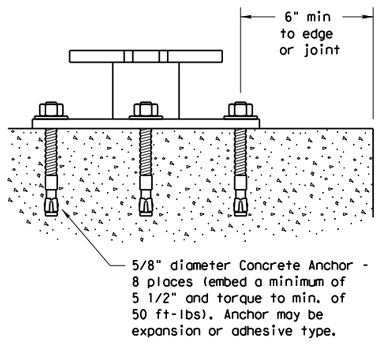
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

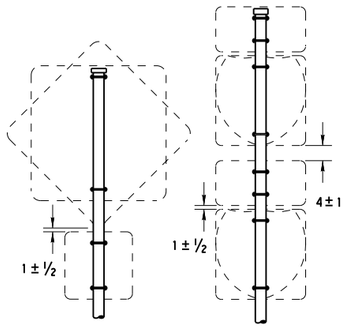
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

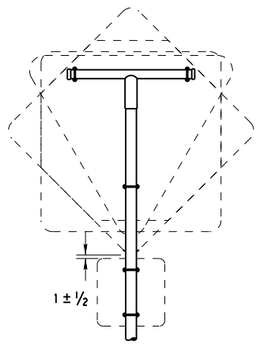
CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092

DIST	COUNTY	SHEET NO.
HOU	FORT BEND	146

DATE: 09/10/2021 10:08 AM
FILE: DOCUMENT NAME



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



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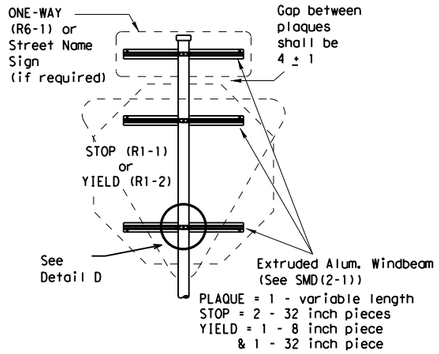

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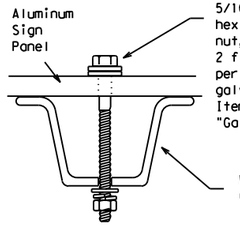
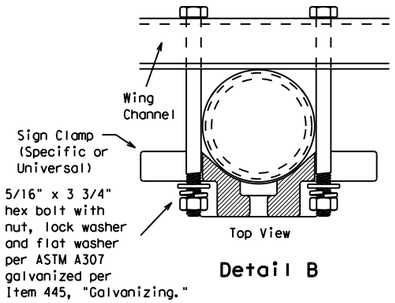
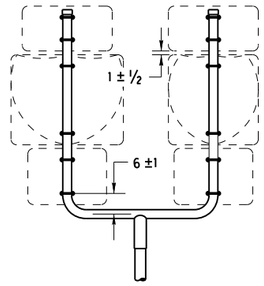


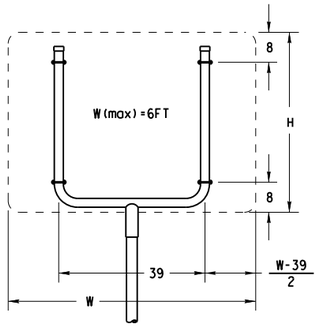
Detail A



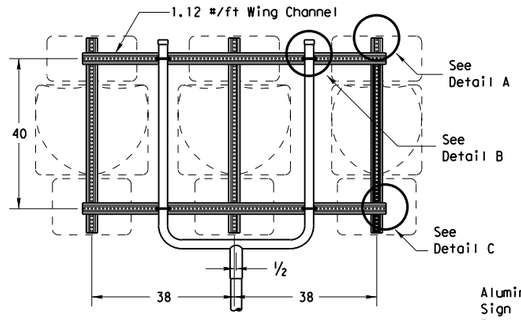
Detail B



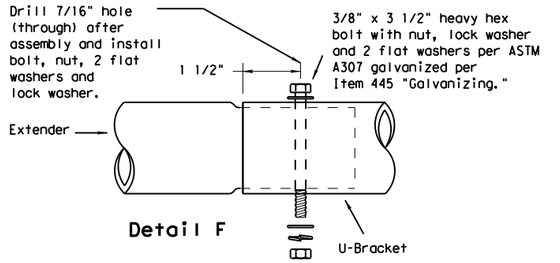
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

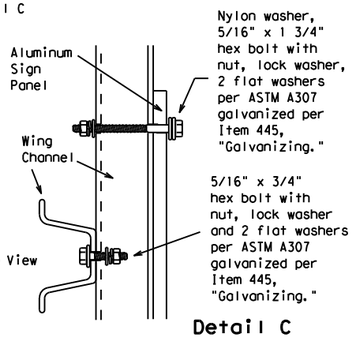


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

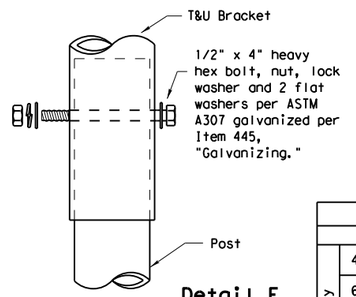


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



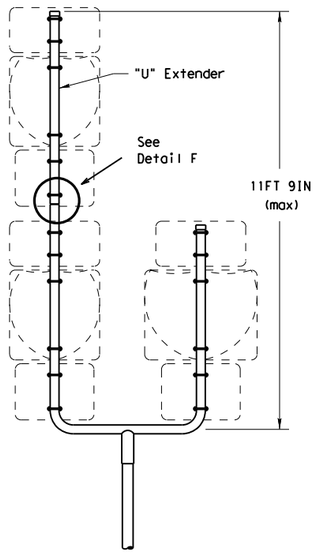
Detail E

GENERAL NOTES:

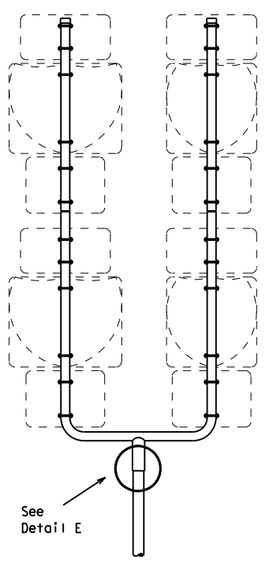
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

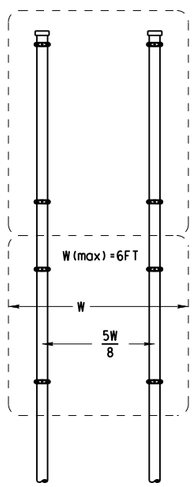
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



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

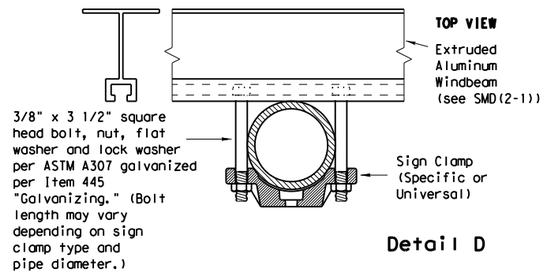


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

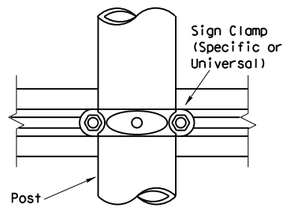


SM RD SGN ASSYM TY XXXXX(2)XX(P)

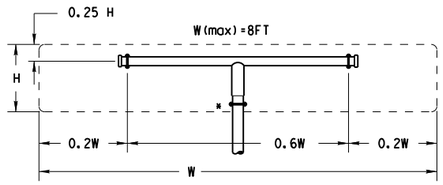
SIDE VIEW



Detail D



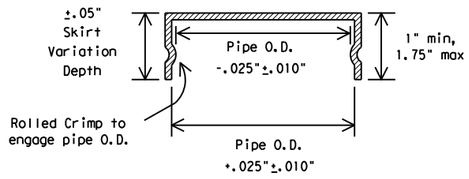
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		147

9-08 REVISIONS

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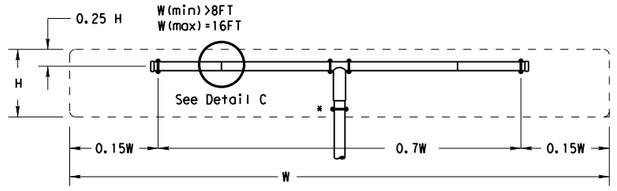
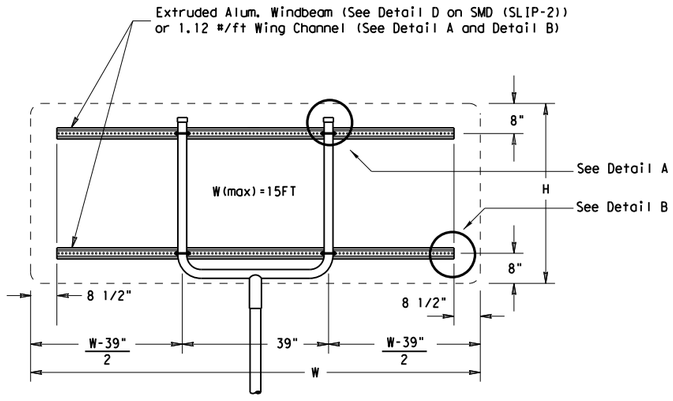
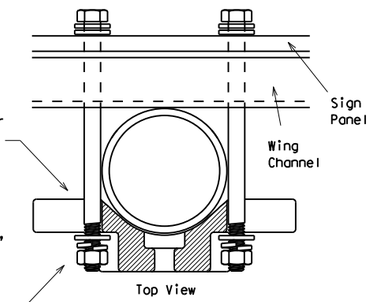


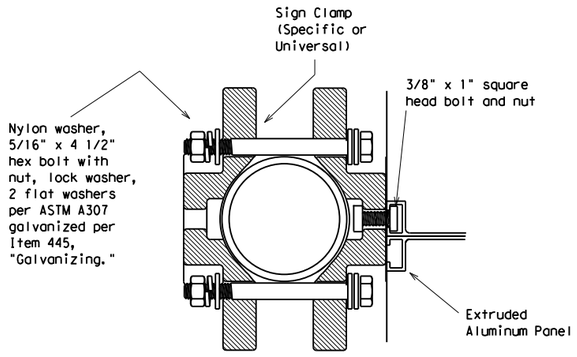
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



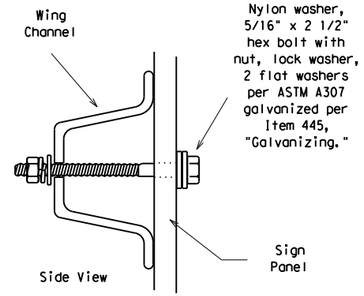
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



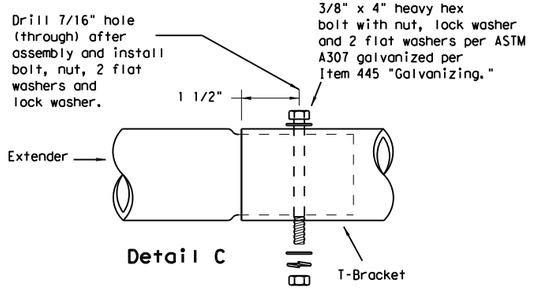
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

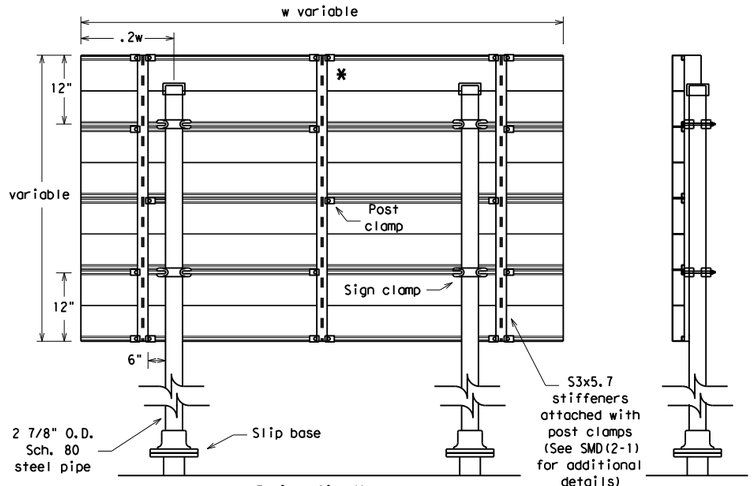


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

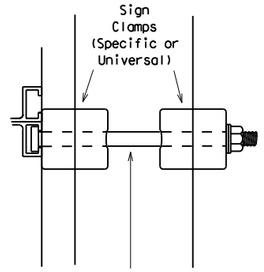


Typical Sign Mount

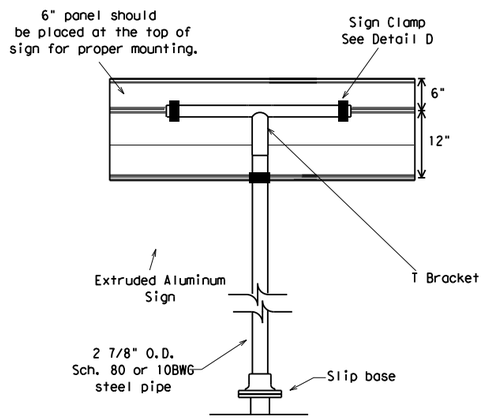
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

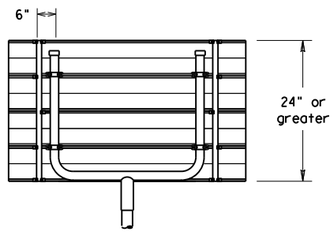
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. See table above.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

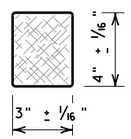
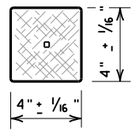
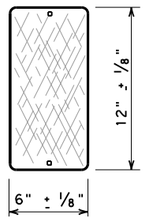
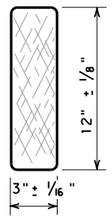
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092

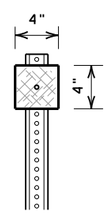
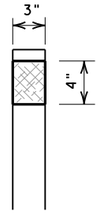
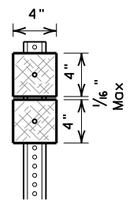
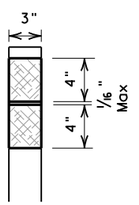
DIST	COUNTY	SHEET NO.
HOU	FORT BEND	148

DATE: 09/10/2021 11:29 AM
FILE: DOCUMENT NAME

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

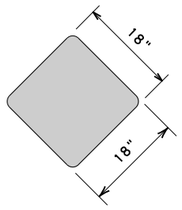
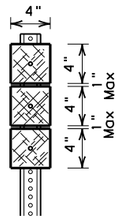
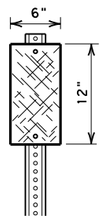
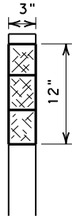
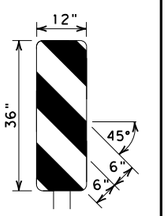
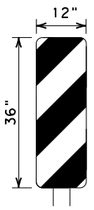
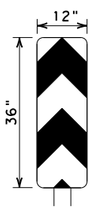
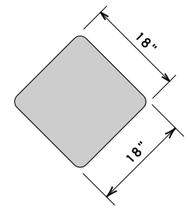
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

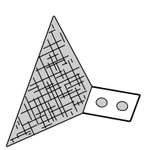
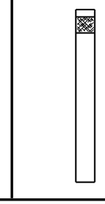
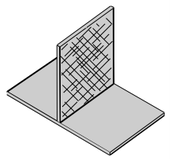
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

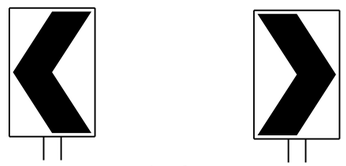
OBJECT MARKERS

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

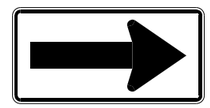
BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

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.

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

DATE:
FILE: dom1-20.dgn

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
1257	01	052, ETC.	FM 1092
DIST	COUNTY		SHEET NO.
HOU	FT BEND		149

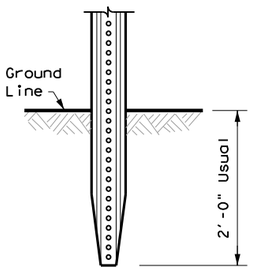
REVISIONS
10-09 3-15
4-10 7-20

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

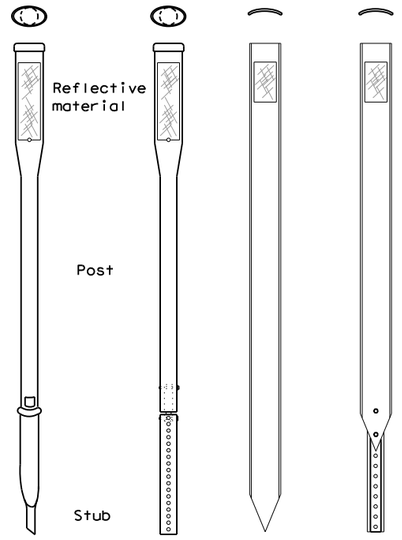


NOTES

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.

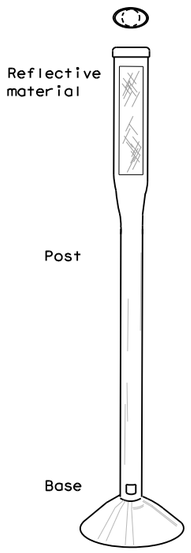
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



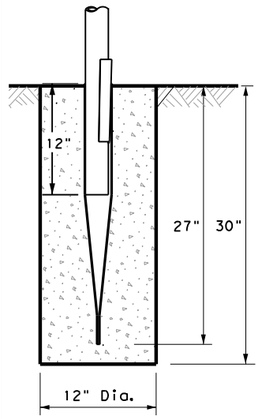
SURFACE MOUNT

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.

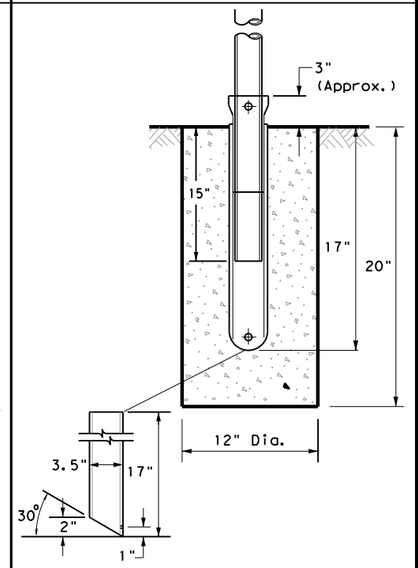
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

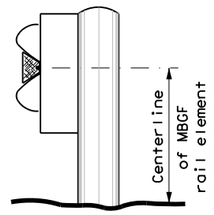
NOTE

1. Install per manufacturer's recommendations.

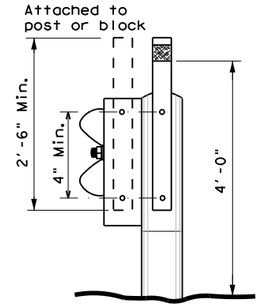
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

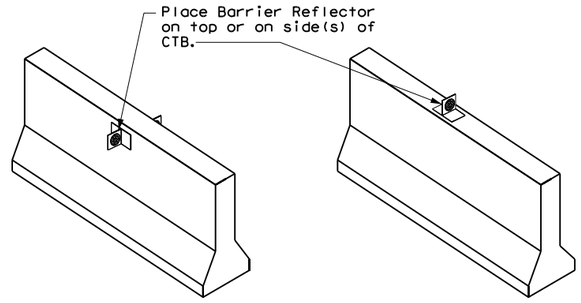
GF1



GF2



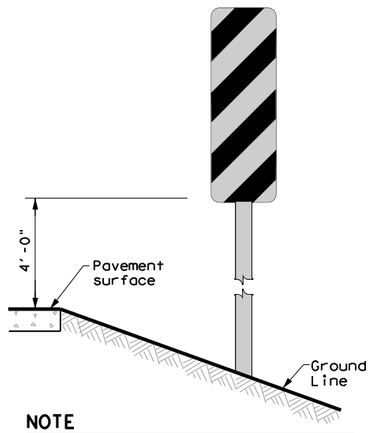
CONCRETE TRAFFIC BARRIER (CTB)



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.

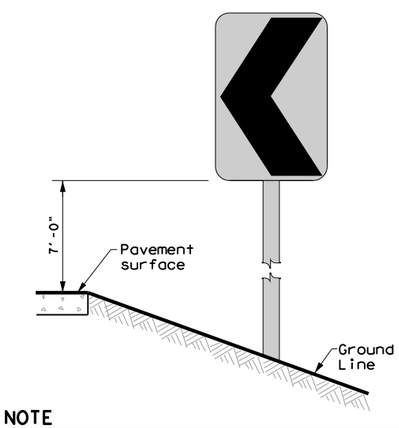
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

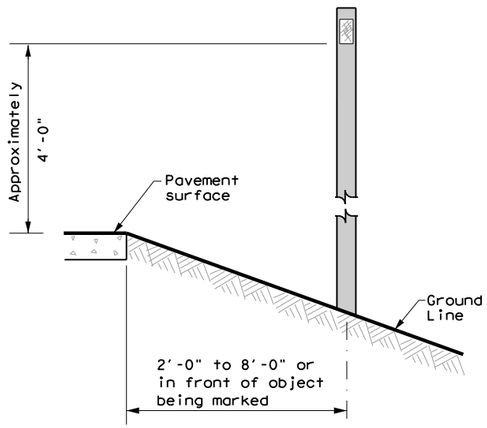
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	1257	01	052, ETC.	FM 1092
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	HOU	FT BEND		150

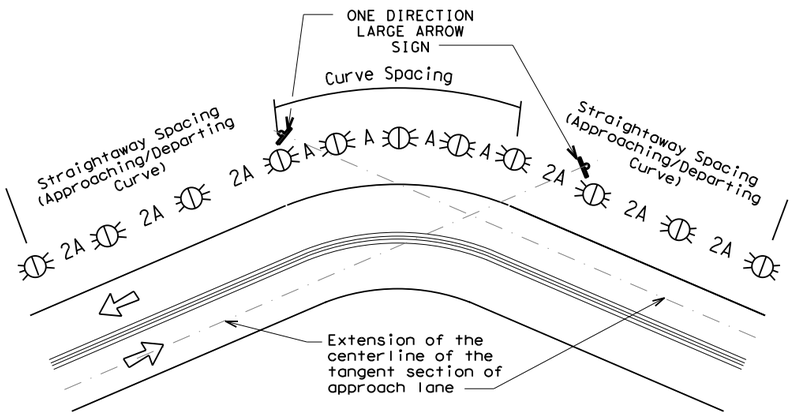
20B

DATE:
FILE:

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

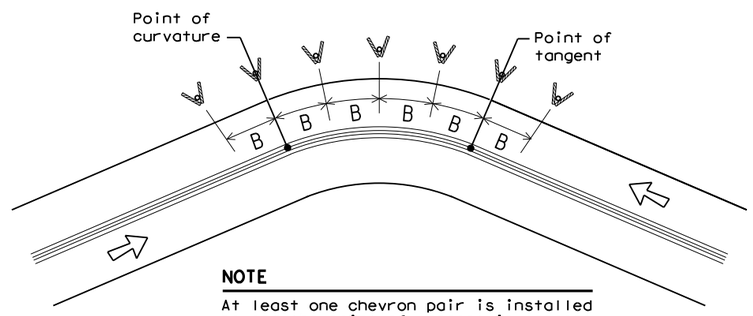
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

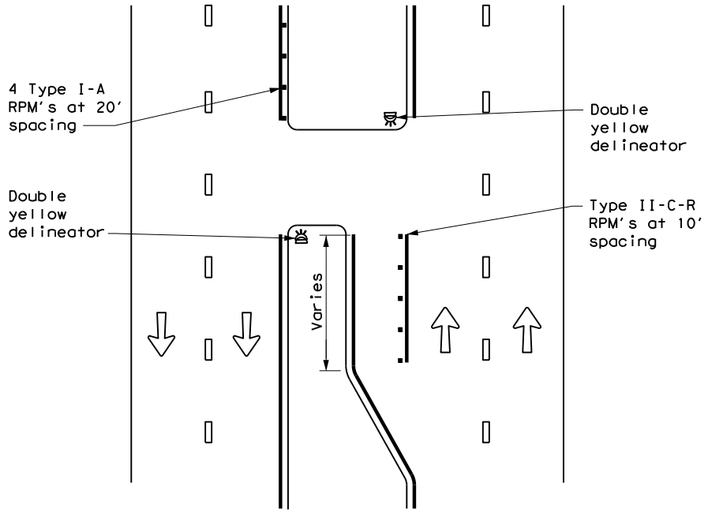
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	HOU	FT BEND		151

DATE:
FILE:

20C

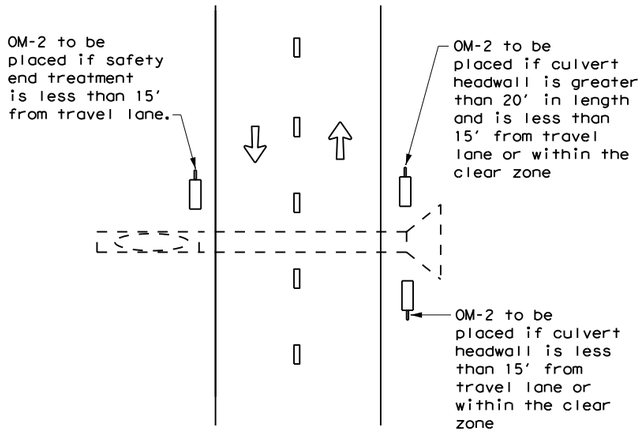
DATE:
FILE:

CROSSOVERS



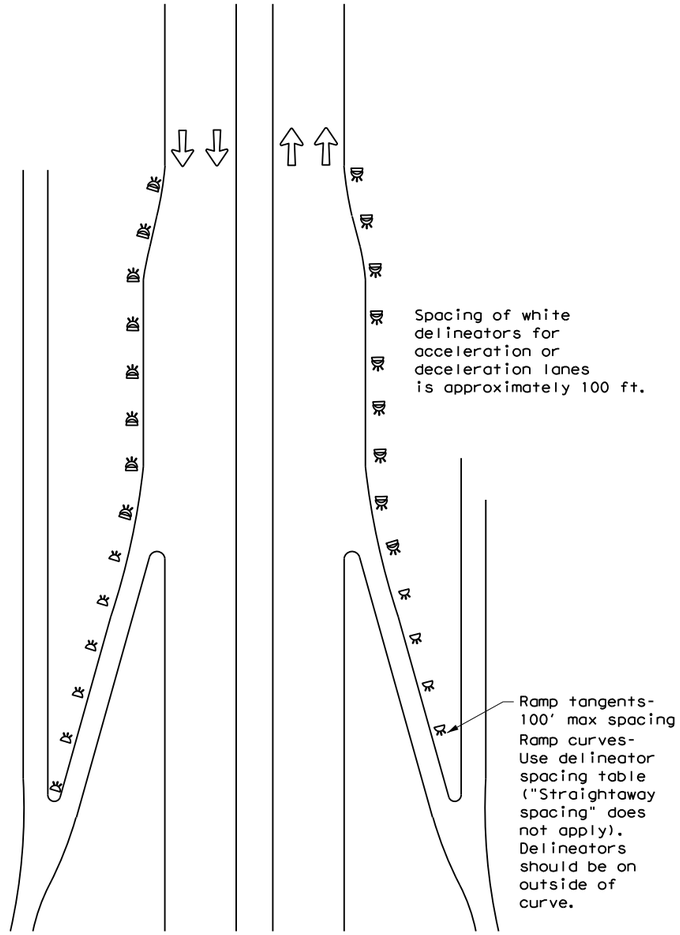
DETAIL 1

FOR CULVERTS WITHOUT MBGF



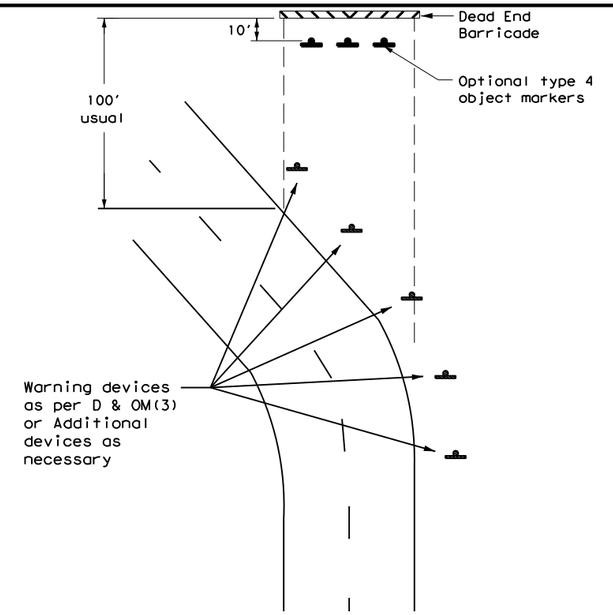
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



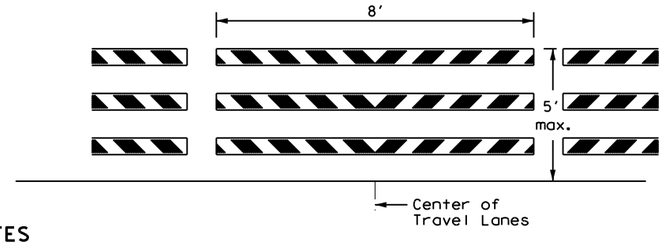
DETAIL 3

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

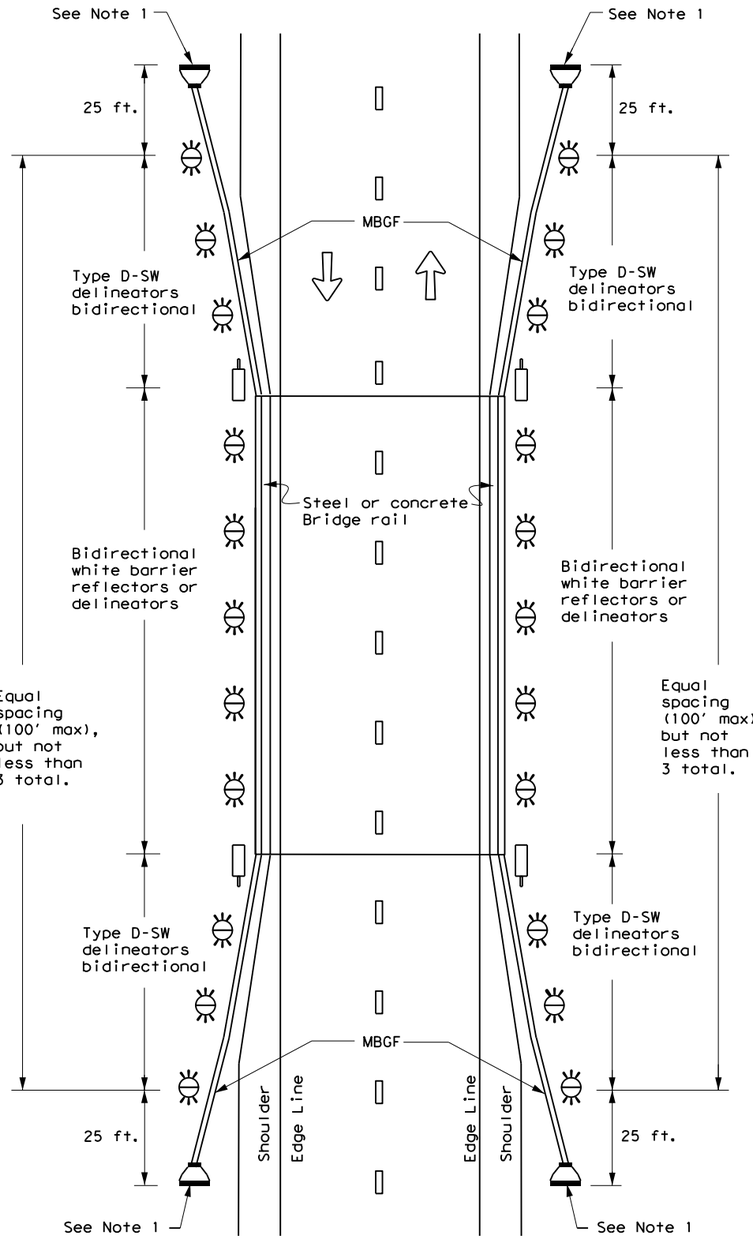
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
3-15	DIST	COUNTY		SHEET NO.
7-20	HOU	FT BEND		152

20D

DATE: 08/30/2021 10:39 AM
FILE: DOCUMENT NAME

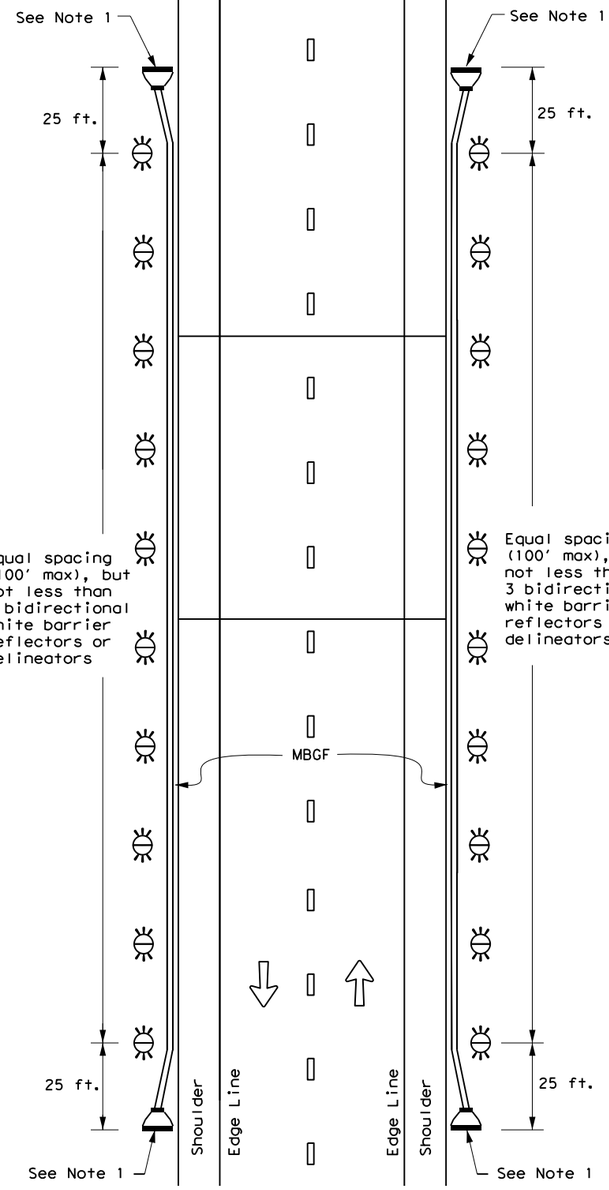
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

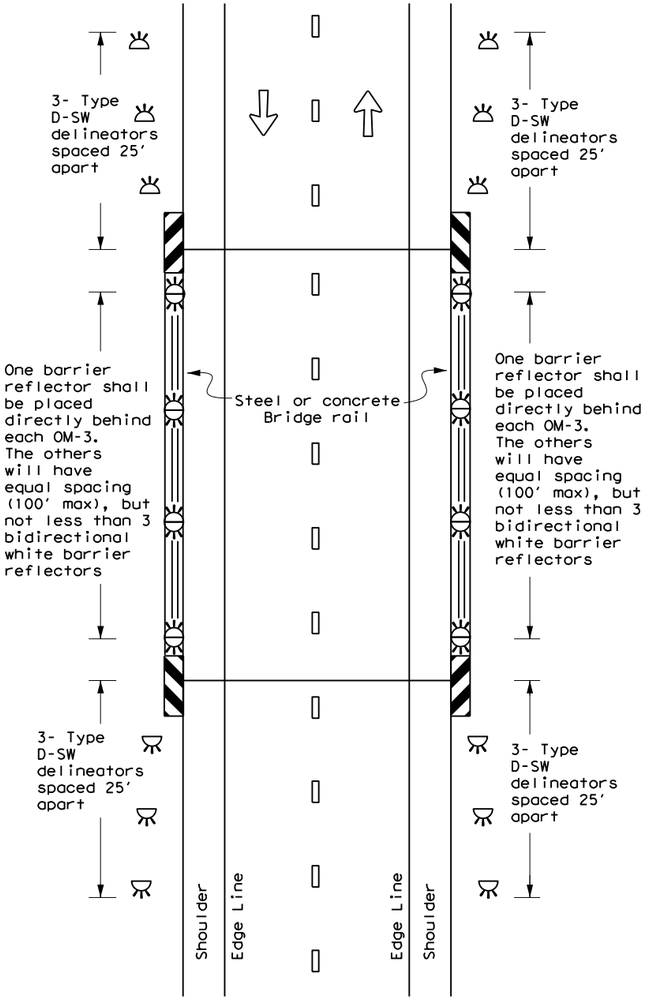
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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
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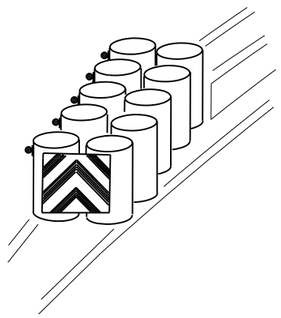
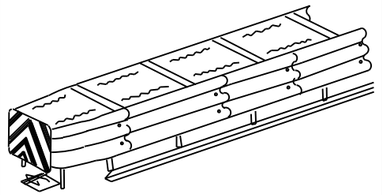
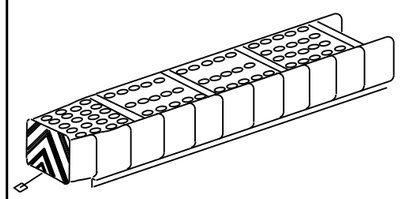
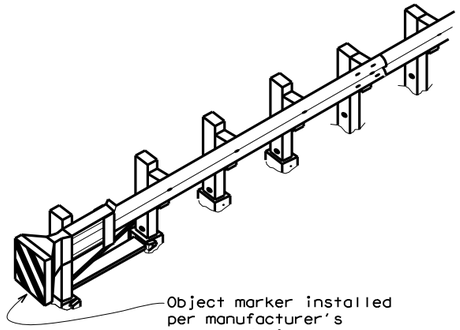
7-20	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		153

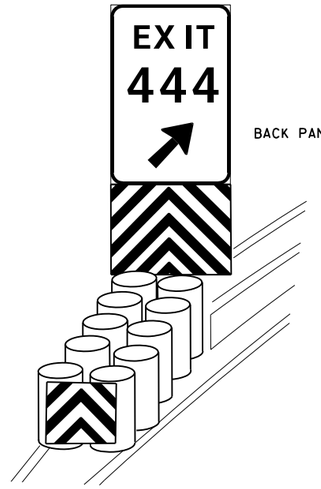
20E

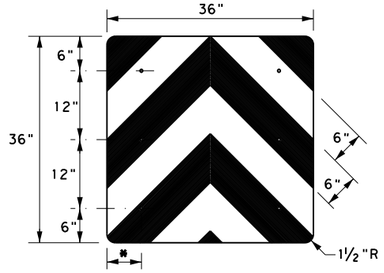


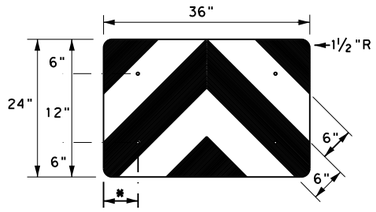




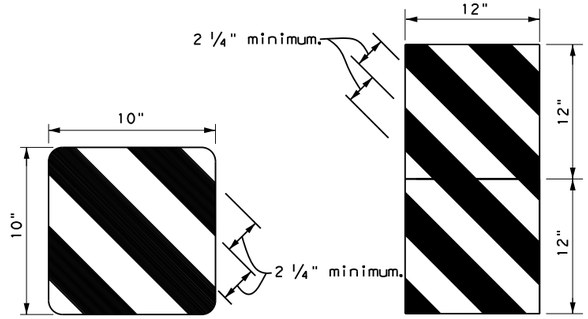




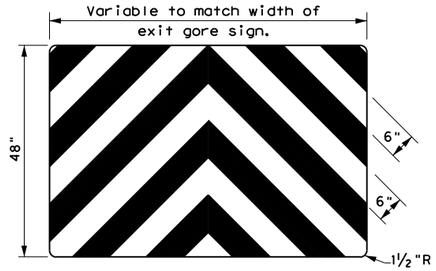


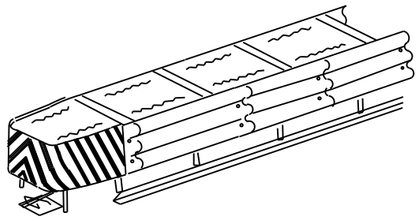


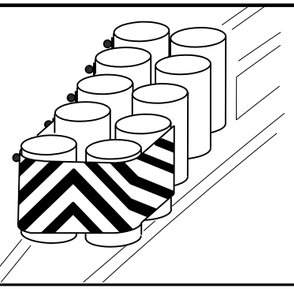
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

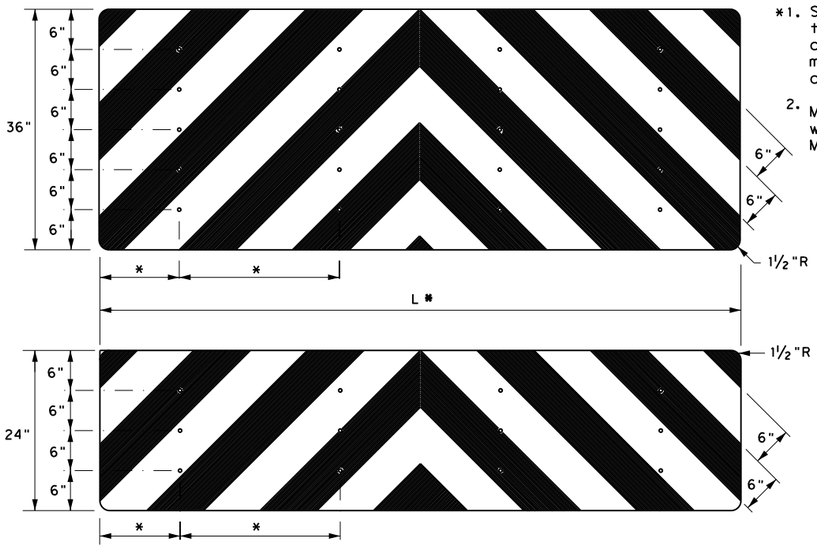


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

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

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

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

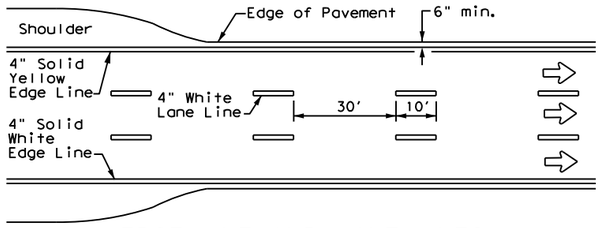
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

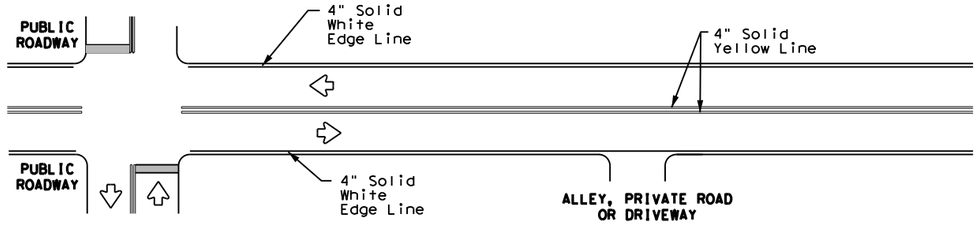
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052	FM 1092
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	HOU	FORT BEND		154
4-98 7-20				

20G

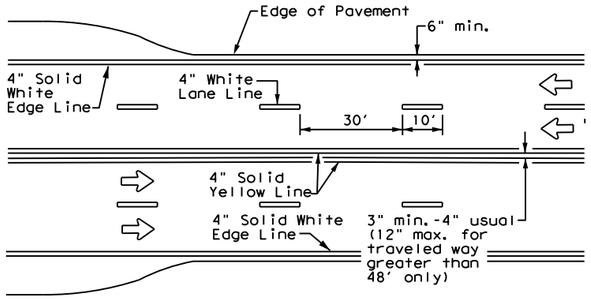
DATE: 08/30/2021 10:40 AM
FILE: DOCUMENT NAME



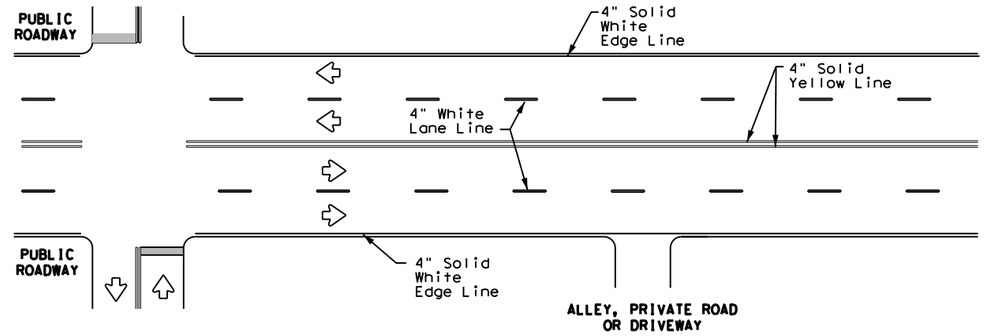
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



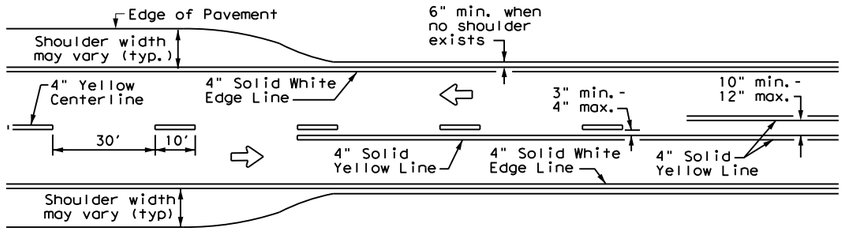
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



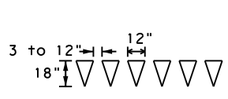
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



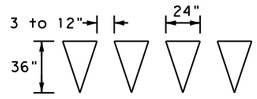
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

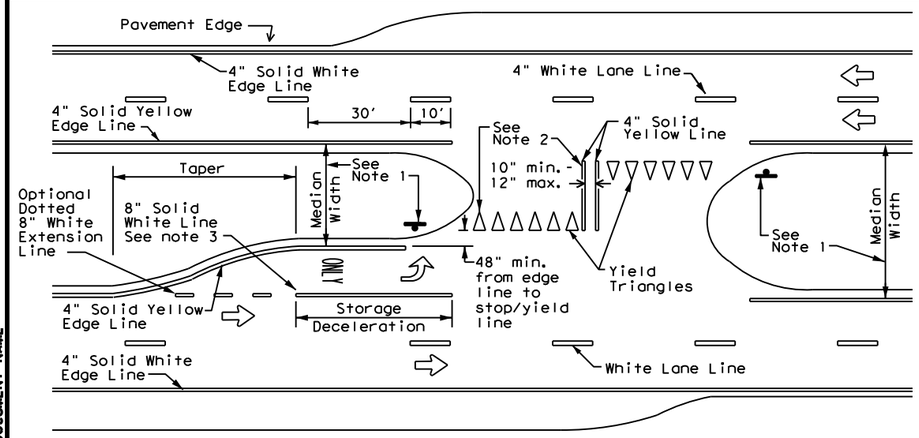


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

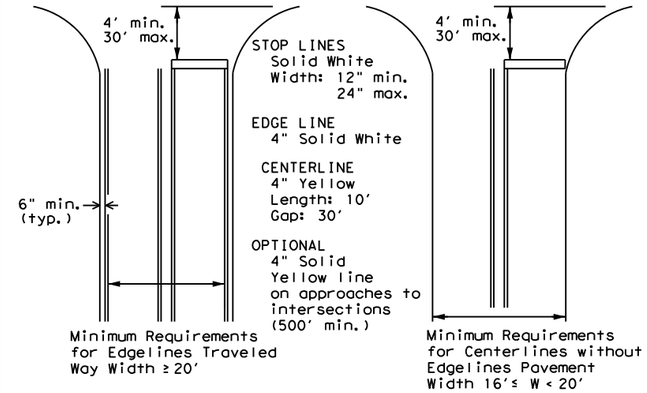
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

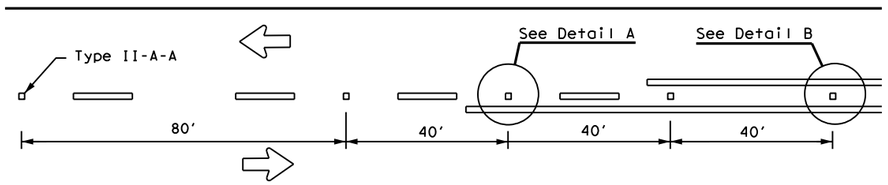
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	1257	01	052	FM 1092
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	FORT BEND		155

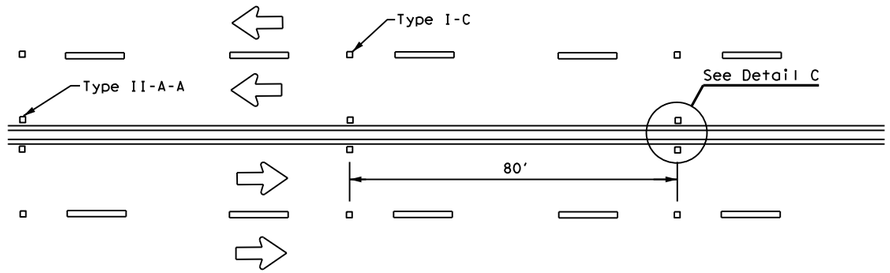
22A

DATE: 08/30/2021 10:41 AM
FILE: DOCUMENT NAME

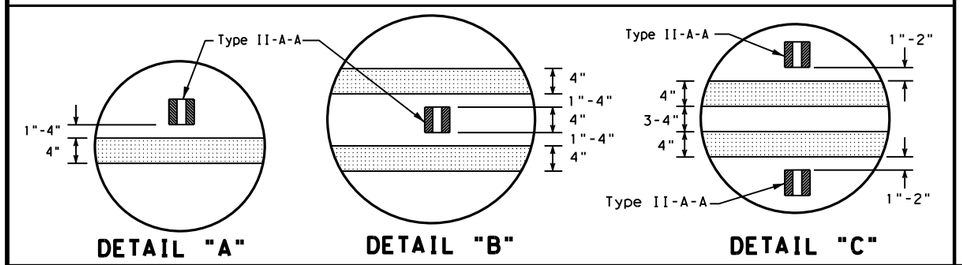
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



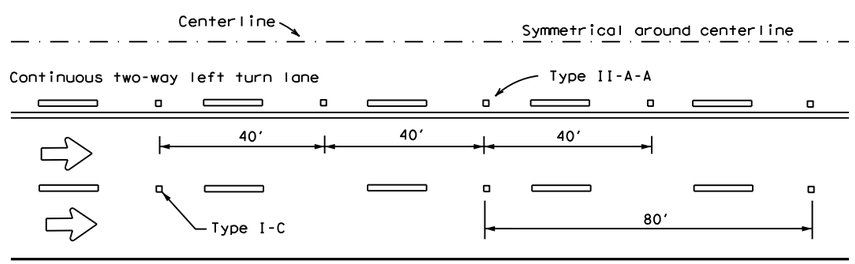
CENTERLINE FOR ALL TWO LANE ROADWAYS



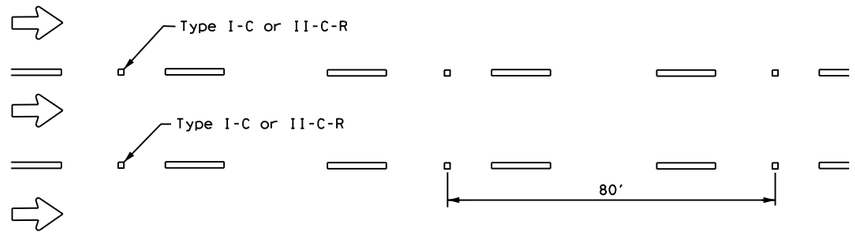
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

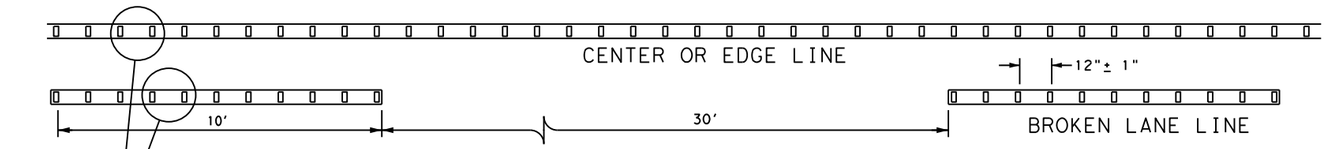


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



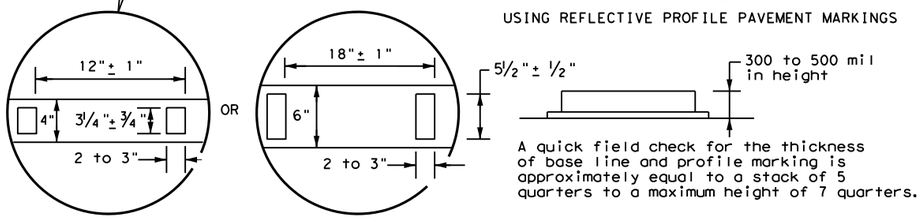
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

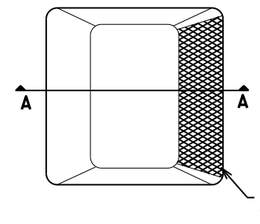
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

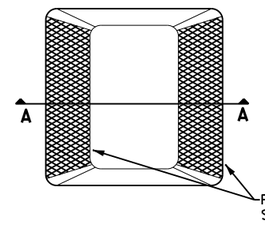
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



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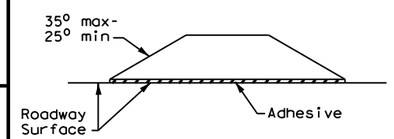


SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

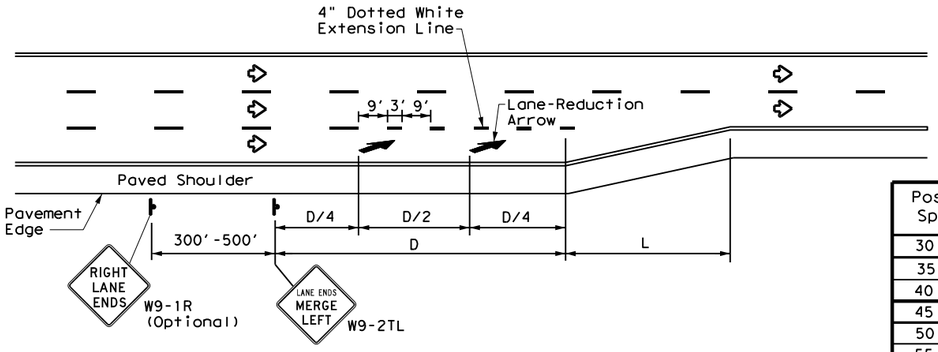
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		156

22B

DATE:
FILE:

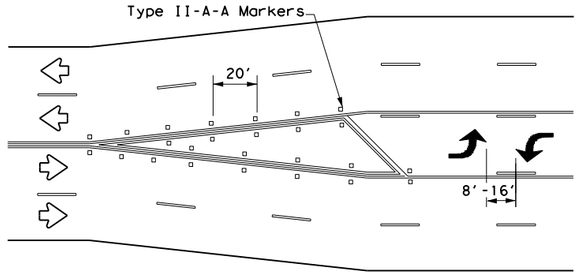


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

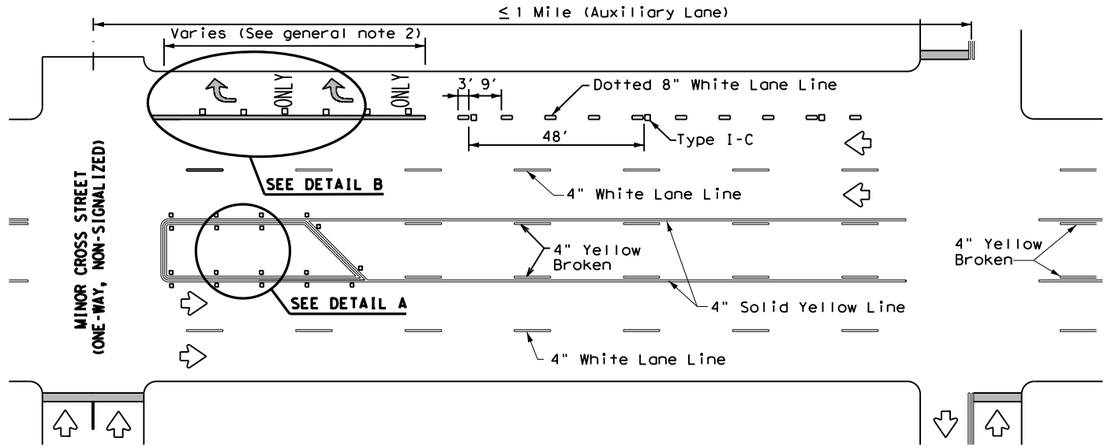
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

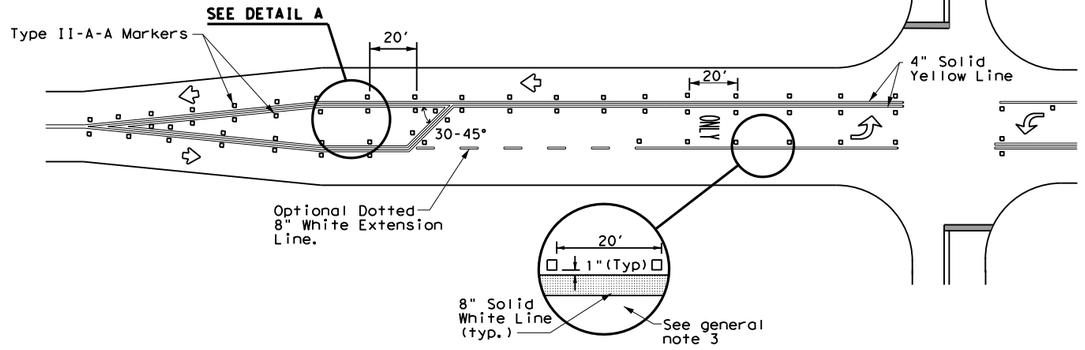
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

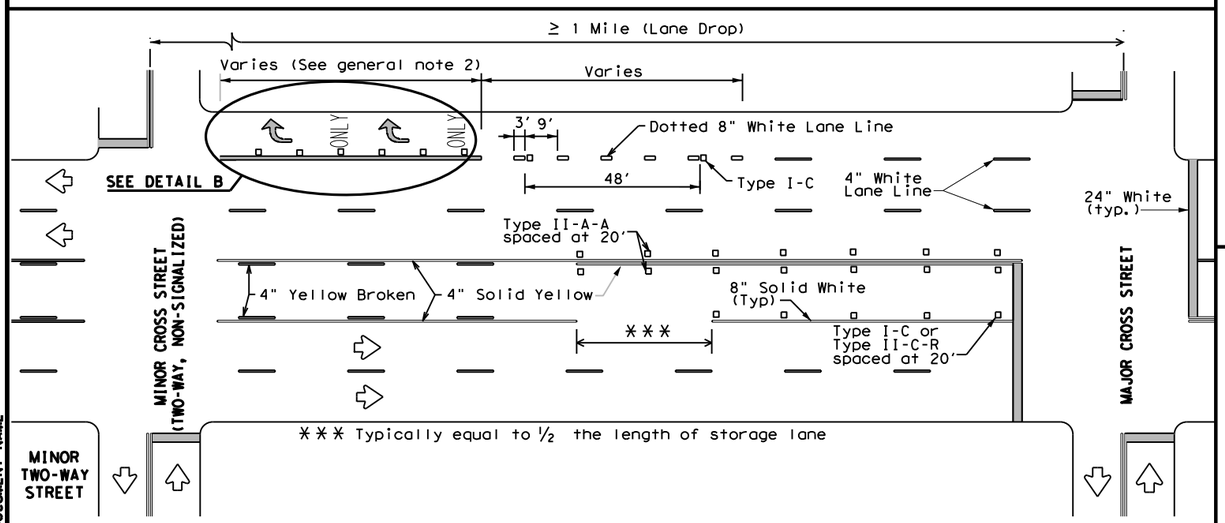
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



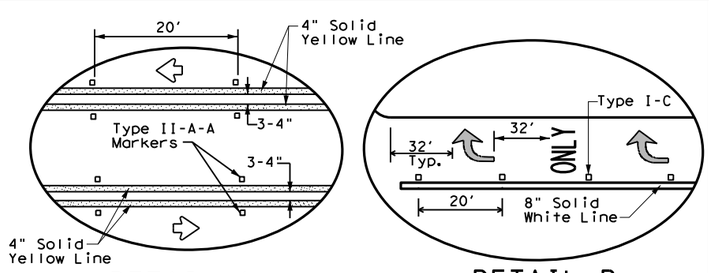
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



Texas Department of Transportation

Traffic Safety Division Standard

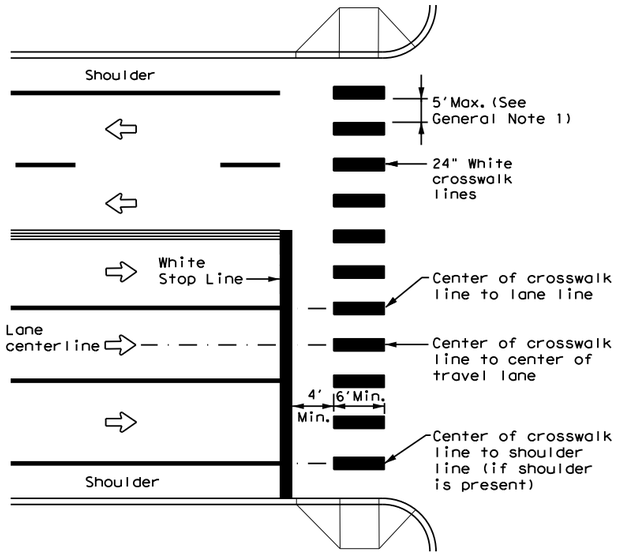
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052	FM 1092
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	HOU	FORT BEND		157
3-03 6-20				

22C

DATE: 08/30/2021 10:42 AM
FILE: DOCUMENT NAME

DATE:
FILE:



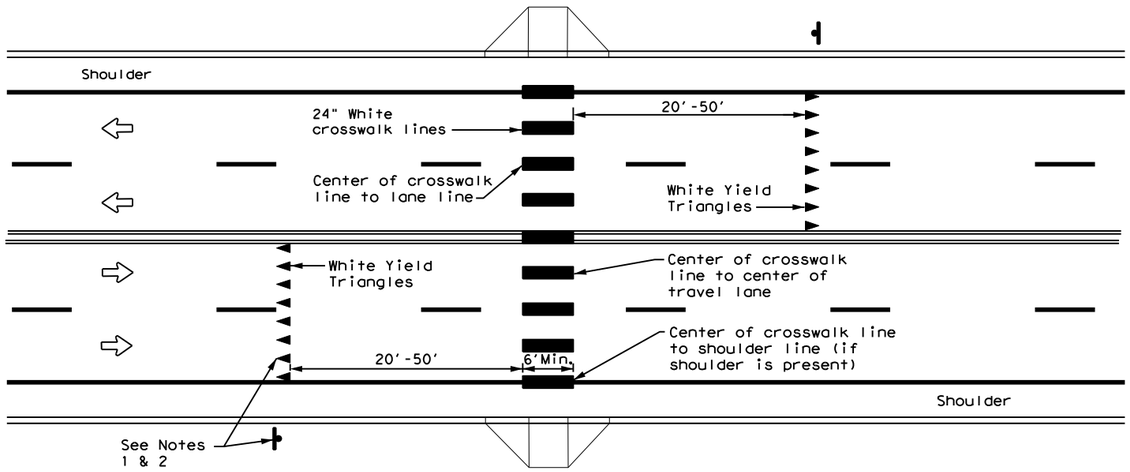
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar/Yield Triangles and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES

1. Use yield triangles with "Yield Here to Pedestrians" signs at unsignalized mid block crosswalks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

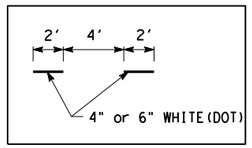
Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-20

FILE: pm4-20.dgn	DN:	CK:	DW:	CK:
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC.	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		158

22D



DETAIL "A"

TYPICAL PLACEMENT OF DOTTED EXTENSION AT INTERSECTIONS

*4"or 6" WHITE(SLD) 40 LF EA.

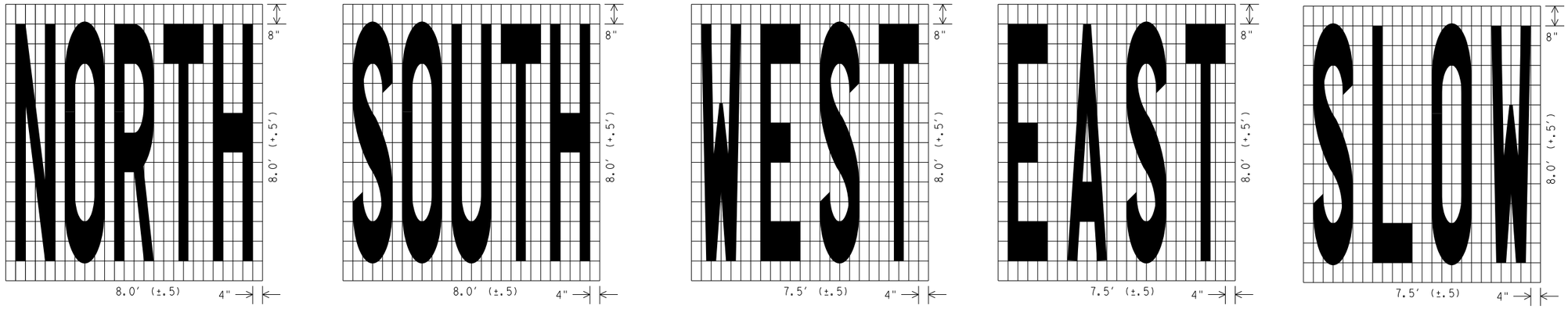
Texas Department of Transportation
Houston District

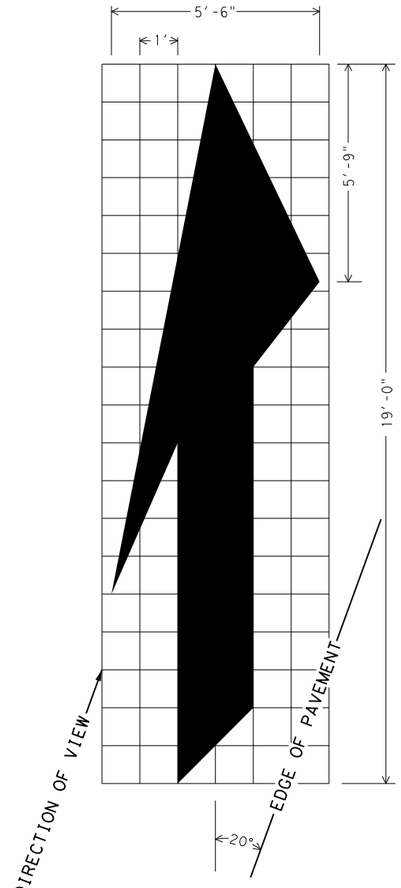
PAVEMENT MARKINGS
(DOTTED EXTENSION DETAILS)

PM(DOT)-11

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 4/2010 4/2011	HOU	6		159
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	FT BEND	1257	01	052,ETC	FM 1092

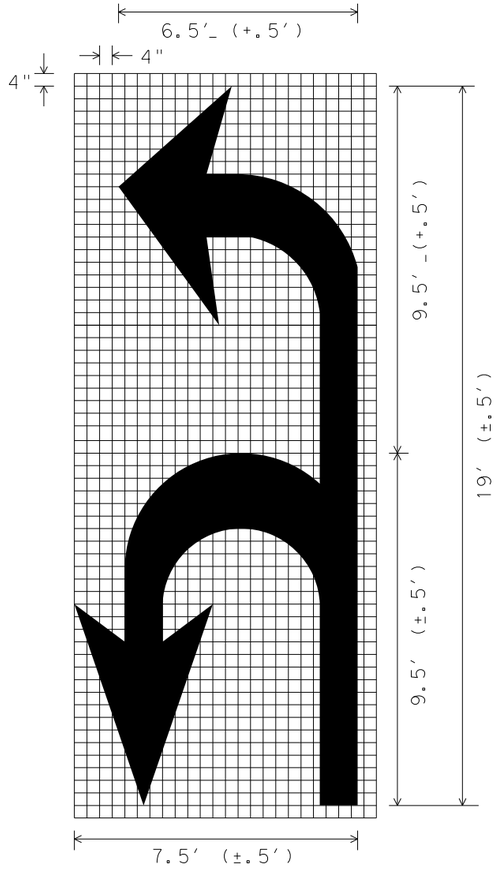
STD N-28



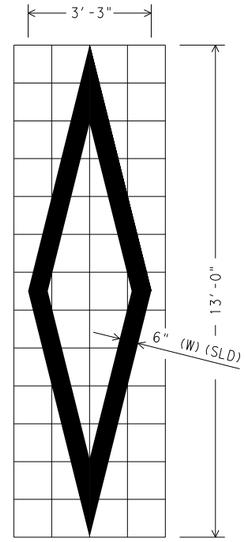


ISOMETRIC ARROW

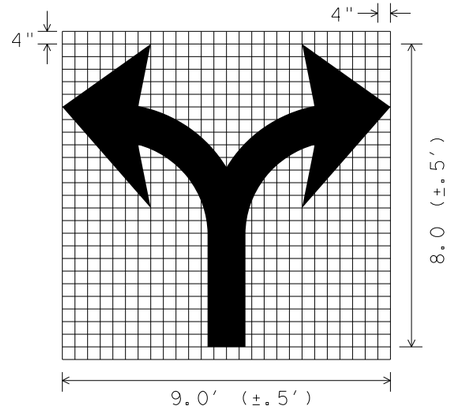
12 INCH GRID
AREA = 42 SQ. FT.
RIGHT LANE DROP ARROW
(FOR LEFT LANE, USE MIRROR IMAGE)



U-L ARROW



DIAMOND SYMBOL



SCALE 1/4" = 1′

Texas Department of Transportation
Houston District

PAVEMENT MARKINGS (WORDS, ARROWS & SYMBOLS)

PM(WAS)-07

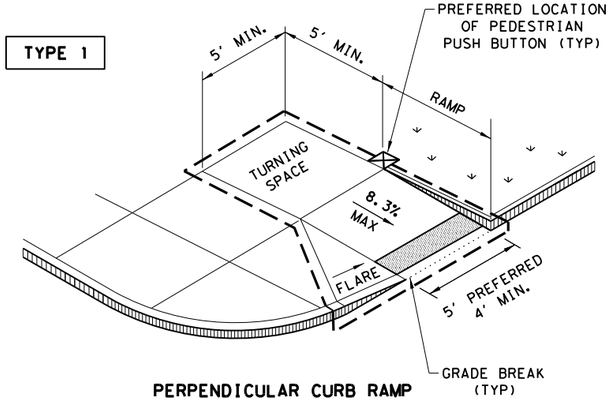
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 03-19-07	HOU	6		160

COUNTY	CONTROL	SECT	JOB	HIGHWAY
FT BEND	1257	01	052,ETC	FM 1092

STD-N31

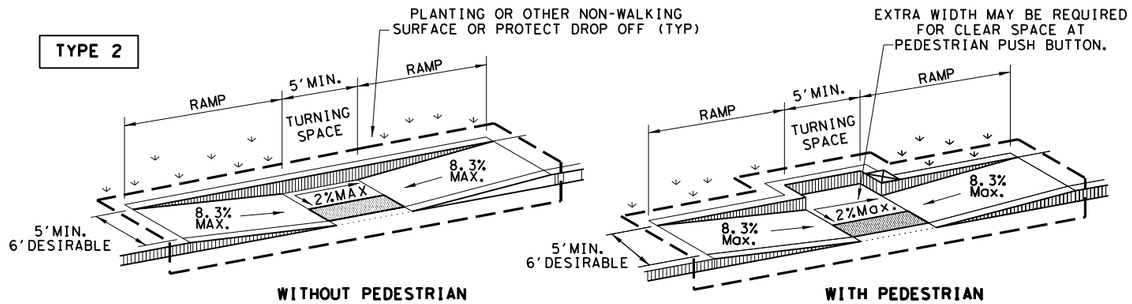
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

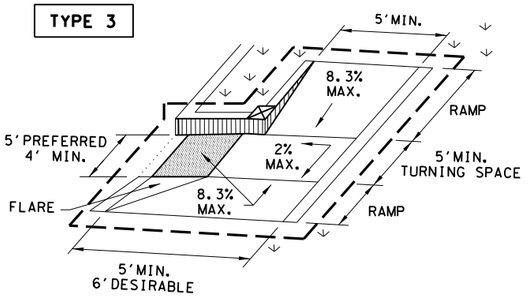


WITHOUT PEDESTRIAN PUSH BUTTON

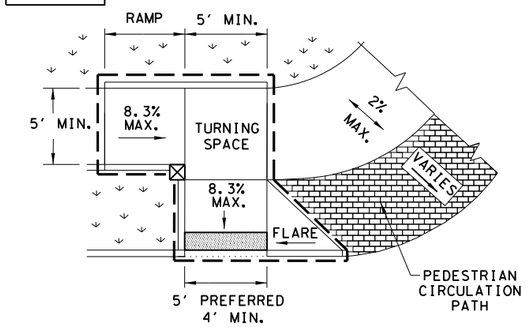
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

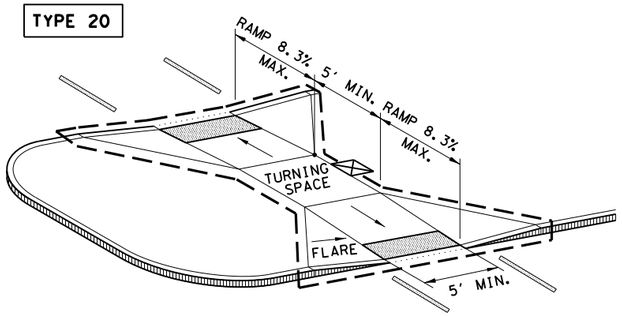


TYPE 6



COMBINATION CURB RAMPS

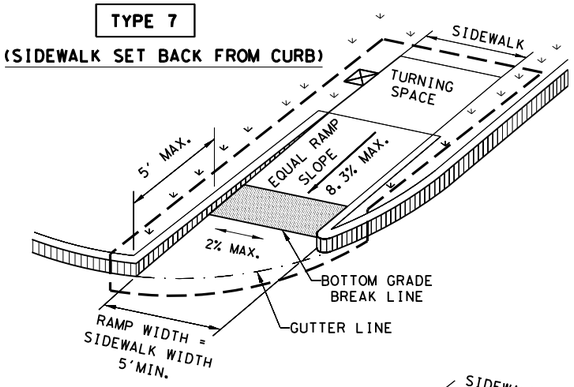
TYPE 20



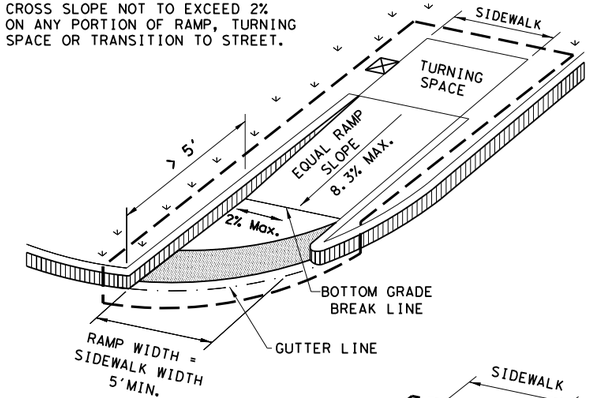
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

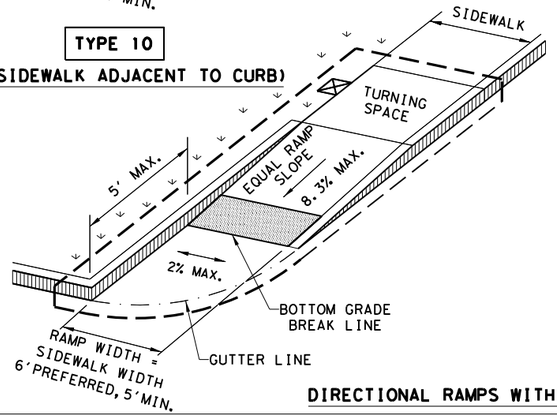


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

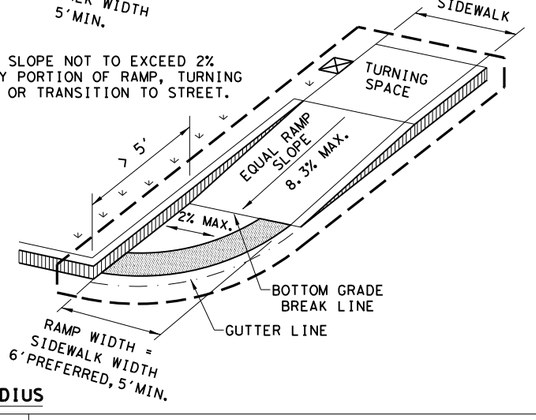


TYPE 10

(SIDEWALK ADJACENT TO CURB)

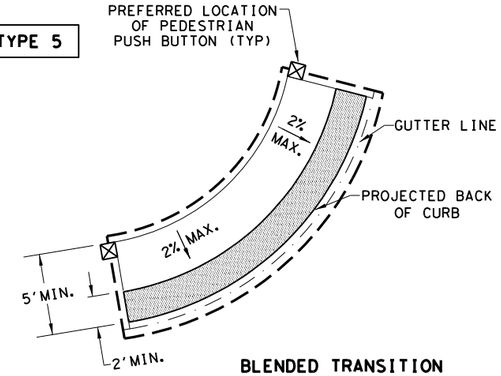


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

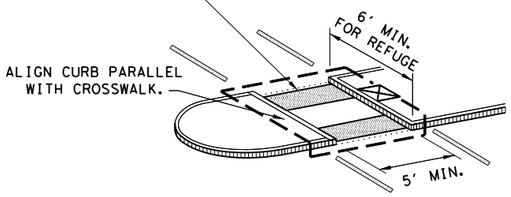
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

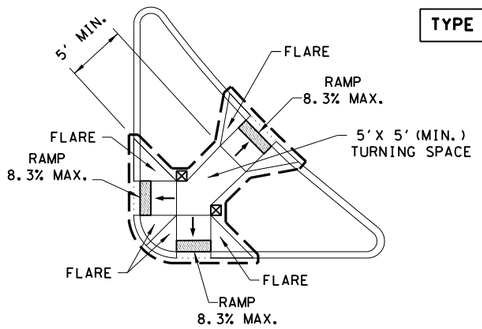
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



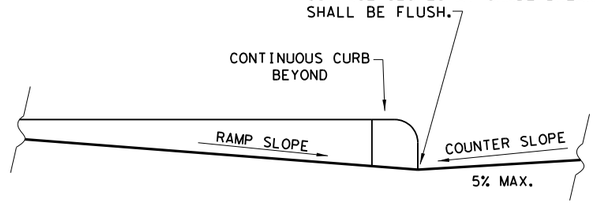
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	1257	01	052, ETC	FM 1092
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		161

DATE:
FILE:

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

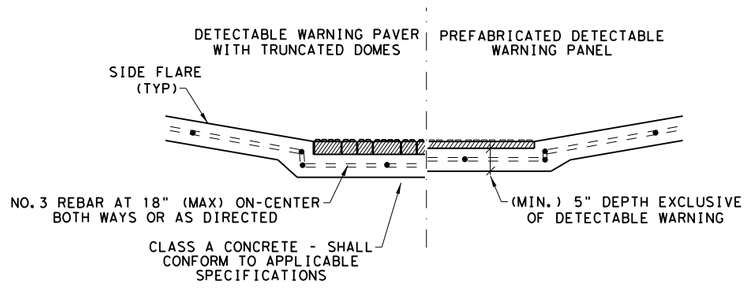
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

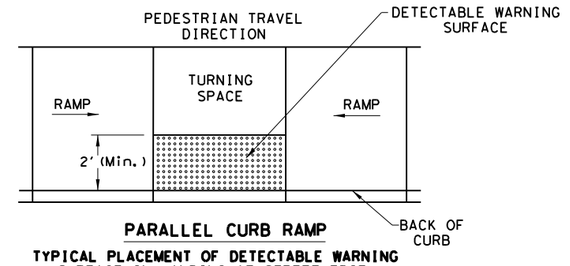
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

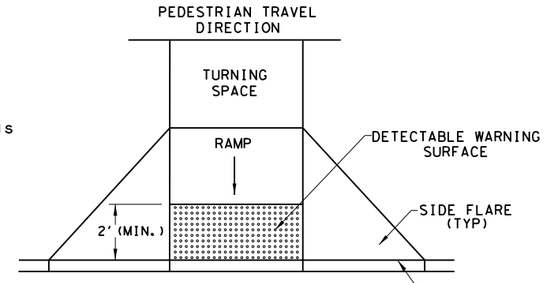


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

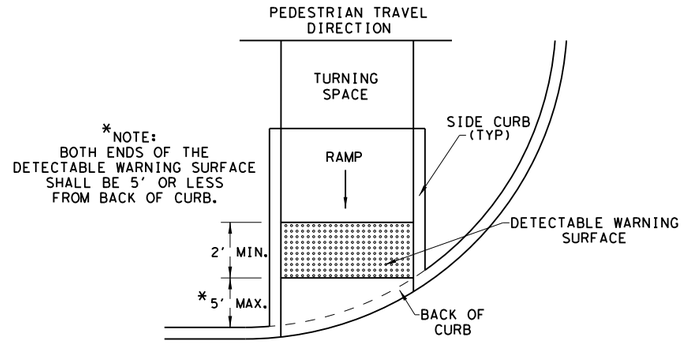
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

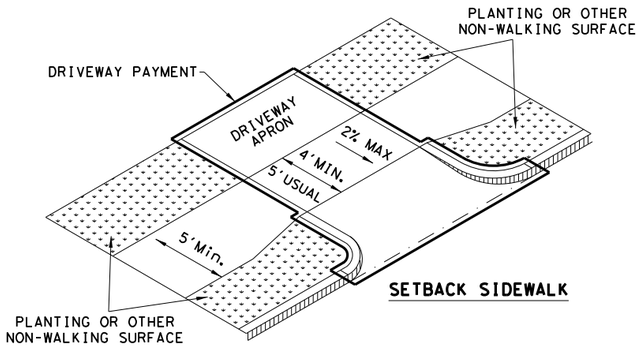
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

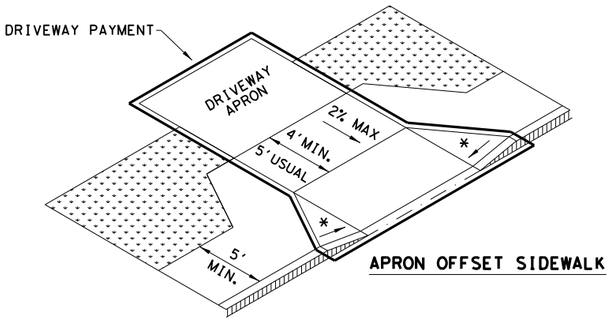
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1257	01	052, ETC	FM 1092	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.	
	HOU	FORT BEND		162	

DATE:
FILE:

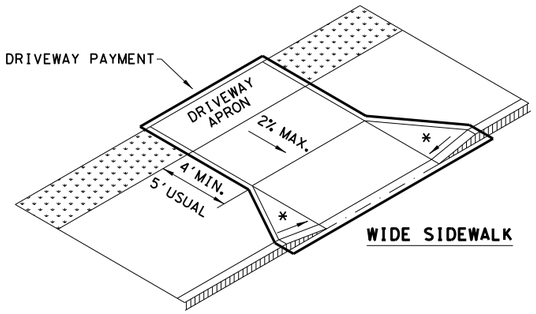
SIDEWALK TREATMENT AT DRIVEWAYS



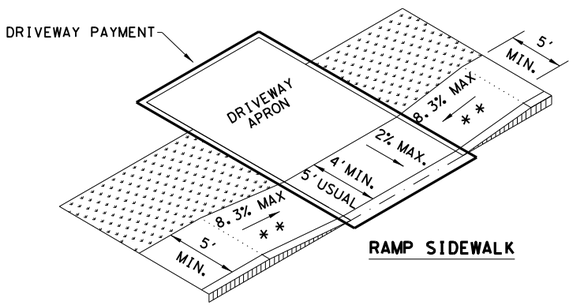
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

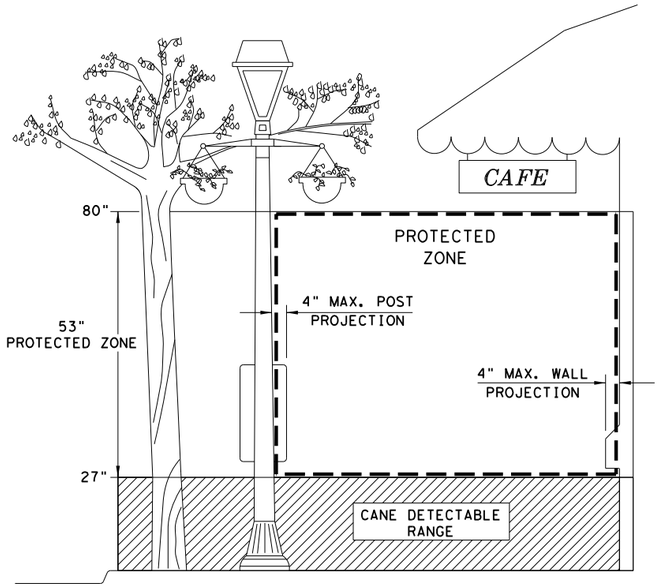


RAMP SIDEWALK

NOTES:

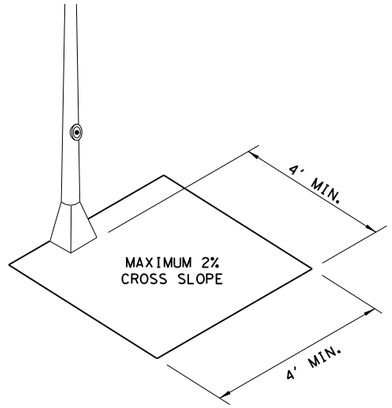
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

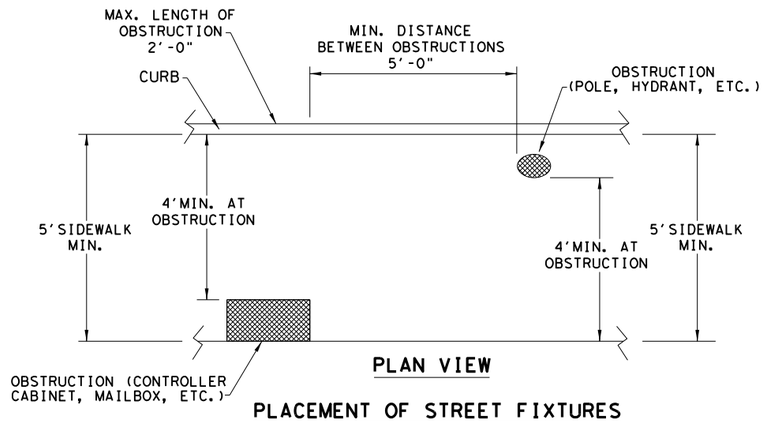


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



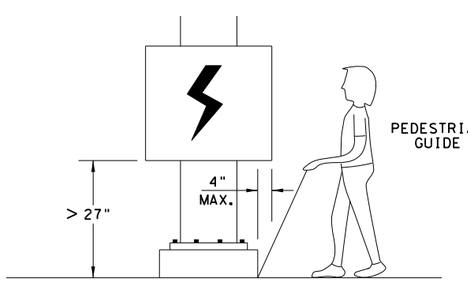
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



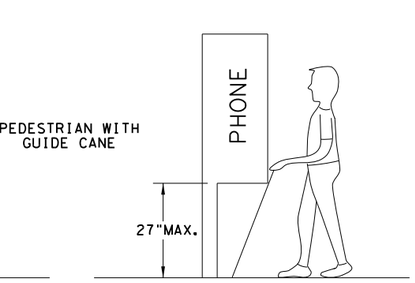
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

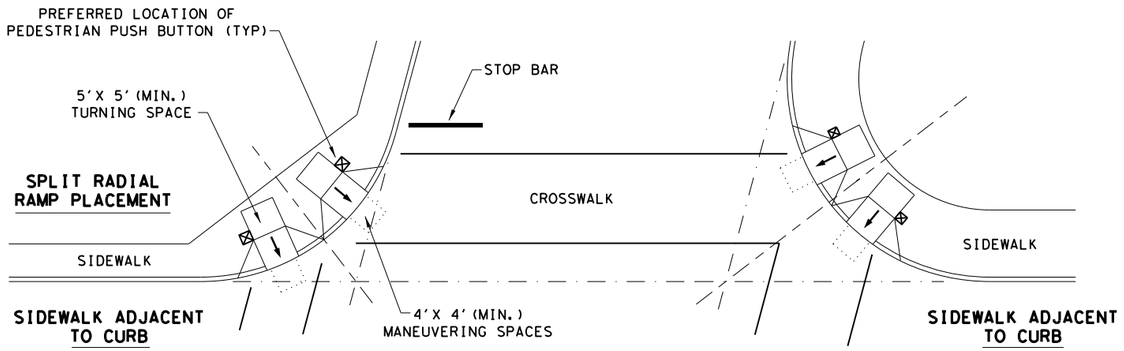
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1257	01	052, ETC	FM 1092	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	HOU	FORT BEND		163	

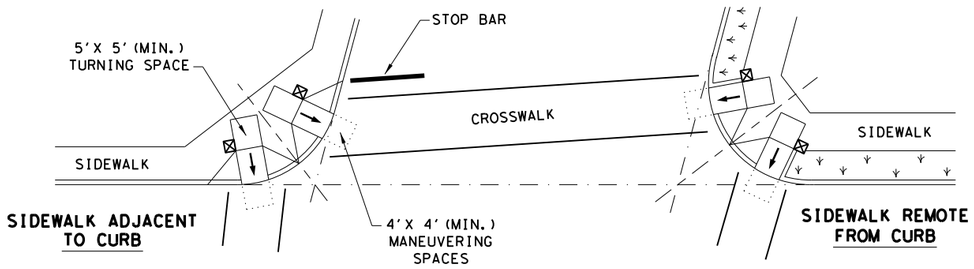
DATE:
FILE:

TYPICAL CROSSING LAYOUTS

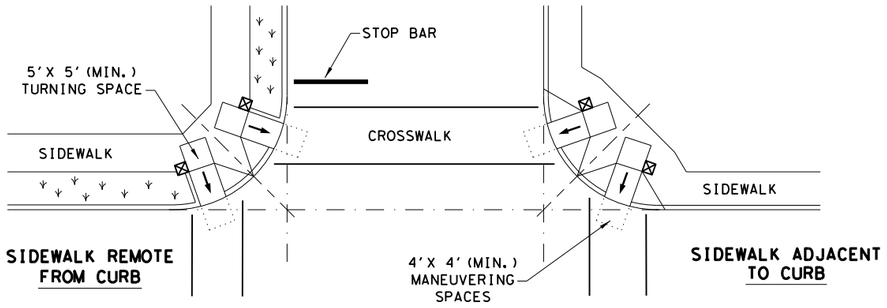
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



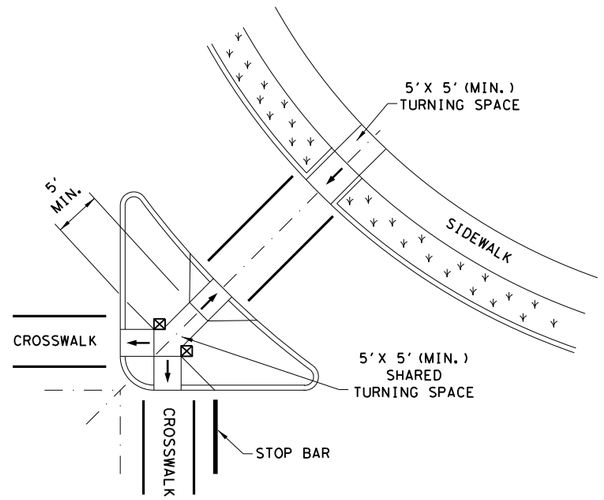
SKEWED INTERSECTION WITH "LARGE" RADIUS



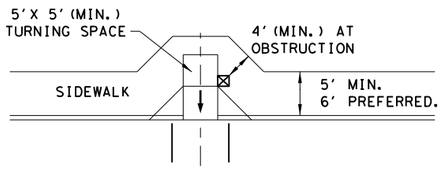
SKEWED INTERSECTION WITH "SMALL" RADIUS

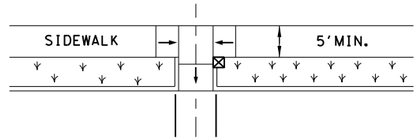


NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND





MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

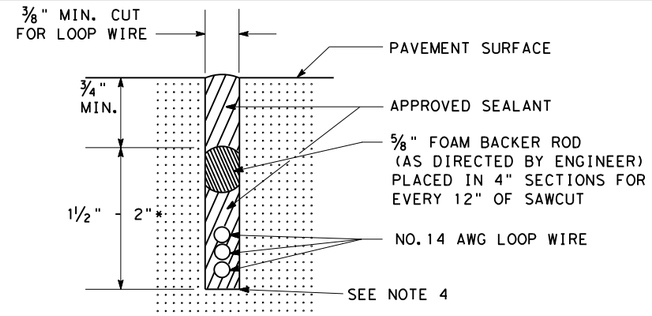
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

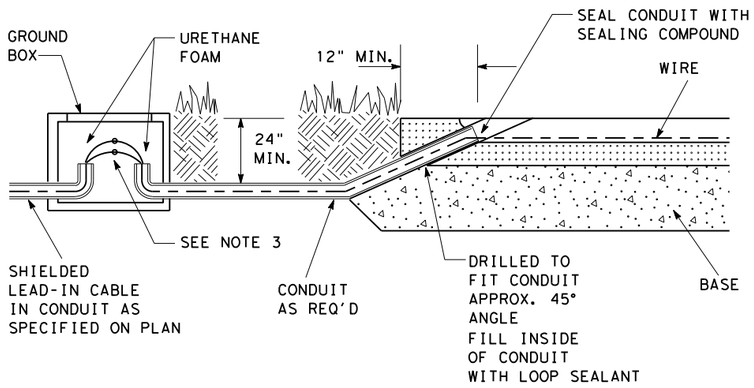
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052, ETC	FM 1092
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		164

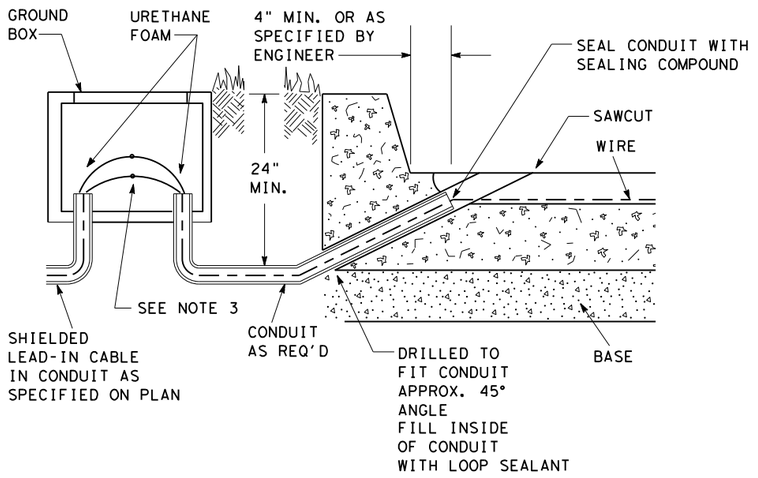


LOOP SAW CUT CROSS-SECTION

* SAWCUTS IN BRIDGE DECKS ARE TYPICALLY 1" DEPTH MAXIMUM
SAWCUTS IN BRIDGE DECKS AND ACROSS EXPANSION JOINTS
SHALL BE AS APPROVED BY ENGINEER

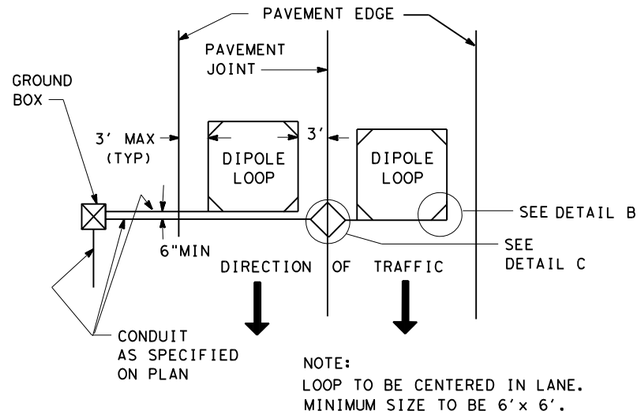


TYPICAL LEAD IN CONFIGURATION (WITHOUT CURBING)

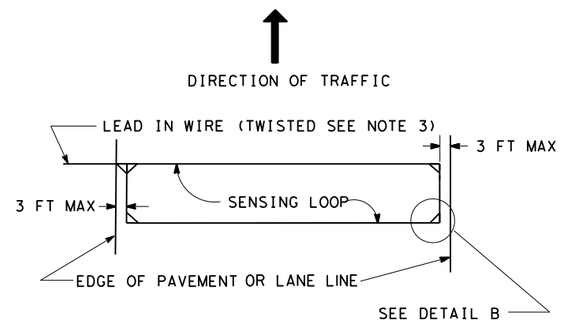


TYPICAL LEAD IN CONFIGURATION (WITH CURBING)

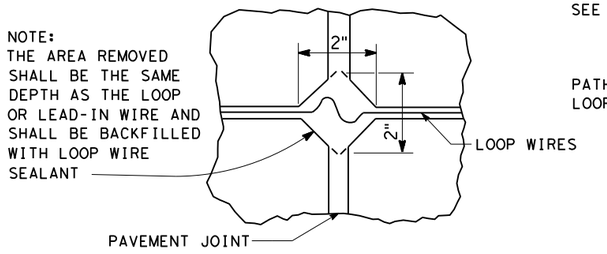
TYPE DET.	NUMBER OF LANES	LENGTH	WIDTH	TURNS OF WIRE
PULSE	1	6 FT.- 12 FT.	6 FT.	4
PULSE	2	13 FT.-26 FT.	6 FT.	3
PULSE	3	27 FT.-39 FT.	6 FT.	2
PULSE	4	40 FT.-46 FT.	6 FT.	1
PRES-ENCE	1	40 FT.	6 FT.	2



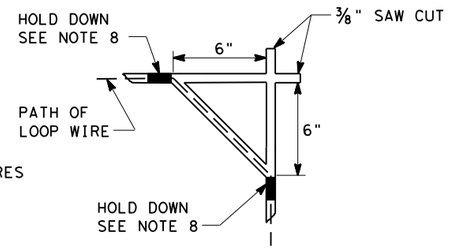
PAVEMENT JOINT DETAILS



TYPICAL LAYOUT OF DIPOLE LOOP



DETAIL C



DETAIL B

TYPICAL ALL FOUR CORNERS
(DIPOLE LOOPS)

NOTES:

1. INSTALL THE LOOP WIRES IN THE SHORTEST TIME PRACTICAL, NOT TO EXCEED 4 HOURS MAXIMUM AND SCHEDULE THIS WORK DURING OFF- PEAK HOURS TO MINIMIZE DELAY TO VEHICLE TRAFFIC.
2. CUT PAVEMENT WITH A CONCRETE SAW TO NEAT LINES AND REMOVE LOOSE MATERIAL. ENSURE A CLEAN AND DRY CUT WHEN PLACING THE SEALING COMPOUND.
3. TWIST LEAD-IN WIRES A MINIMUM OF FIVE TURNS PER FOOT AND DO NOT DISTURB THEM AFTER THE LOOP HAS BEEN TUNED. DO NOT TWIST LOOP WIRES IN SAW CUT.
4. SEAL WIRE PLACED IN THE SAW CUT BY FULLY ENCAPSULATING IT IN A SEALANT ACCEPTABLE TO THE ENGINEER. SEALING COMPOUND SHALL BE IN ACCORDANCE WITH DMS 6340.
5. INSTALL TWO-CONDUCTOR #14 SHIELDED CABLE FROM THE BASE OF A STEEL POLE OR TOP OF A WOOD POLE TO THE CONTROLLER OR AS APPROVED BY THE ENGINEER.
6. ENSURE CONNECTIONS ARE SOLDERED. SEAL SOLDER JOINT WITH SCOTCH CAST OR OTHER METHOD ACCEPTABLE TO THE ENGINEER.
7. FURNISH #14 XHHW LOOP WIRE LOOSELY ENCASED IN A FLEXIBLE VINYL OR PLASTIC TUBE. APPLY A WATERPROOF SEAL TO THE ENDS OF THE VINYL OR PLASTIC TUBING ENCASING THE WIRE IMMEDIATELY AFTER PLACING THE WIRE TO PREVENT MOISTURE FROM ENTERING THE TUBE.
8. SECURE THE LOOP WIRE IN PLACE EVERY 2 FT. WITH SHORT STRIPS OF RUBBER OR NEOPRENE FLEXIBLE TUBING OR POLYETHYLENE FOAM SEALANT BACKER APPROXIMATELY 1 IN. IN LENGTH. LEAVE STRIPS IN PLACE AND FILL THE SLOT WITH LOOP SEALER.
9. INSTALL SAWCUT OF SUFFICIENT DEPTH TO PROVIDE FOR A MINIMUM OF 1 IN. DEPTH OF SEALER OVER THE WIRE.
10. INSTALL EACH LOOP DETECTOR LEAD-IN IN A SEPARATE SAWCUT FROM THE DETECTOR TO THE EDGE OF ROADWAY. SEPARATE THE SAW CUTS AT A MINIMUM OF 6 IN. INSTALL EACH LOOP DETECTOR RUN IN A SEPARATE CONDUIT (SIZE AS REQUIRED) FROM THE EDGE OF ROADWAY TO A GROUND BOX AS SHOWN ON THE PLAN LAYOUT.
11. PLACE LOOP WIRE IN A FLEXIBLE VINYL OR POLYETHYLENE TUBING OF 0.184 IN. MINIMUM I.D., 0.031 IN. MINIMUM WALL THICKNESS AND 0.26 IN. MAXIMUM O.D., HAVING A SMOOTH BORE. ENSURE THE TUBING DOES NOT ADHERE TO THE LOOP WIRE IN any WAY. ENSURE TUBING IS CAPABLE OF RESISTING DETERIORATION FROM OILS, SOLVENTS AND TEMPERATURES UP TO 212°F. ENSURE TUBING IS HIGHLY ABRASION RESISTANT AND REMAINS FLEXIBLE FROM -22°F TO 212°F.

Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS
LOOP DETECTOR DETAILS

LDD

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2015	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 8/2004 7/2012 SPELLING 7/2015 °C TO °F	HOU	6		165
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	FORT BEND	1257	01 052, EIC	FM 1092

STD-M3

TYPICAL LOOP DETECTOR

PLACEMENT LAYOUT FOR DIAMOND INTERCHANGE

(Ø2 IS ALWAYS TO THE CONTROLLER'S LEFT)

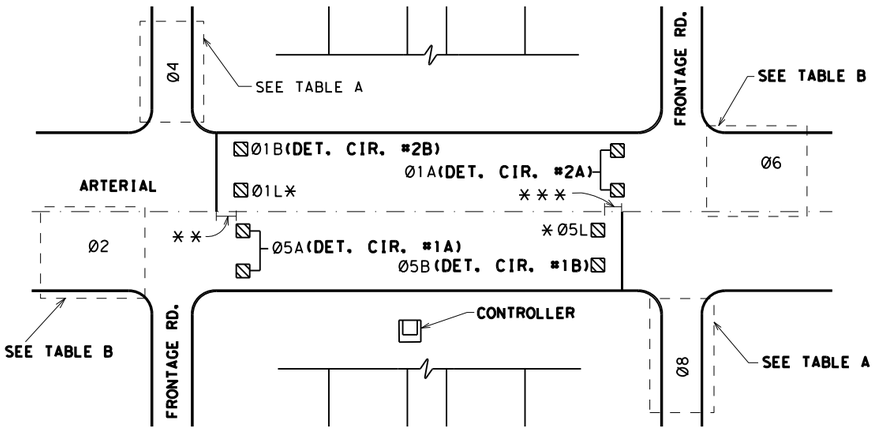
* USE FOR LEFT TURN ONLY

** MAKE SURE TRAFFIC TURNING FROM FRONTAGE ROAD DOES NOT MISS DETECTORS FOR Ø1A AND Ø5A.

*** LOOP PLACEMENT IS 5 FEET FROM STOP LINE

DETECTOR CONNECTIONS

Ø1A LOOP DETECTORS	DETECTOR CIRCUIT #2A
Ø1B LOOP DETECTORS	DETECTOR CIRCUIT #2B
Ø5A LOOP DETECTORS	DETECTOR CIRCUIT #1A
Ø5B LOOP DETECTORS	DETECTOR CIRCUIT #1B



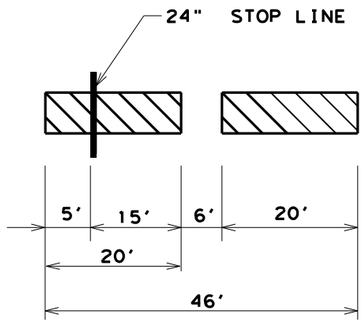
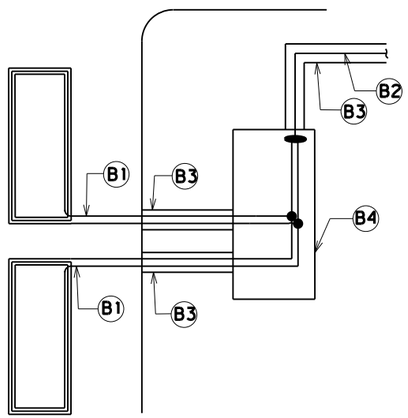


TABLE B

PRESENCE DETECTORS PLACEMENT (LEFT TURN LANE AND (MINOR STREET ONLY)



B1 LOOP WIRE

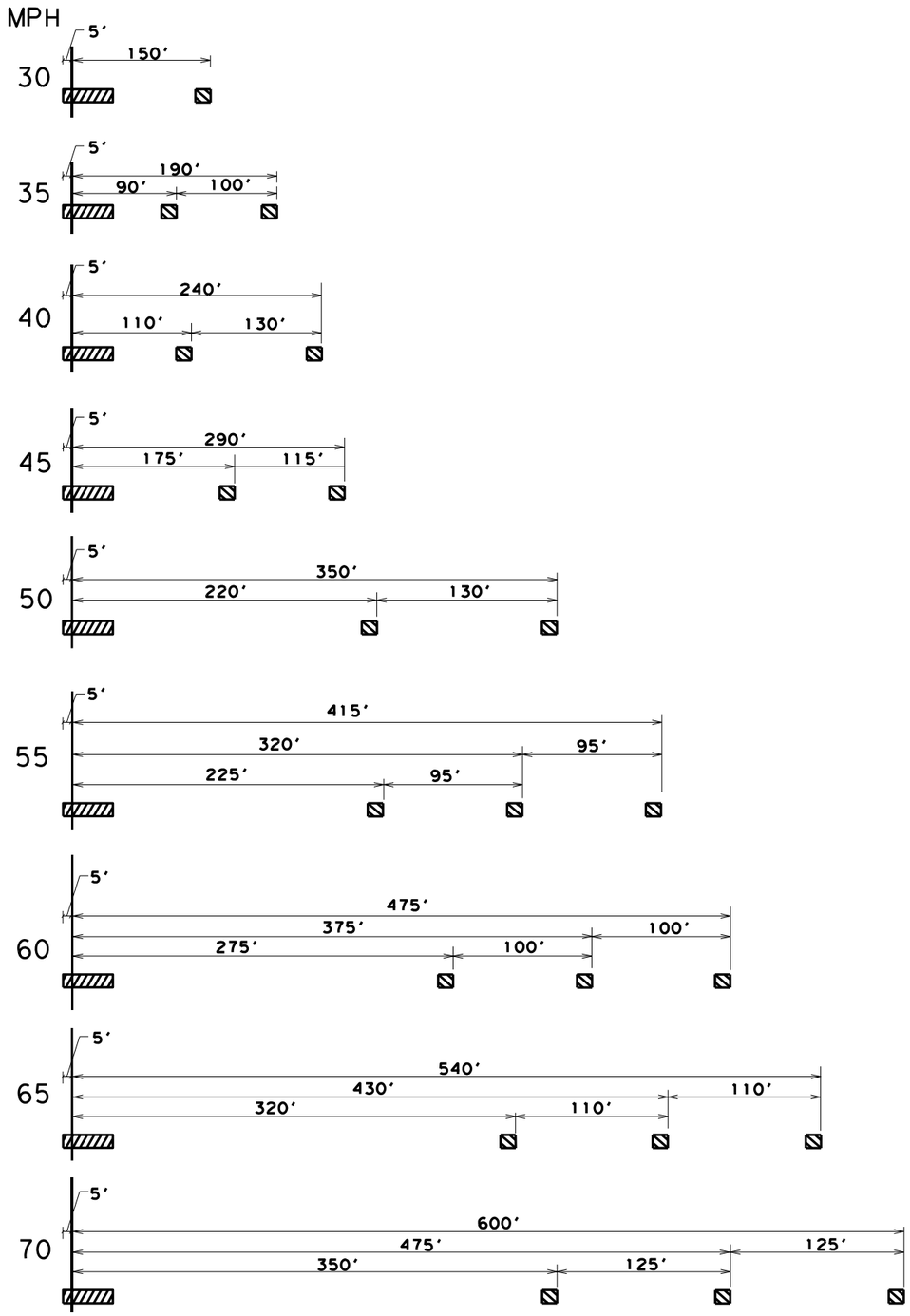
B2 LOOP LEAD-IN TO CONTROLLER

B3 CONDUIT AS REQUIRED

B4 GROUND BOX

CONNECTION

CONNECTION FOR DETECTORS



(6' x 20')

(6' X 6')

24" STOP LINE

TABLE A

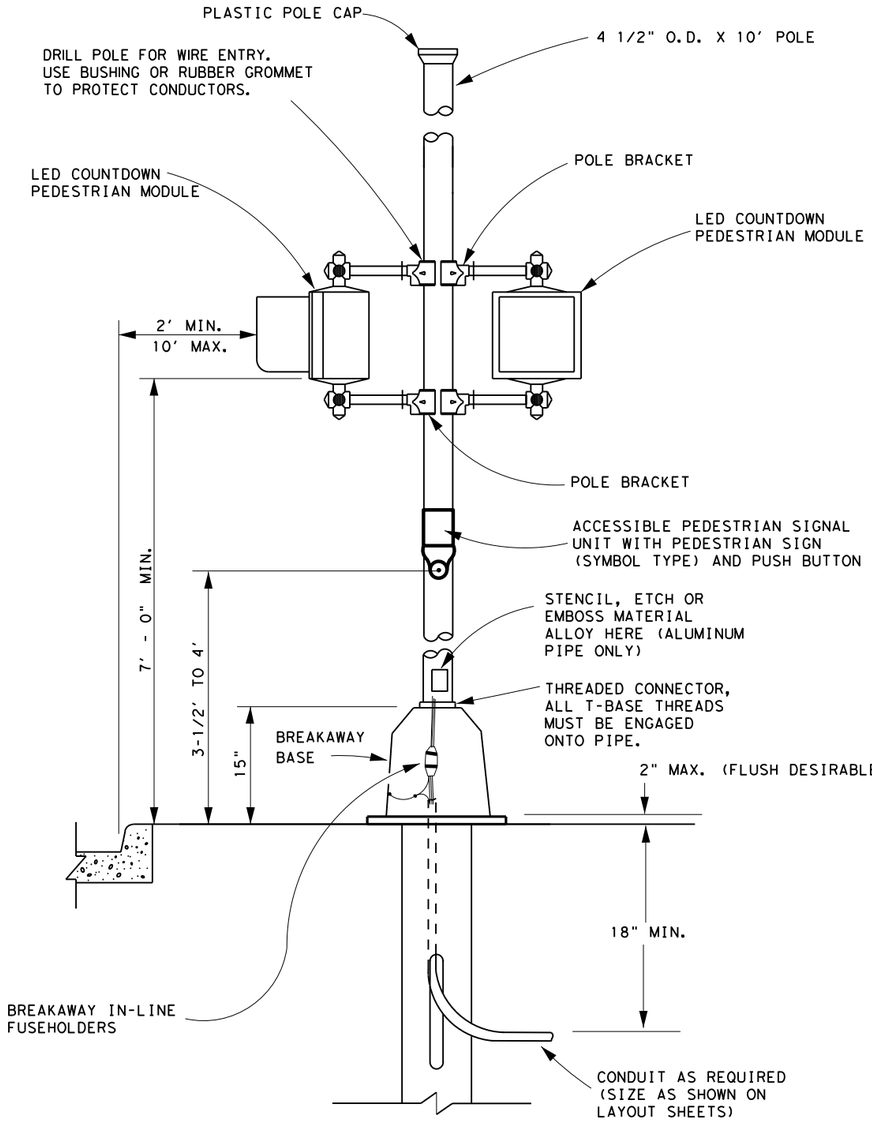
LOOP DETECTORS PLACEMENT ACCORDING TO APPROACH SPEED (NOT TO SCALE)

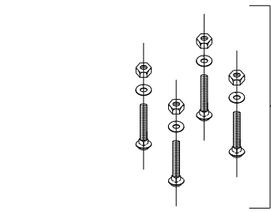
TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

SIGNAL DETAILS/STANDARDS
LOOP DETECTOR DETAILS
PLACEMENT
LDDP

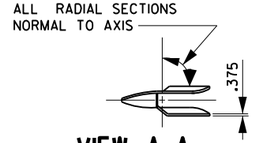
SCALE	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY
N. T. S.	6	TEXAS				FM 1092
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
	HOU	FORT BEND	1257	01	052	166

STD-M18





HARDWARE DETAIL



VIEW A-A

SCREW ANCHOR FOUNDATION DETAIL

NOTE:

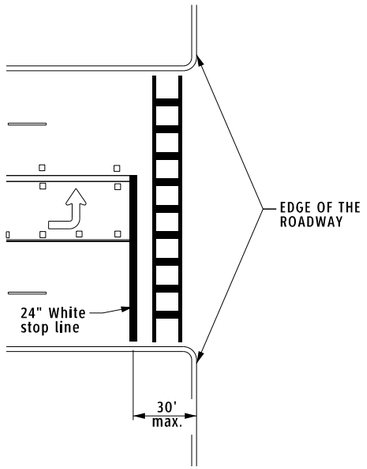
SEE STANDARD (RFBA - 13) FOR NOTES AND
NON - FUSED BREAKAWAY ELECTRICAL CONNECTOR DETAILS

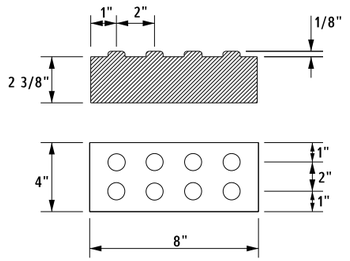
Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS CONSTRUCTION DETAILS FOR POLE MOUNTED (APS) PEDESTRIAN SIGNALS

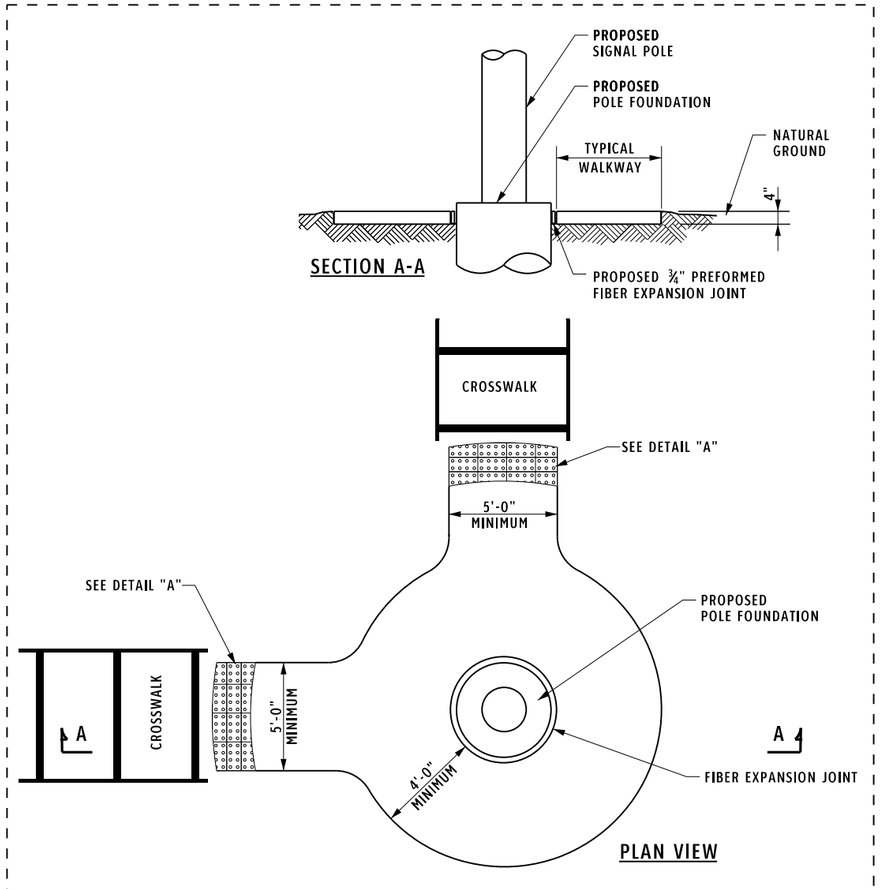
CD/PM(APS)PS

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2012	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 07-14 02-15	HOU	6		167
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	FORT BEND	1257	01	052	FM 1092





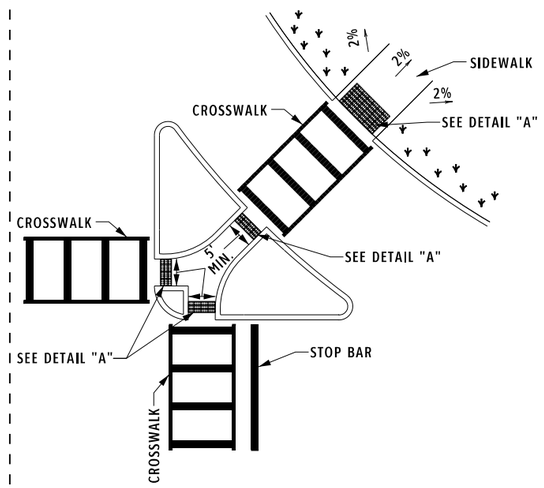
DETAIL "A"

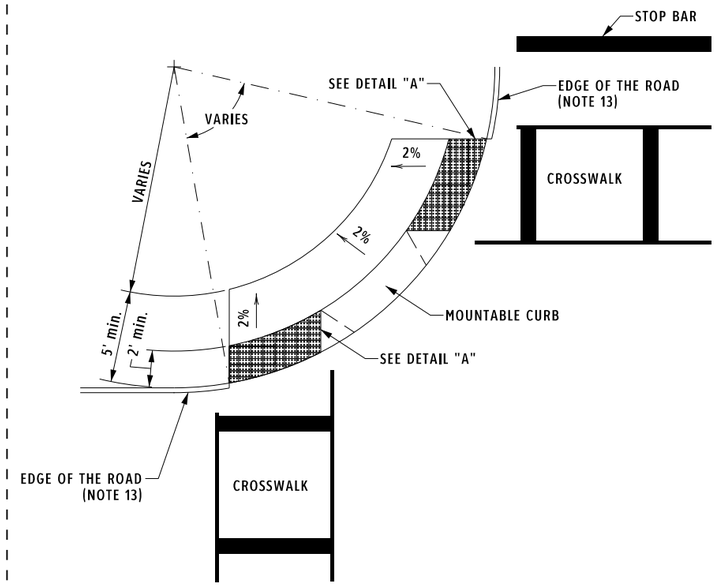


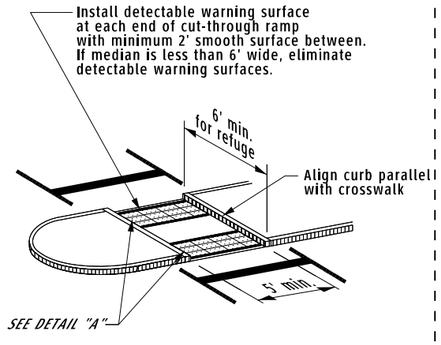
PLAN VIEW

Pedestrian Facilities
General Notes

1. All slopes are maximum allowable. The least possible slope that will still drain properly should be used. Adjust access pad length or grade of approach sidewalks as directed.
2. Detectable Warning Paver shown in Detail "A" will be subsidiary to the Bid Item 531.
3. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the edge of pavement, a 6' sidewalk width is encouraged. Where a 5' sidewalk can not be provided due to site constraints, a minimum 3' sidewalk with 5'x 5' passing areas at intervals not to exceed 200' is required.
4. Landings shall be 5'x 5' minimum with a maximum 2% slope in any direction.
5. Maneuvering space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
6. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
7. Additional information on access pads/sidewalks location, design, light reflective value and texture may be found in the current edition of the Texas Accessibility Standards (TAS) and 16 TAC §68.102.
8. To serve as a pedestrian refuge area, the median should be a minimum of 5' wide. Medians should be designed to provide accessible passage over or through them.
9. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
10. Existing features that comply with TAS may remain in place unless otherwise shown on the plans.
11. Access pads/side walks and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
12. Provide a smooth transition where the access pad/side walk connect to the street.
13. If ramps are in rural locations, curbs may not exist and shoulders may be present.







TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT

ACCESS PAD RAMP DETAILS

ACCRD

SCALE	FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY
N. T. S.	6	TEXAS					TEXAS
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB		SHEET NO.
	HOU	FORT BEND	1257	01	052		168

DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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		DIST	COUNTY		SHEET NO.
		HOU	FORT BEND		169

71A

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

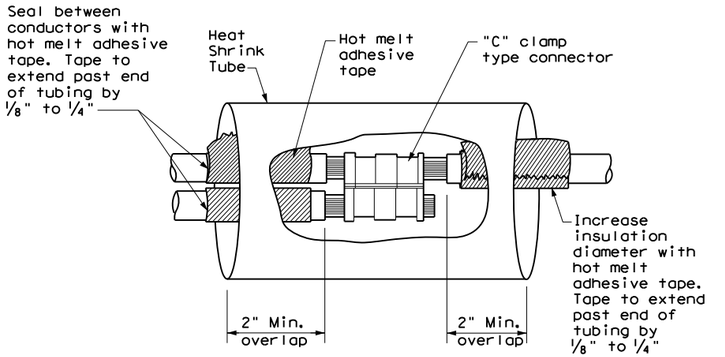
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

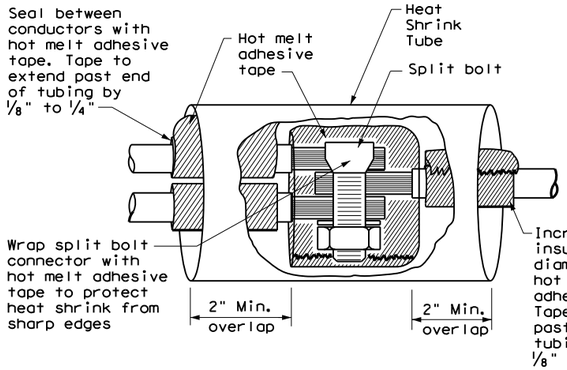
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

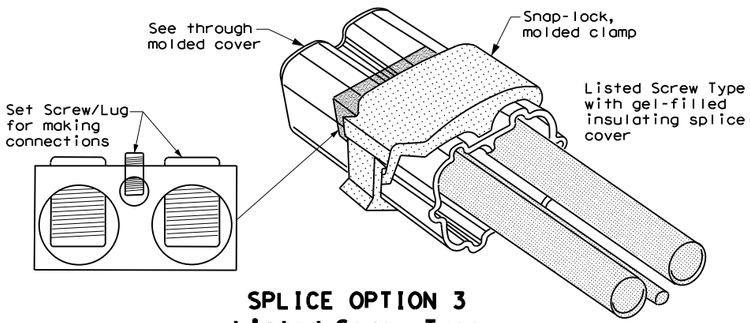
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

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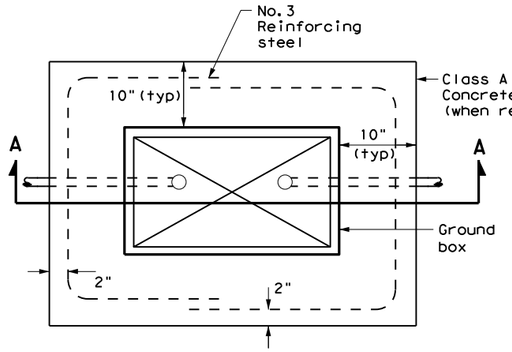
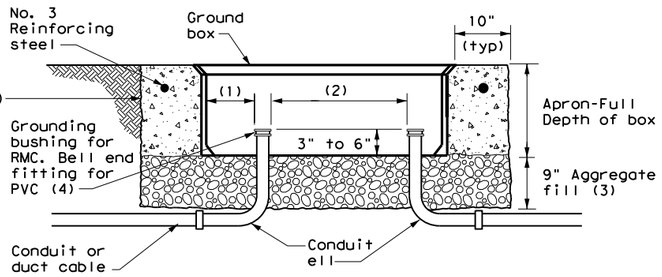


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

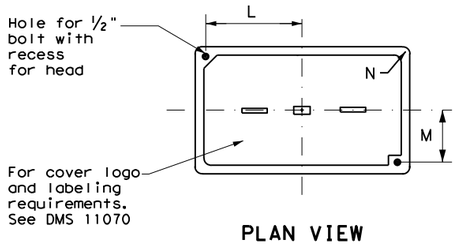
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

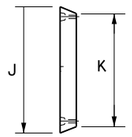
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



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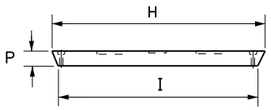

SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

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REVISIONS	1257	01	052,ETC.	FM 1092
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71D

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☐ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

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 area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

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

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Mar 18, 2020
FILE:

Version 2.1

Texas Department of Transportation | TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1257	01	052,etc.	FM 1092
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	Hou	Ft. Bend/Harris		172

SITE DESCRIPTION

PROJECT LIMITS: FM 1092 FROM IH 69 TO SH 6

PROJECT DESCRIPTION: CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING OF BASE REPAIR, 1.5" PLANING, SEAL COAT, 1" TOM OVERLAY, SIGNING AND PAVEMENT MARKINGS

MAJOR SOIL DISTURBING ACTIVITIES: N/A

TOTAL PROJECT AREA: 76 AC

TOTAL AREA TO BE DISTURBED: N/A

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): N/A

EXISTING CONDITION OF SOIL & VEGETATIVE
COVER AND % OF EXISTING VEGETATIVE COVER: N/A

NAME OF RECEIVING WATERS:
RUNOFF WILL BE RECEIVED BY STAFFORD RUN AND OYSTER CREEK.
BOTH CREEKS UTIMATELY DRAIN INTO THE BRAZOS RIVER (SEGMENT 1202)
BRAZOS RIVER BASIN.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

____ TEMPORARY SEEDING
____ PERMANENT PLANTING, SODDING, OR SEEDING
____ MULCHING
____ SOIL RETENTION BLANKET
____ BUFFER ZONES
____ PRESERVATION OF NATURAL RESOURCES

OTHER: N/A

STRUCTURAL PRACTICES:

____ SILT FENCES
____ HAY BALES
____ ROCK BERMS
____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS
____ PAVED FLUMES
____ ROCK BEDDING AT CONSTRUCTION EXIT
____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS
____ SEDIMENT TRAPS
____ SEDIMENT BASINS
____ STORM INLET SEDIMENT TRAP
____ STONE OUTLET STRUCTURES
____ CURBS AND GUTTERS
____ STORM SEWERS
__X__ VELOCITY CONTROL DEVICES
__X__ EROSION CONTROL LOGS

OTHER: ____

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES: ____

1. INSTALL ANY SWP3 AS DIRECTED BY ENGINEER.
2. MAINTAIN THE SWP3 DURING THE CONSTRUCTION TIME.
3. REMOVE THE SWP3 WHEN THE WORK IS COMPLETED.

STORM WATER MANAGEMENT: STORM WATER DRAINAGE WILL BE FACILITATED BY EXISTING ROADSIDE DITCHES AND STORM INLETS SYSTEM.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The area adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: All inspections will be performed by a TxDOT inspector per one of the options below as directed by the Area Engineer
1. At least every 7 calendar days
2. At least every 14 days or after 0.5 inches or more of rainfall
An inspection and maintenance report should be made for each inspection. Based on the inspection results, the controls shall be revised according to the inspection report.

WASTE MATERIALS: The dumpster used to store all waste material will meet all state and local city solid waste management regulations. All trash and construction debris will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation and the trash will be hauled to a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): In the event of a spill which may be considered hazardous, the Houston District Safety Office shall be contacted immediately at 713-802-5962.

SANITARY WASTE: All Sanitary Waste will be collected from the portable units as necessary or as required by local regulations by a licensed sanitary waste management contractor.

OFFSITE VEHICLE TRACKING:

__X__ HAUL ROADS DAMPENED FOR DUST CONTROL
____ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
__X__ EXCESS DIRT ON ROAD REMOVED DAILY
____ STABILIZED CONSTRUCTION ENTRANCE

OTHER: ____

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the sediment that may enter receiving waterways. Disposal areas shall not be located in any waterway, waterbody or streambed. Construction staging areas and vehicle maintenance areas shall be constructed by the contractor in a manner which minimizes the runoff of all pollutants. All waterways shall be cleared as soon as practical of temporary embankments, temporary bridges, matting, falsework, piling, debris, and other obstructions placed during construction operations that are not part of the finished work.

STATE OF TEXAS
TAN N. LUONG
107515
LICENSED PROFESSIONAL ENGINEER

09-27-2021

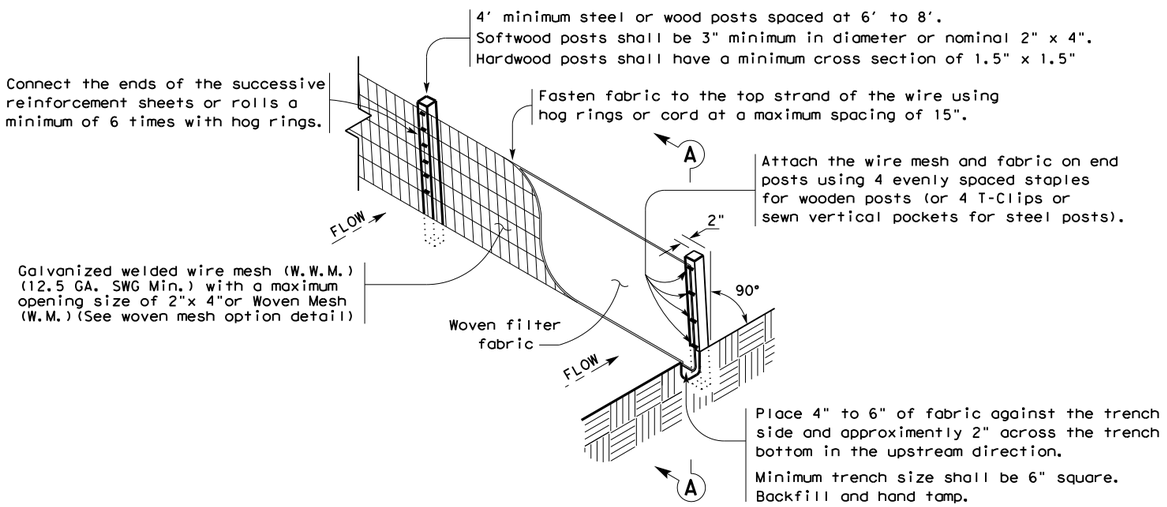
Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

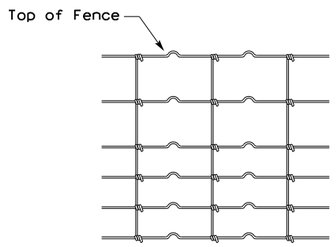
FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 9/2010 INSPECTION NOTE 9/2013 INSPECTION NOTE 11/2013 SW3P TO SWP3 03/2015 2014 SPECS	HOU	6		173
	COUNTY		CONTROL SECT JOB	HIGHWAY
	FORT BEND		HOU 1257 01	FM 1092

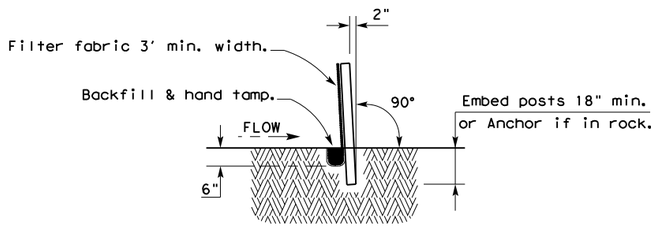
STD G-1



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.

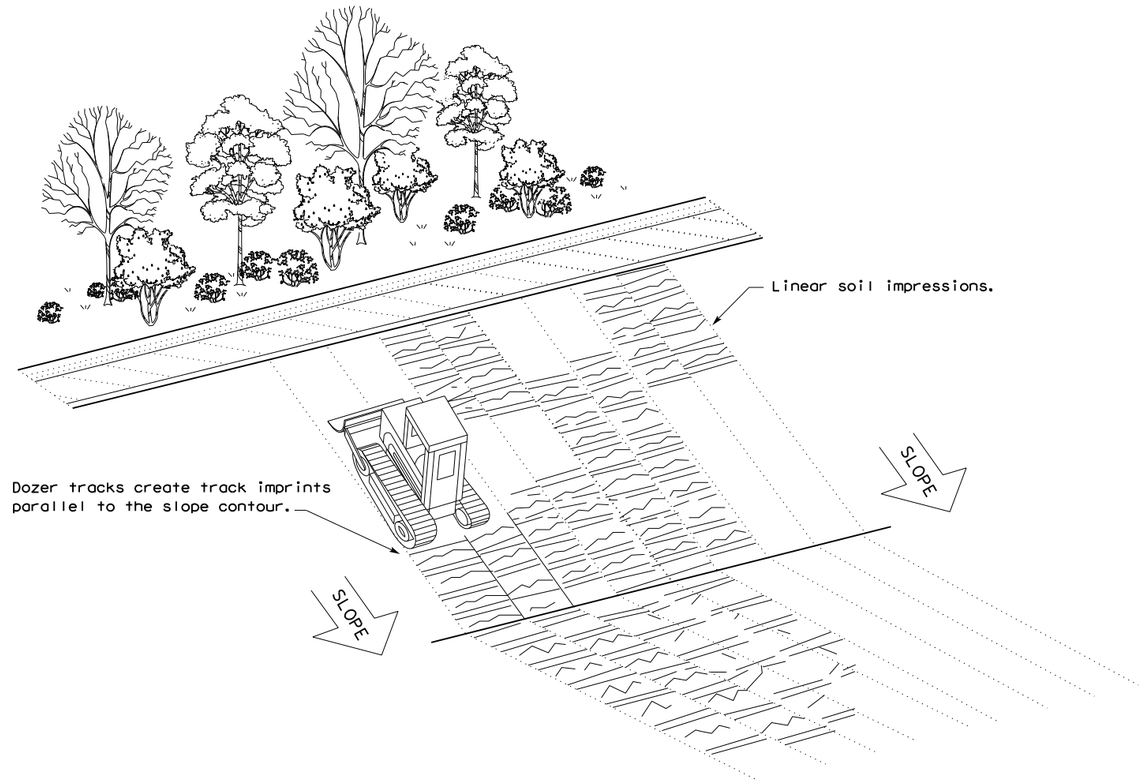
LEGEND

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

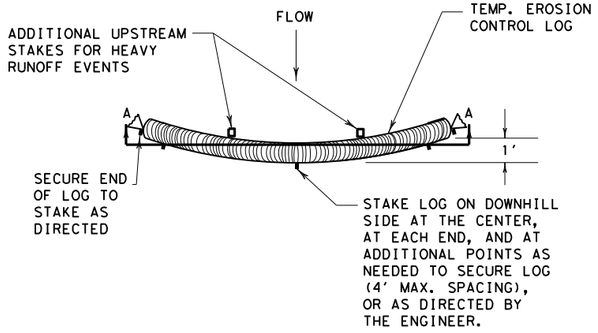
FENCE & VERTICAL TRACKING

EC(1)-16

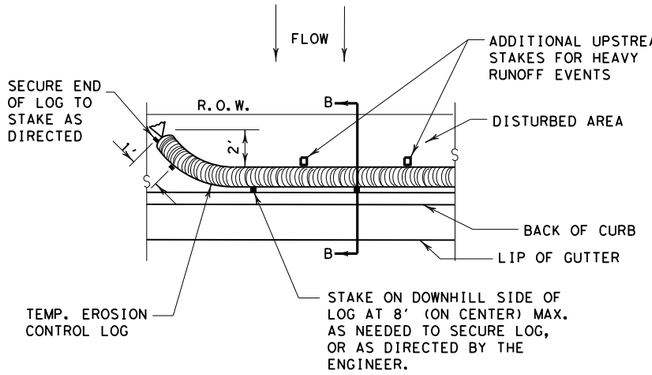
FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1257	01	052, ETC.		FM 1092	
	DIST	COUNTY			SHEET NO.	
	HOU	FORT BEND			174	

DATE
FILE

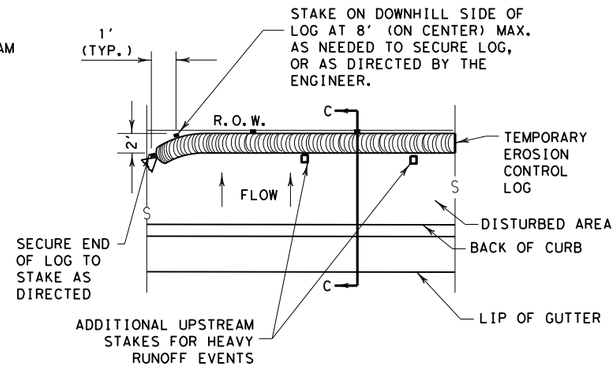
DATE:
FILE:



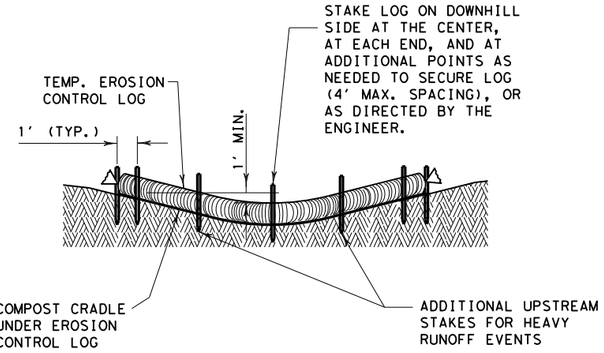
PLAN VIEW



PLAN VIEW



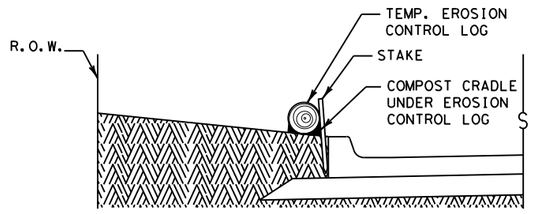
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

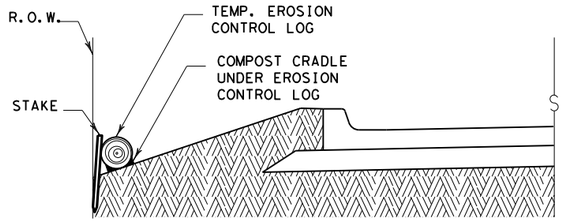
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

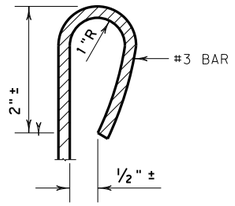
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

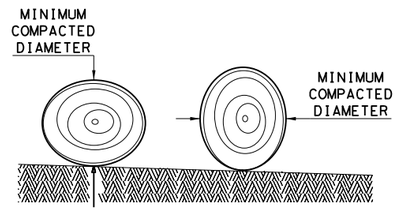
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1257	01	052, ETC.		FM 1092	
	DIST		COUNTY			SHEET NO.
	HOU		FT BEND			175

DATE:
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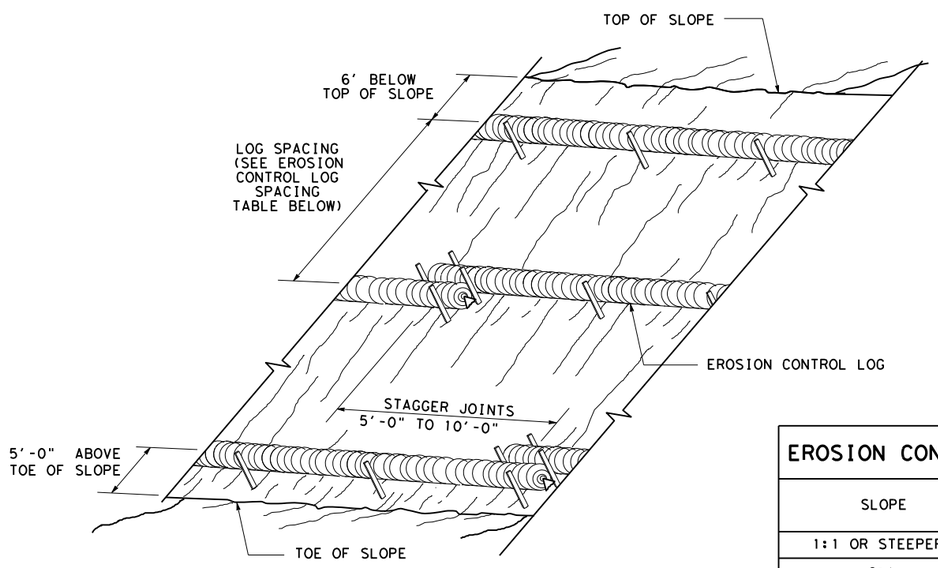
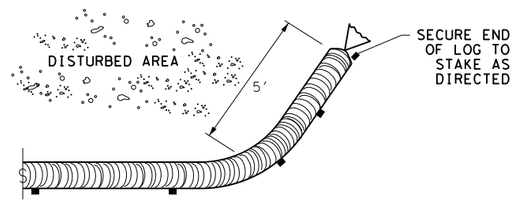


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

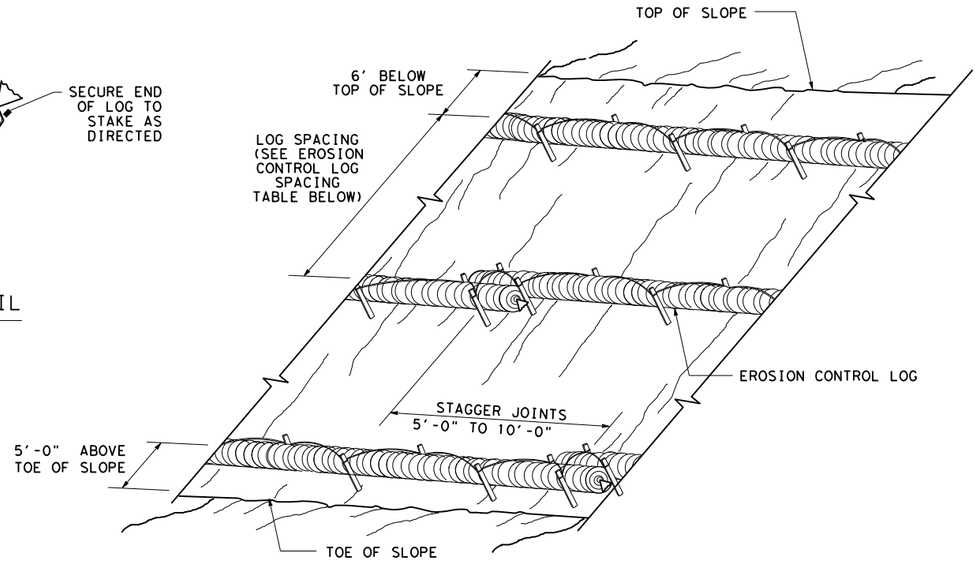
CL-SST



END SECTION RAP DETAIL

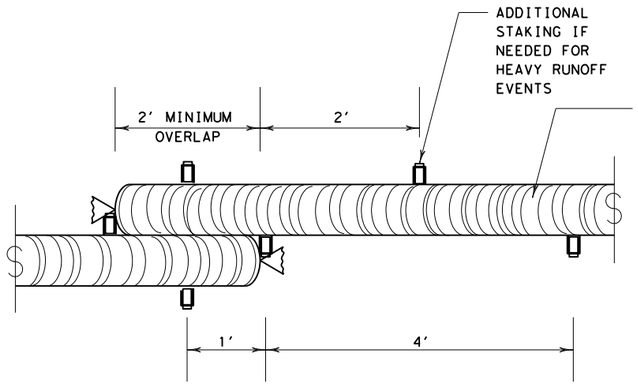
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

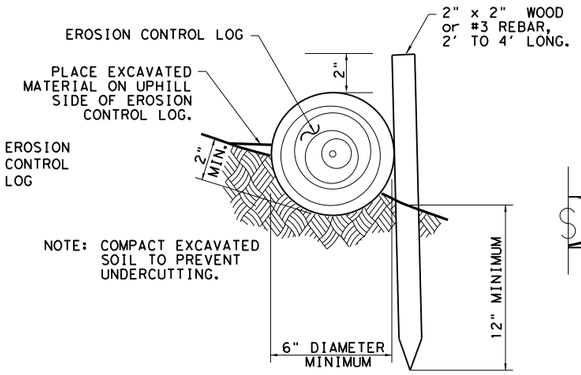
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

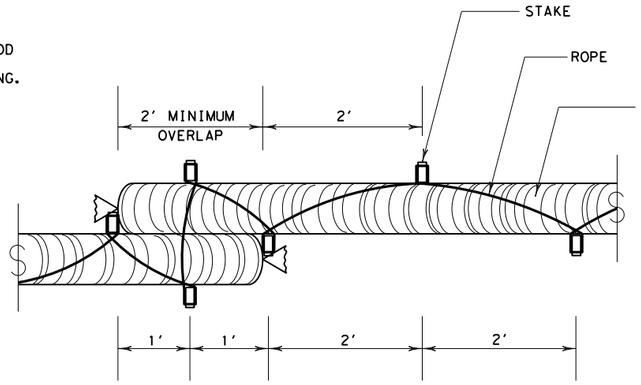


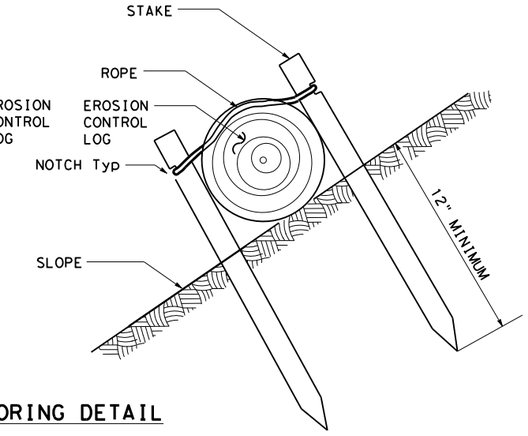


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

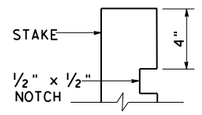
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1257	01	052, ETC.	FM 1092	
	DIST	COUNTY		SHEET NO.	
	HOU	FT BEND		176	

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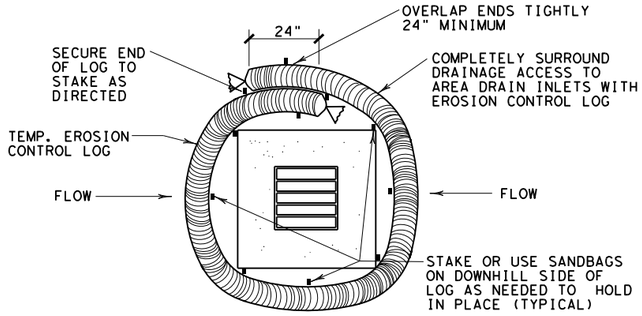
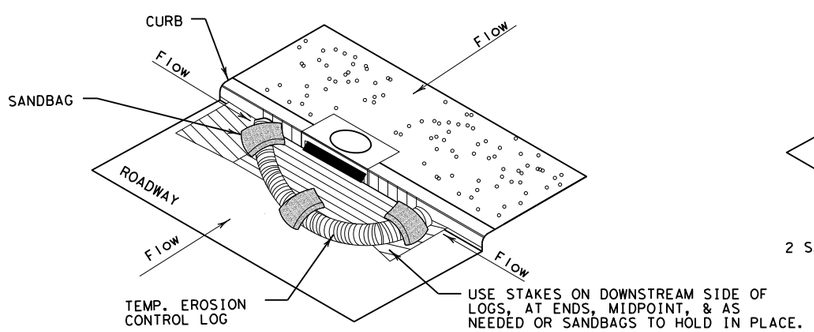


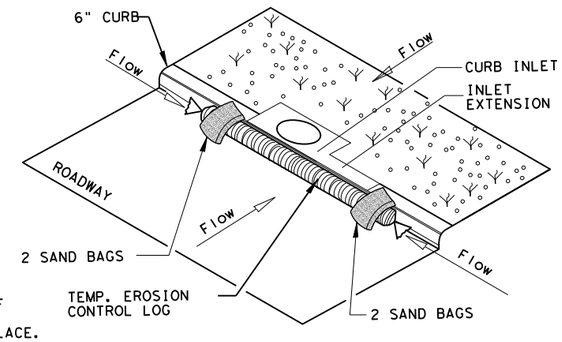
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

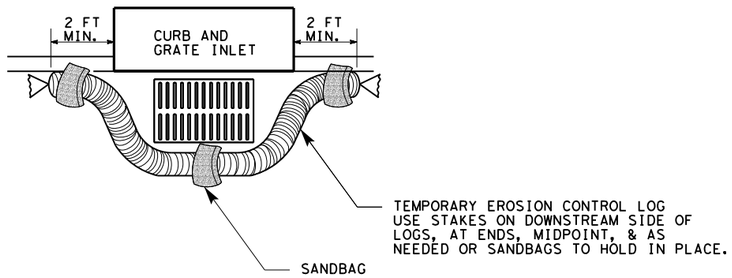
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

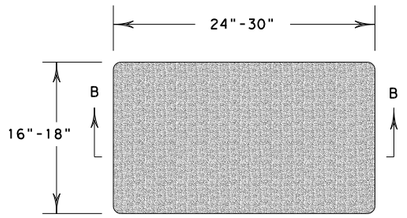
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	1257	01	052, ETC.		FM 1092		
	DIST	COUNTY			SHEET NO.		
	HOU	FT BEND			177		