INDEX OF SHEETS
SEE SHEET 2

NO TDLR REQUIRED

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. C 500-3-635, ETC
CSJ 0500-03-635, ETC

IH 45
HARRIS COUNTY

CSJ	LIMITS	STATION	ROADWAY		BRIDGE		TOTAL	
			FT	MI	FT	MI	FT	MI
0500-03-635	SL 8 SOUTH TO ALMEDA GENOA RD	348+01.54 TO 456+00	10,798.46	2.045	-	-	10,798.46	2.045
0500-03-636	MAIN ST TO LINK RD	1263+75.78 TO 1328+08.00	6,432.22	1.218	-	-	6,432.22	1.218

FUNCTIONAL CLASSIFICATION:
URBAN FRONTAGE ROAD

DESIGN SPEED	
MAIN LANES	N/A MPH
ACCESS ROADS	N/A MPH
RAMPS	N/A MPH
FRONTAGE ROADS	35 MPH

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	C 500-3-635, ETC		1
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0500	03	635, ETC	IH 45

DESIGN ADT

	IH 45 FRTG ROADS SL 8 TO ALMEDA-GENOA	IH 45 FRTG ROADS ALMEDA-GENOA TO SL 8		IH 45 FRTG ROADS N. MAIN ST TO LINK RD	IH 45 FRTG ROADS LINK RD TO N. MAIN ST
2024	19,180	20,201	2024	7,596	7,048
2044	20,417	27,825	2044	10,518	9,759

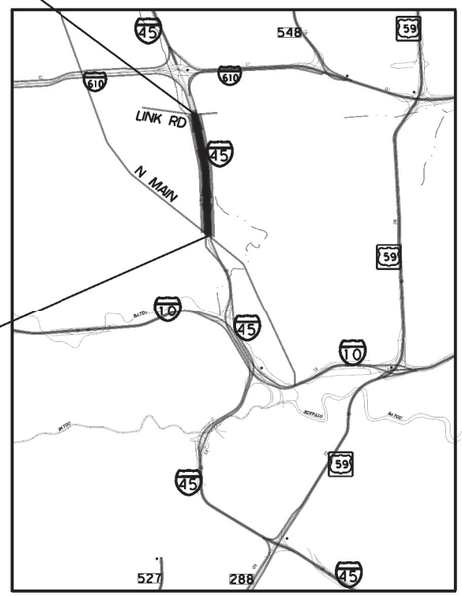
LIMITS: FROM SL 8 SOUTH TO ALMEDA GENOA RD, ETC
FOR THE CONSTRUCTION OF SAFETY IMPROVEMENT PROJECTS
CONSISTING OF ASPHALT PAVEMENT AND OVERLAY, ETC

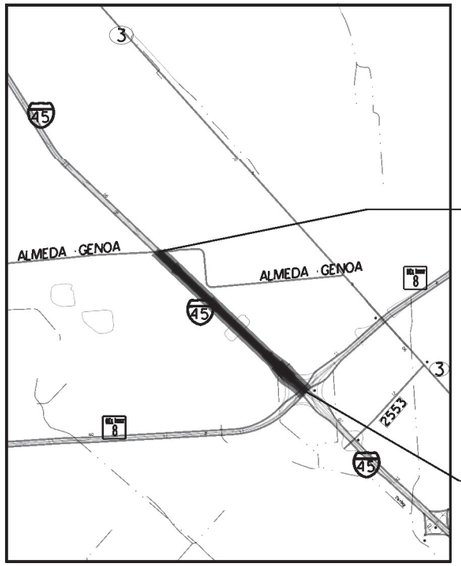
PROJECT'S DESC : MILL & OVERLAY EXISTING FRTG ROADS, REPLACE PAVEMENT MARKINGS & SIGNAGE ETC.

NET LENGTH OF PROJECT
RDWY = 17,230.68 FT = 3.263 MI
BRIDGE = 0.0 FT = 0.0 MI
TOTAL = 17,230.68 FT = 3.263 MI

END CSJ: 0500-03-636
STA 1328+08.00
MP: 27.283
REF MKR: 51+0.190
N: 13,860,901.29
E: 3,118,874.44

BEGIN CSJ: 0500-03-636
STA 1263+75.78
MP: 26.064
REF MKR: 49+0.887
N: 13,854,525.94
E: 3,119,516.76





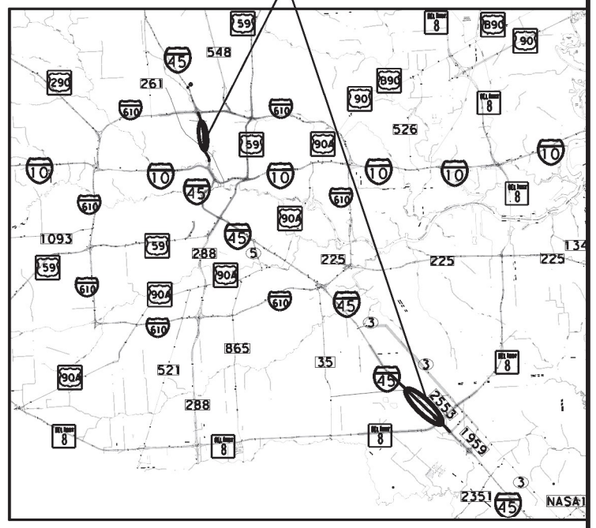
BEGIN CSJ: 0500-03-635
STA 348+01.54
MP: 8.683
REF MKR: 32+0.594
N: 13,797,030.10
E: 3,166,634.51

END CSJ: 0500-03-635
STA 456+00
MP: 10.713
REF MKR: 34+0.706
N: 13,789,477.19
E: 3,174,352.03

PROJECT LOCATION

NTS
RR CROSSINGS : NONE
EXCEPTIONS : NONE
EQUATIONS : NONE

PROJECT LOCATION



VICINITY MAP

CONCURRENCE:

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

Director of Houston Public Works Date

SUBMITTED FOR LETTING: 4/22/2024

DocuSigned by:
Pat Nwachukwu P.E.
32C86996739A4BB...
SUPERVISING DESIGN ENGINEER

APPROVED FOR LETTING: 5/22/2024

DocuSigned by:
Brett McLeod
FE9C2D7C24E843D...
for DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED LABOR PROVISIONS FOR STATE PROJECT: SP 000-008.

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

COUNTY HARRIS PROJ. NO. C 500-3-635, ETC
HWY. NO. IH 45 LETTING DATE AUGUST 2024
DATE ACCEPTED

INDEX OF SHEETS
SEE SHEET 2

NO TDLR REQUIRED

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. C 500-3-635,ETC
CSJ 0500-03-635,ETC

IH 45
HARRIS COUNTY

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DESIGN ADT					
	IH 45 FRTG ROADS			IH 45 FRTG ROADS	
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2024	19,180	20,201	2024	7,596	7,048
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FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	C 500-3-635,ETC		1
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0500	03	635,ETC	IH 45

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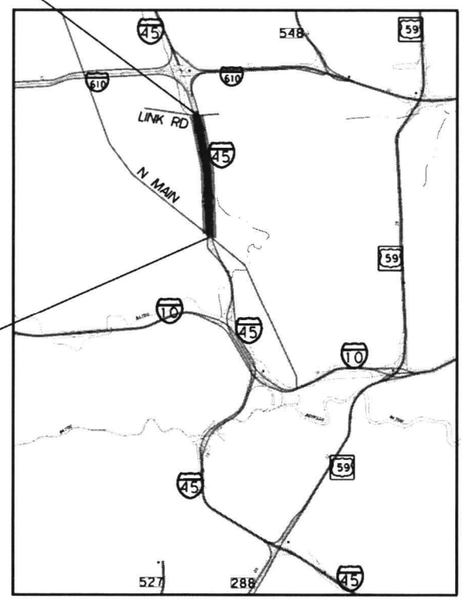

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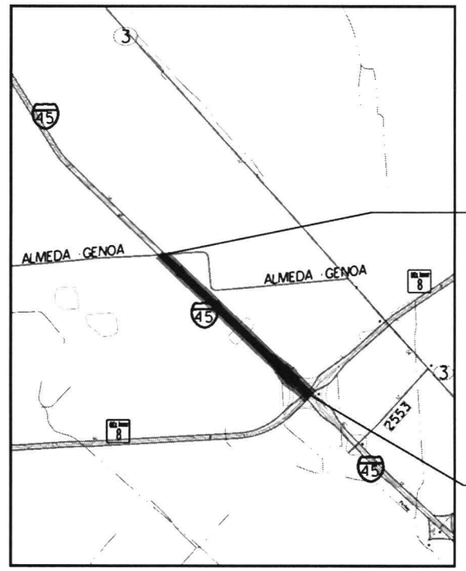

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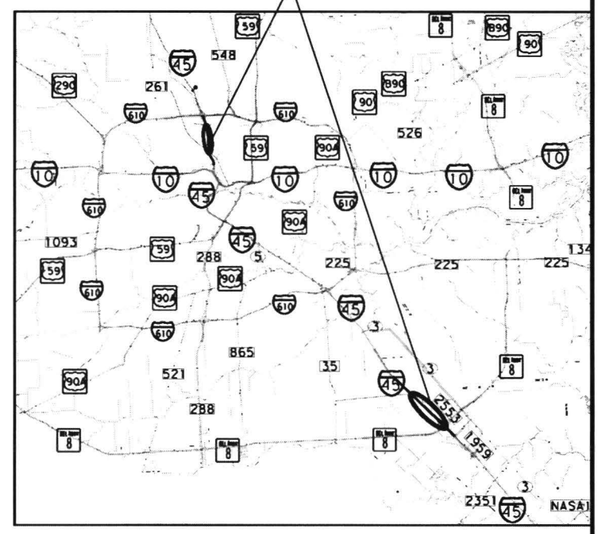

VICINITY MAP

CONCURRENCE:

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

05/23/24
Director of Houston Public Works Date

PUBLIC WORKS & ENGINEERING
ACCEPTED AND FILED
77807
CITY DRAWING NUMBER
HOUSTON, TEXAS

DocuSigned by:
SUBMITTED FOR LETTING: 4/22/2024
Pat Nwachukwu P.E.
SUPERVISING DESIGN ENGINEER
32C86996739A4BB...

APPROVED FOR LETTING:

DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED LABOR PROVISIONS FOR STATE PROJECT: SP 000-008.

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

COUNTY HARRIS PROJ. NO. C 500-3-635,ETC
HWY. NO. IH 45 LETTING DATE AUGUST 2024
DATE ACCEPTED

CK:
DW:
CK:
DN:

GENERAL

	1	TITLE SHEET
	1A	TITLE SHEET (CITY SIGNATURE)
	2	INDEX OF SHEETS
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	14	IRI DATA
	15	GENERAL NOTES
	16	ESTIMATE & QUANTITY SHEET

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	18-20	SUMMARY OF PAVEMENT MARKING QUANTITIES
	21	SUMMARY OF TRAFFIC SIGNAL QUANTITIES
	22-23	SUMMARY OF CTMS QUANTITIES
	24-28	SUMMARY OF SMALL SIGN QUANTITIES

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	32	IH-45 CAVALCADE DETOUR TRAFFIC CONTROL PLAN
	33	IH-45 LINK RD UNDERPASS TRAFFIC CONTROL PLAN PLAN STEP 1
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#	52	DS TC 8020-04 (HOU DIST)
#	53	TCP (1-4)-18
#	54	TCP (1-5)-18
#	55	TCP (2-6)-18
#	56	TCP (3-2)-13
#	57	TCP (3-3)-14
#	58	TCP (3-4)-13
#	59	TCP (6-1)-12
#	60	TCP (6-2)-12
#	61	TCP (6-3)-12
#	62	TCP (6-4)-12
#	63	TCP (6-8)-14
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#	125	TSR(5)-13
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#	128	PM(3)-22
#	129	PM(4)-22A
#	130	PM(5)-22
#	131	FPM(1)-22
#	132	FPM(2)-22
#	133	FPM(3)-22
#	134	FPM(4)-22
#	135	FPM(5)-22
#	136	FPM(6)-22
#	137	SMD(GEN)-08
#	138	SMD(SLIP-1)-08
#	139	SMD(SLIP-2)-08
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#	141	BLPM-10
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#	164-166	EC(9)-16

STATE OF TEXAS
WICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

07/03/2024

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

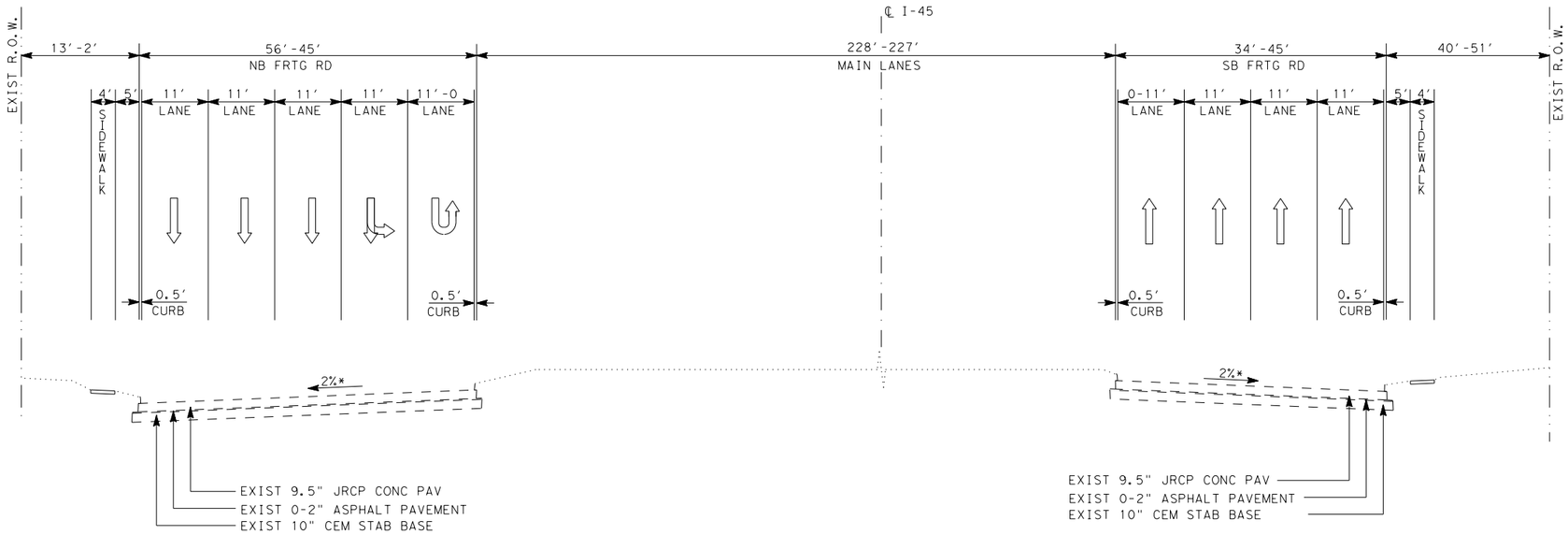
IH 45
INDEX OF SHEETS

SHEET 1 OF 1

Texas Department of Transportation

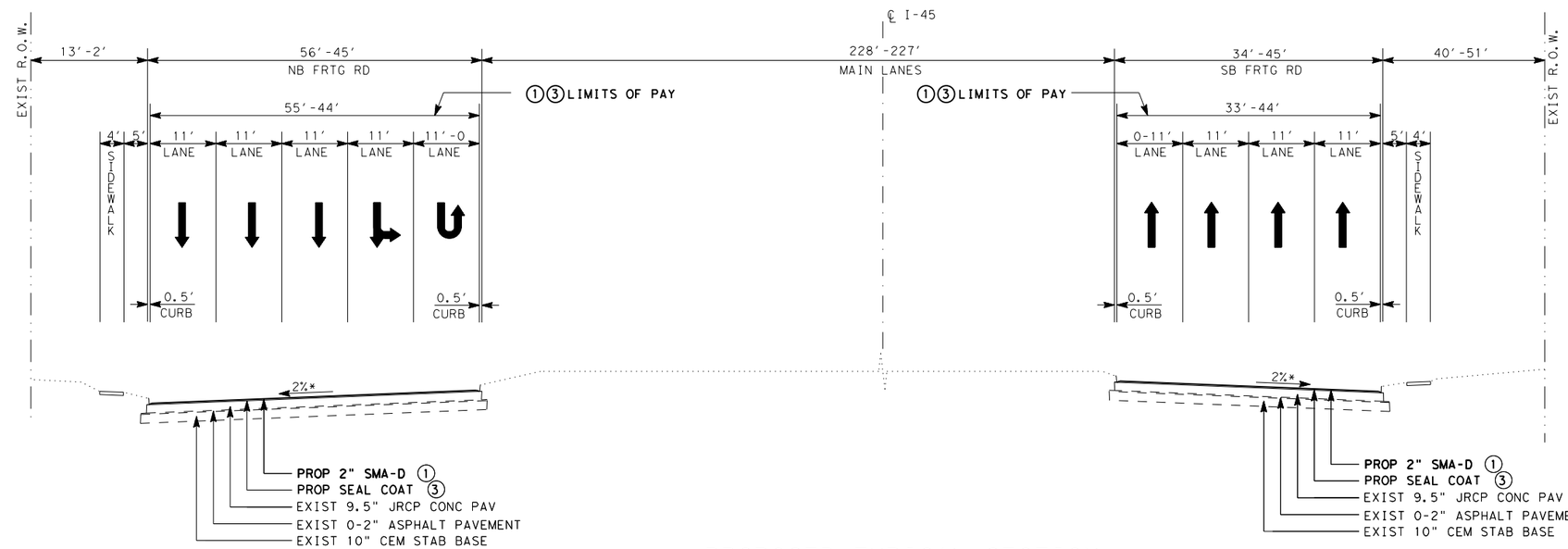
CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		2

DATE:
FILE:



EXISTING TYPICAL SECTION

ALMEDA GENOA RD - KINGSPOINT RD (STA 374+00.00 TO STA 386+67.00)



PROPOSED TYPICAL SECTION

ALMEDA GENOA RD - KINGSPOINT RD (STA 374+00.00 TO STA 386+67.00)

NOTES:

1. SURFACE TEST TYPE A WILL BE USED FOR ITEM 585 "RIDE QUALITY FOR PAVEMENT SURFACES. SEE GENERAL NOTES.
2. THE ASPHALT BINDER MAY NOT BE SUBSTITUTED FOR THIS PROJECT.
3. LOCATIONS OF FULL-DEPTH FLEXIBLE PAVEMENT STRUCTURE REPAIR(8"-10") TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. FOR PAVEMENT MARKINGS, SEE PAVEMENT MARKINGS LAYOUT AND STANDARD SHEETS.
5. REMOVE DIRT, DUST, OR OTHER MATERIAL BEFORE ASPHALT SEALING. NO ADDITIONAL PAYMENT WILL BE MADE. THIS WORKIS SUBSIDIARY TO THE VARIOUS BID ITEMS.
6. MATCH EXISTING DRAINAGE FLOWLINES AT THE GUTTERS.

*MATCH EXISTING CROSS SLOPES;
MATCH COMPLEX SLOPES AT INTERSECTIONS.

① LIMIT OF PROPOSED SMA-D.
PAID BY THE FOLLOWING ITEM:
ITEM 3080-6007 STONE-MTRX-ASPH SMA-D SAC-A PG76-22 (TON).
BLENDING THE AGGREGATE WILL NOT BE ALLOWED.
RAP(RECYCLED ASPHALT PAVEMENT) WILL NOT BE ALLOWED.
RAS(RECYCLED ASPHALT SHINGLES) WILL NOT BE ALLOWED.
BINDER DUMPING WILL NOT BE ALLOWED.

② LIMIT OF PROPOSED UNDERSEAL.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45 TYPICAL SECTIONS

NOT TO SCALE

SHEET 1 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		3

DATE: 04/15/2024 09:47 AM
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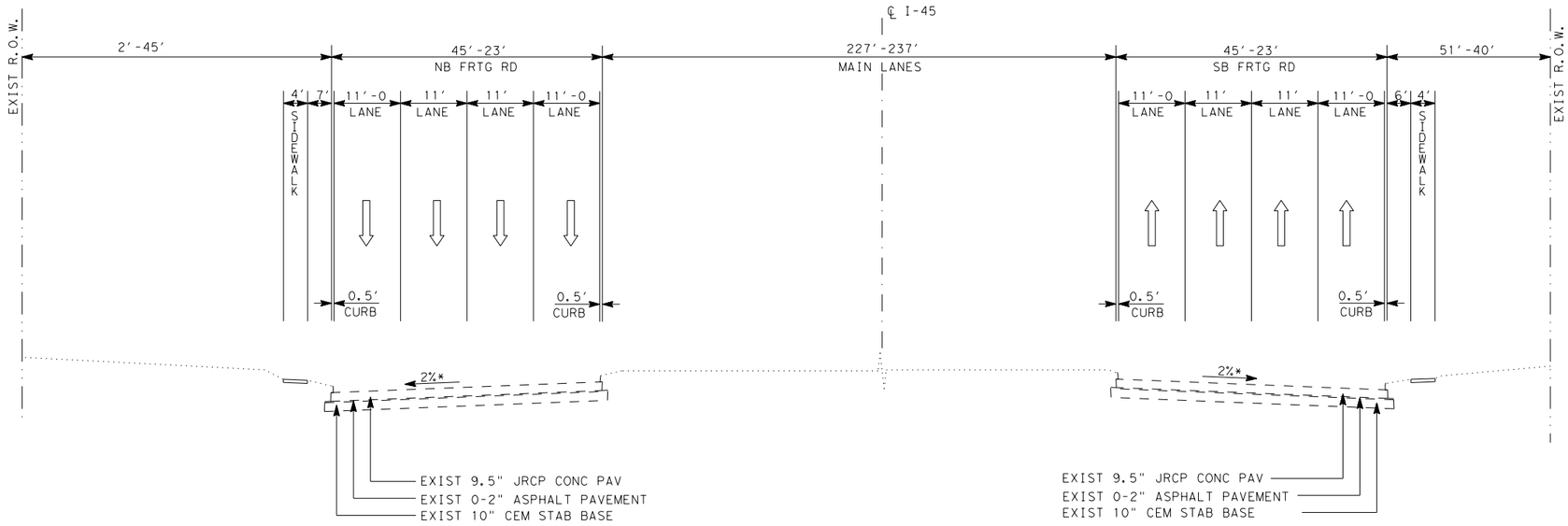
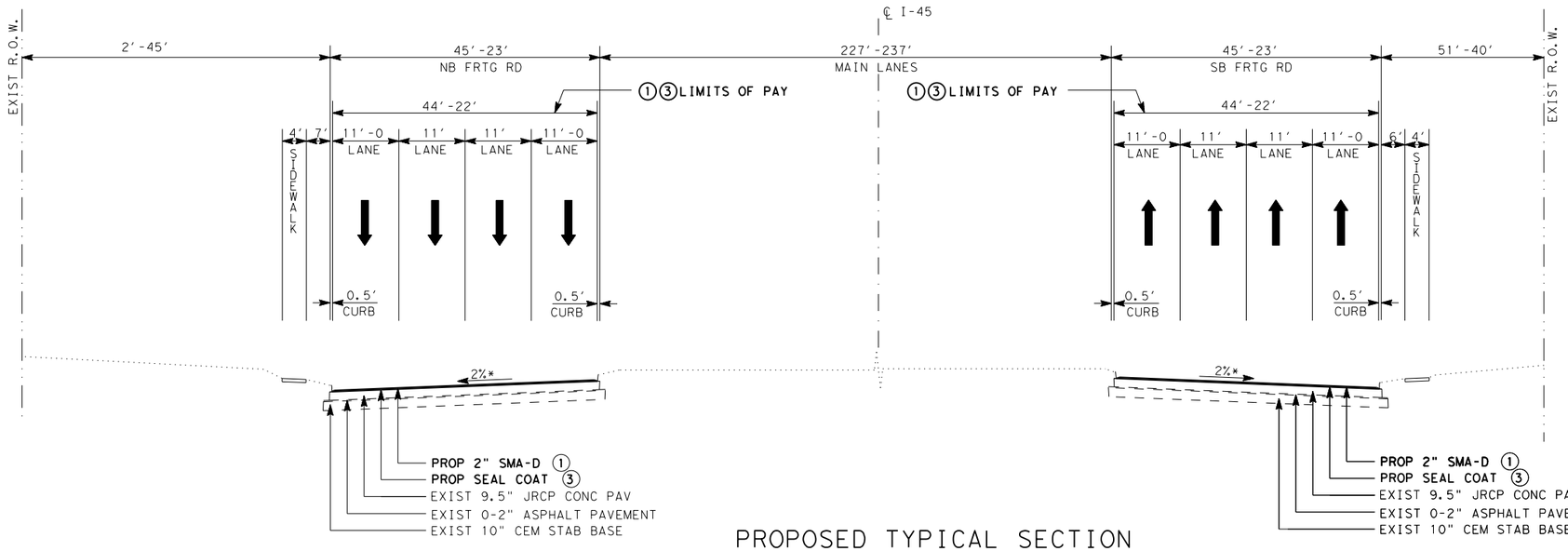


EXISTING TYPICAL SECTION

KINGSPOINT RD - FUQUA ST (STA 386+67.00 TO STA 409+05.00)



PROPOSED TYPICAL SECTION

KINGSPOINT RD - FUQUA ST (STA 386+67.00 TO STA 409+05.00)

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PAID BY THE FOLLOWING ITEM:
ITEM 3085

NOT TO SCALE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
TYPICAL SECTIONS

SHEET 2 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		4

DATE: 04/15/2024 09:47 AM
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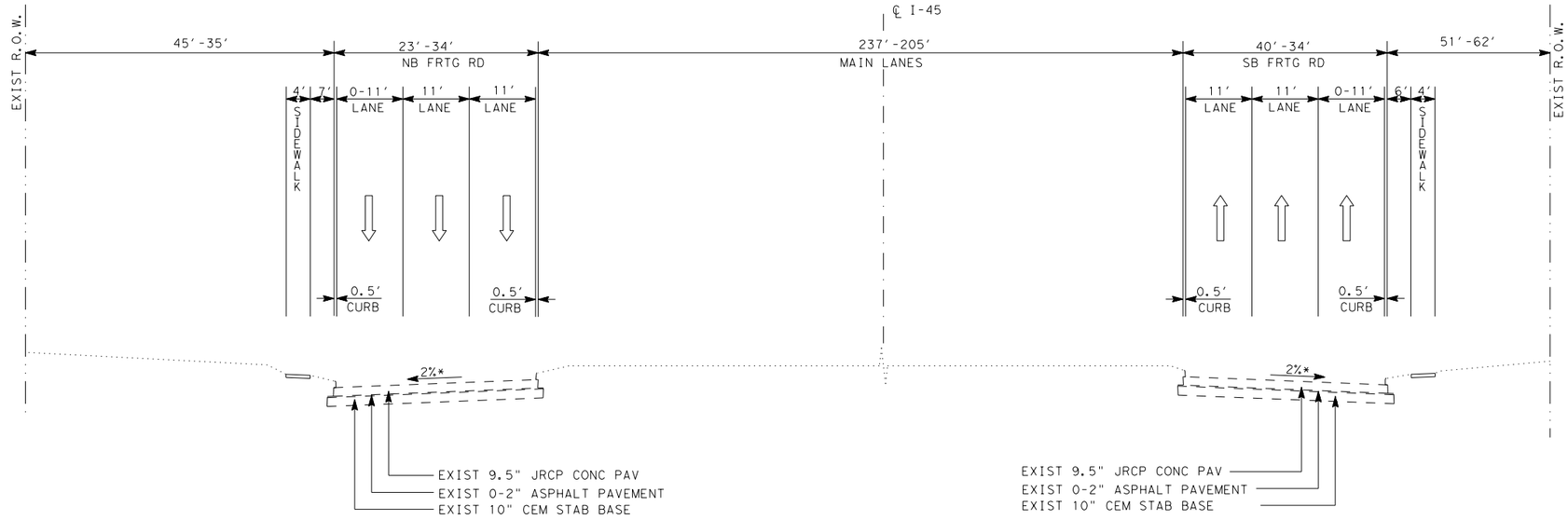
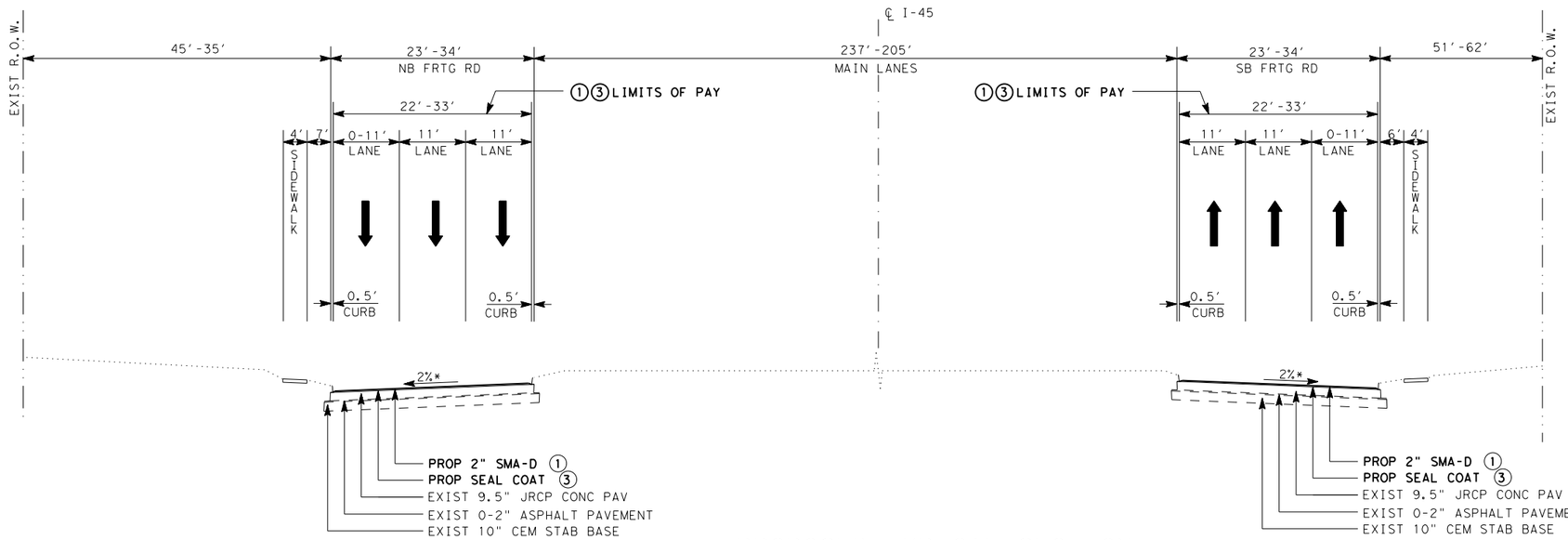


EXISTING TYPICAL SECTION

FUQUA ST - GULF POINTE DR (STA 409+05.00 TO STA 436+42.00)



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FUQUA ST - GULF POINTE DR (STA 409+05.00 TO STA 436+42.00)

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PAID BY THE FOLLOWING ITEM:
ITEM 3085

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PAID BY THE FOLLOWING ITEM:
ITEM 3085

NOT TO SCALE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
TYPICAL SECTIONS

SHEET 3 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		5

DATE: 04/15/2024 09:47 AM
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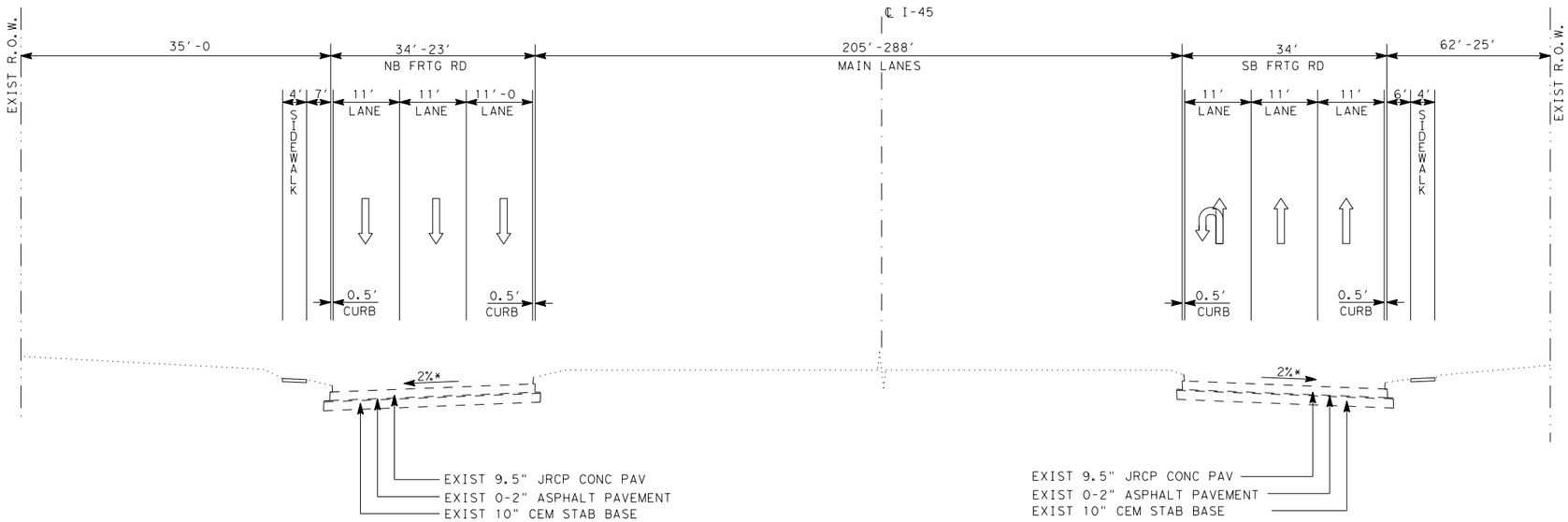
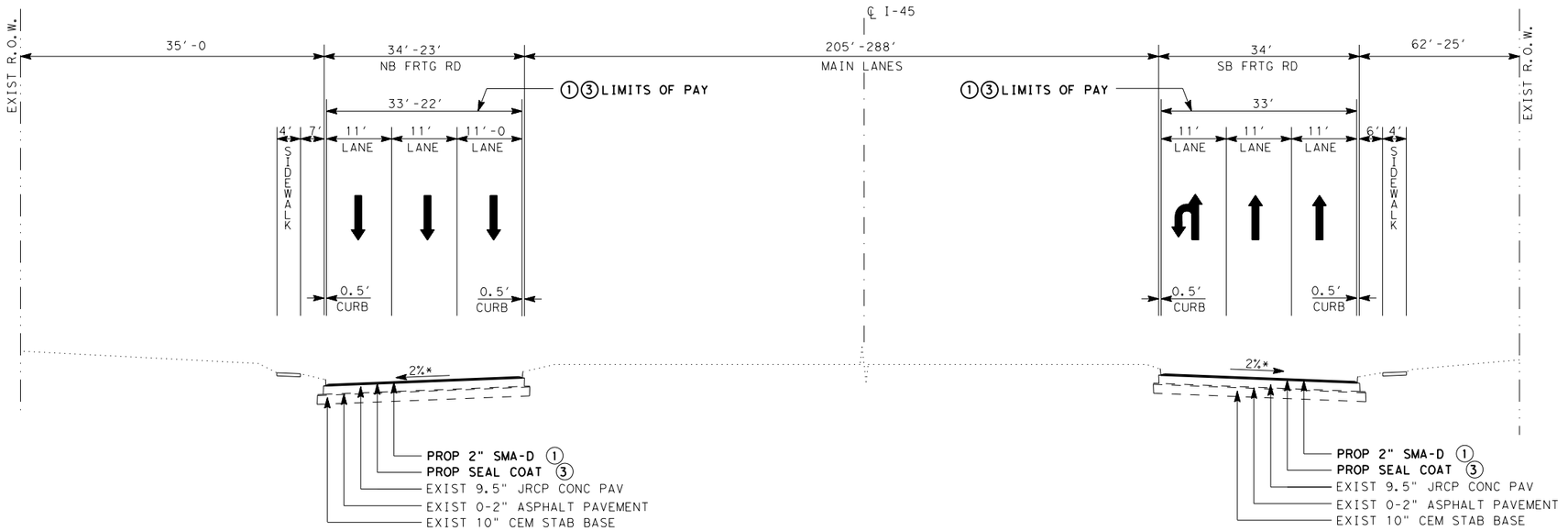


EXISTING TYPICAL SECTION

GULF POINTE DR - SAM HOUSTON TOLLWAY (STA 436+42.00 TO STA 457+31.00)



PROPOSED TYPICAL SECTION

GULF POINTE DR - SAM HOUSTON TOLLWAY (STA 436+42.00 TO STA 457+31.00)

NOTES:

1. SURFACE TEST TYPE A WILL BE USED FOR ITEM 585 "RIDE QUALITY FOR PAVEMENT SURFACES. SEE GENERAL NOTES.
2. THE ASPHALT BINDER MAY NOT BE SUBSTITUTED FOR THIS PROJECT.
3. LOCATIONS OF FULL-DEPTH FLEXIBLE PAVEMENT STRUCTURE REPAIR(8"-10") TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. FOR PAVEMENT MARKINGS, SEE PAVEMENT MARKINGS LAYOUT AND STANDARD SHEETS.
5. REMOVE DIRT, DUST, OR OTHER MATERIAL BEFORE ASPHALT SEALING. NO ADDITIONAL PAYMENT WILL BE MADE. THIS WORKIS SUBSIDIARY TO THE VARIOUS BID ITEMS.
6. MATCH EXISTING DRAINAGE FLOWLINES AT THE GUTTERS.

*MATCH EXISTING CROSS SLOPES;
MATCH COMPLEX SLOPES AT INTERSECTIONS.

① LIMIT OF PROPOSED SMA-D.
PAID BY THE FOLLOWING ITEM:
ITEM 3080-6007 STONE-MTRX-ASPH SMA-D SAC-A PG76-22 (TON).
BLENDING THE AGGREGATE WILL NOT BE ALLOWED.
RAP(RECYCLED ASPHALT PAVEMENT) WILL NOT BE ALLOWED.
RAS(RECYCLED ASPHALT SHINGLES) WILL NOT BE ALLOWED.
BINDER DUMPING WILL NOT BE ALLOWED.

② LIMIT OF PROPOSED UNDERSEAL.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45 TYPICAL SECTIONS

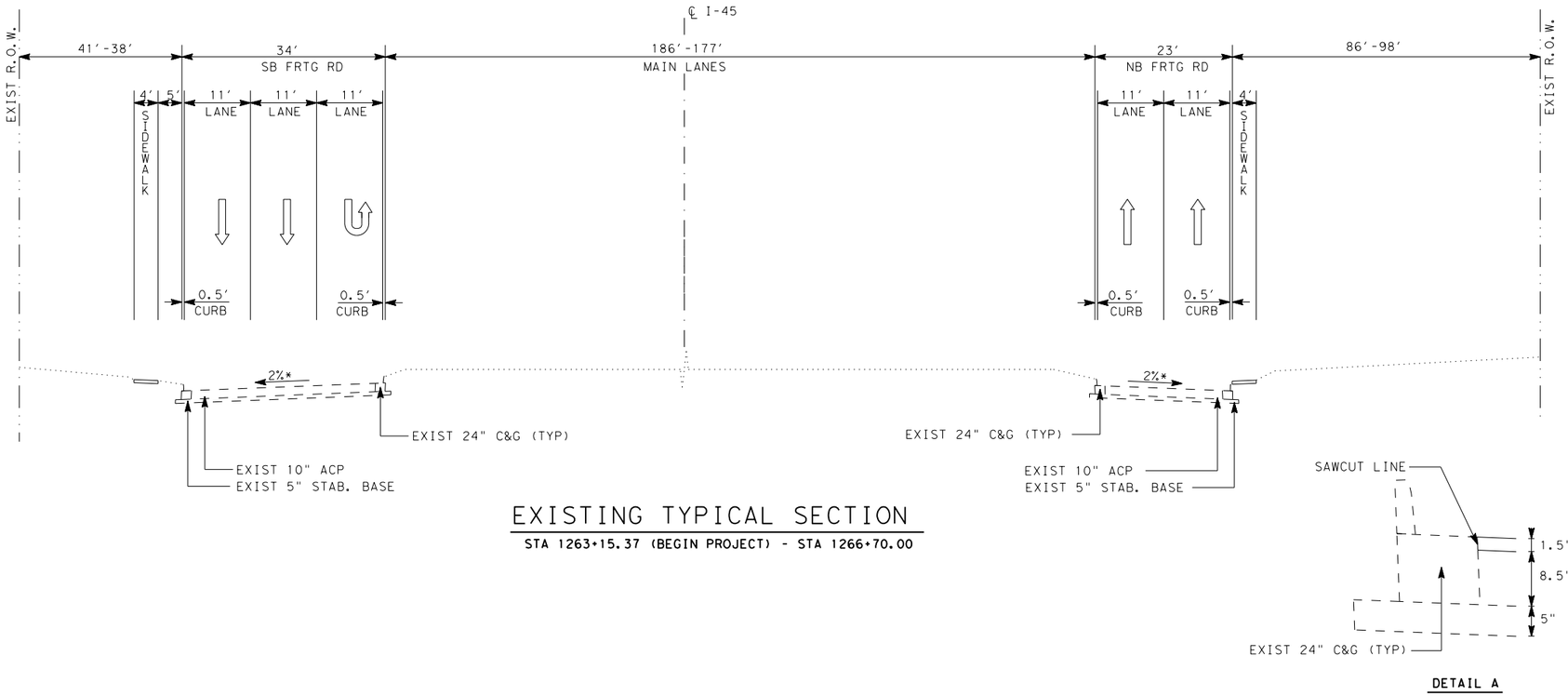
NOT TO SCALE

SHEET 4 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		6

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn



EXISTING TYPICAL SECTION

STA 1263+15.37 (BEGIN PROJECT) - STA 1266+70.00

DETAIL A

NOTES:

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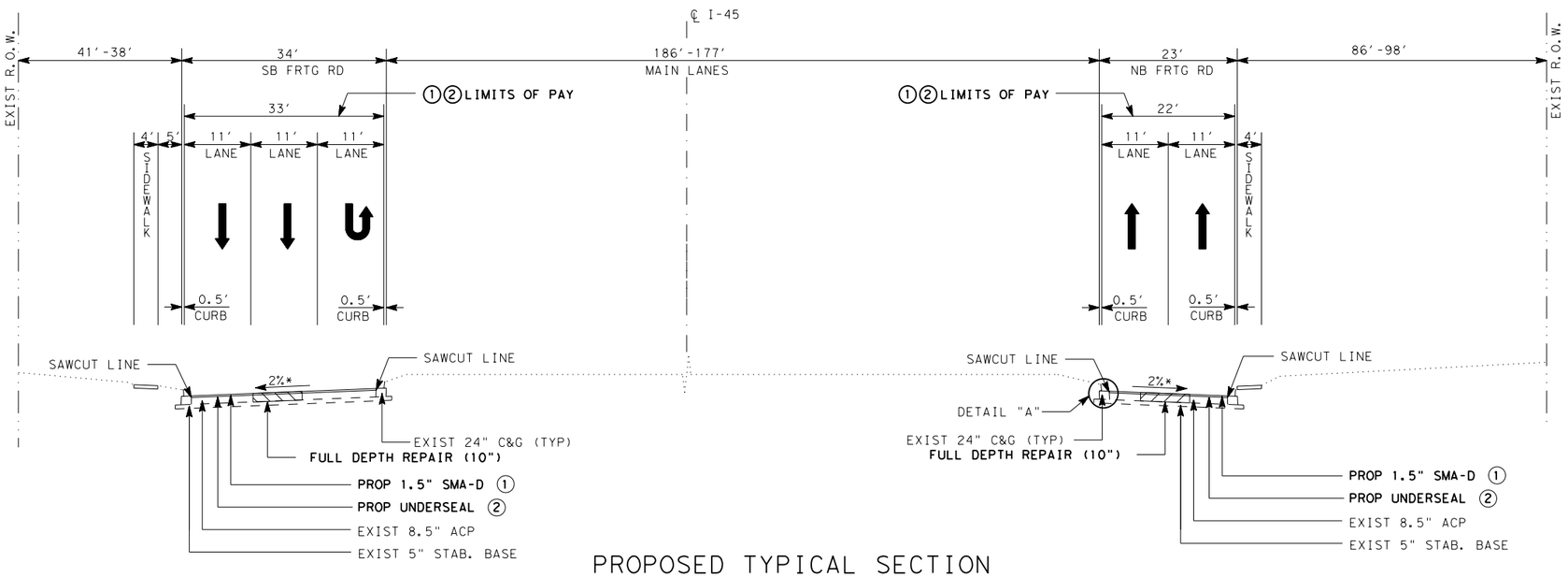
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085



PROPOSED TYPICAL SECTION

STA 1263+15.37 (BEGIN PROJECT) - STA 1266+70.00

NOTE: MILL 1.5" EXISTING SURFACE

NOT TO SCALE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

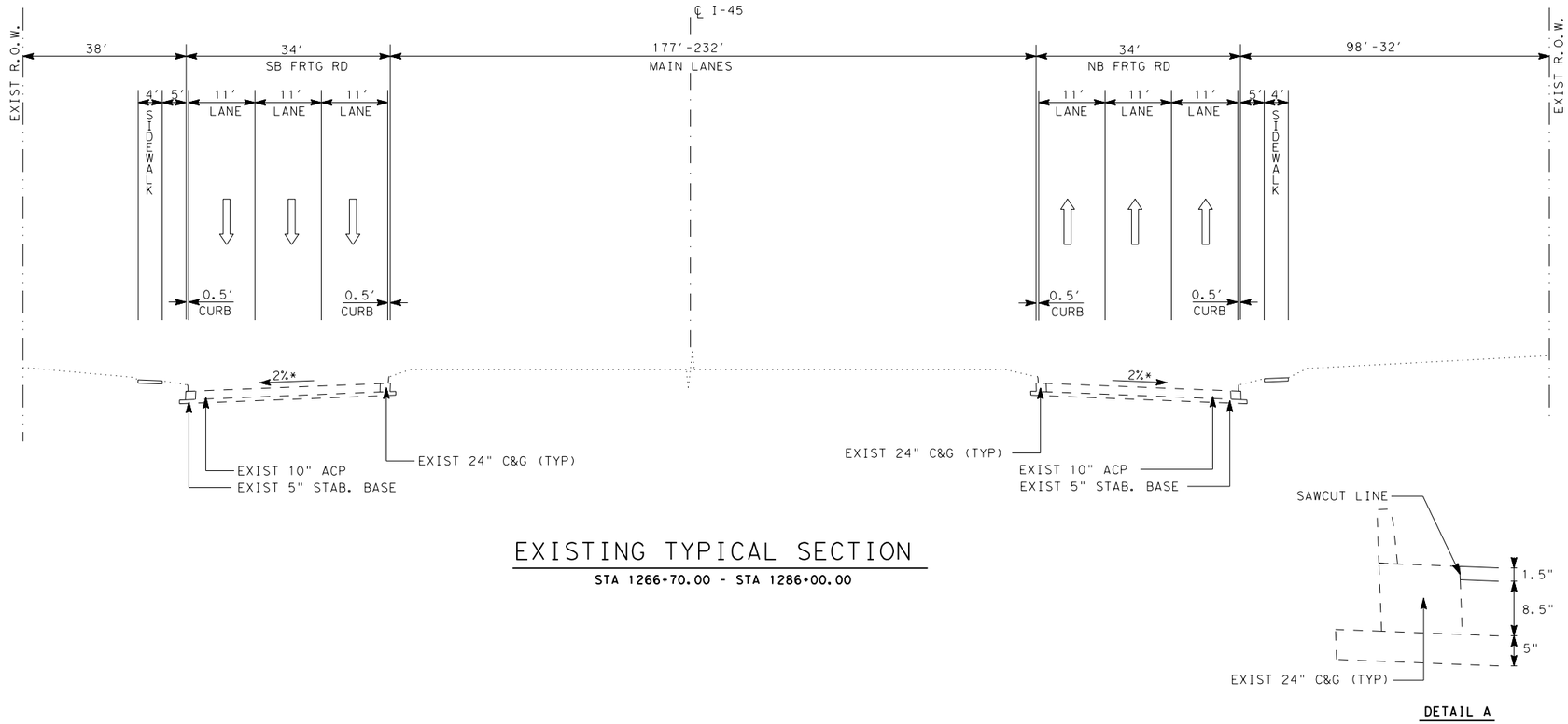
IH-45
TYPICAL SECTIONS

SHEET 5 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		7

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn



EXISTING TYPICAL SECTION

STA 1266+70.00 - STA 1286+00.00

DETAIL A

NOTES:

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6. MATCH EXISTING DRAINAGE FLOWLINES AT THE GUTTERS.

*MATCH EXISTING CROSS SLOPES;
MATCH COMPLEX SLOPES AT INTERSECTIONS.

① LIMIT OF PROPOSED SMA-D.
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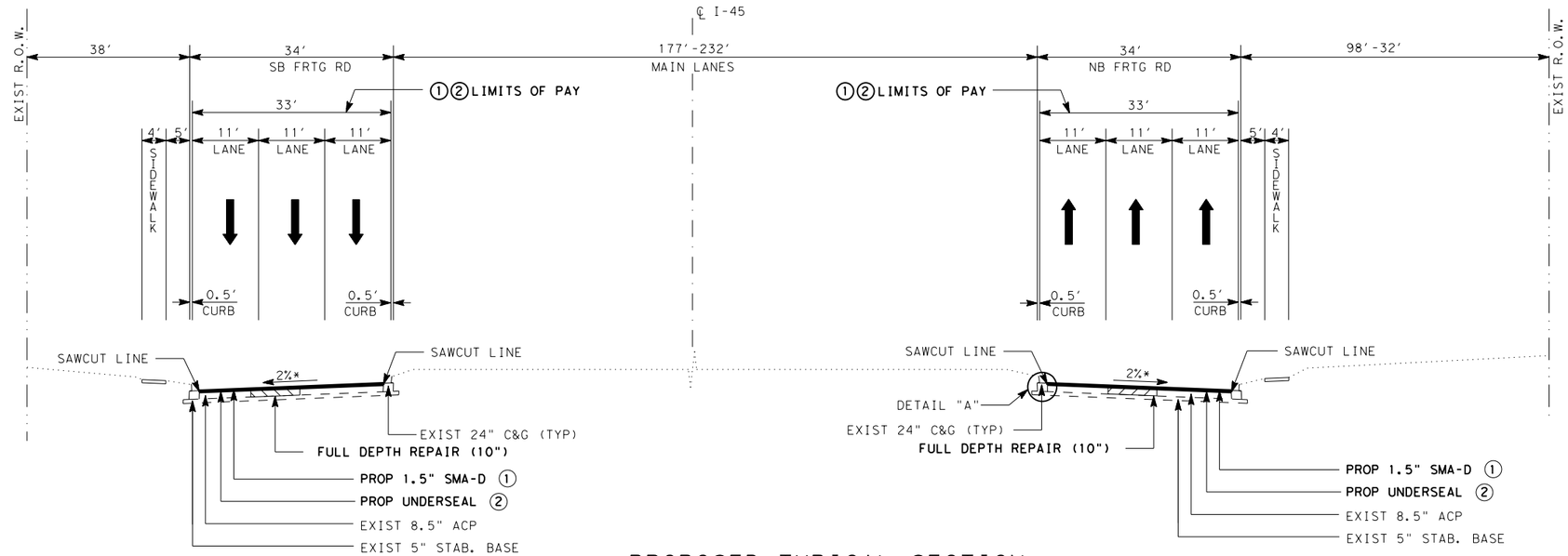
RAS(RECYCLED ASPHALT SHINGLES) WILL NOT BE ALLOWED.
BINDER DUMPING WILL NOT BE ALLOWED.

② LIMIT OF PROPOSED UNDERSEAL.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085



PROPOSED TYPICAL SECTION

STA 1266+70.00 - STA 1286+00.00

NOTE: MILL 1.5" EXISTING SURFACE

NOT TO SCALE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
TYPICAL SECTIONS

SHEET 6 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		8

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn

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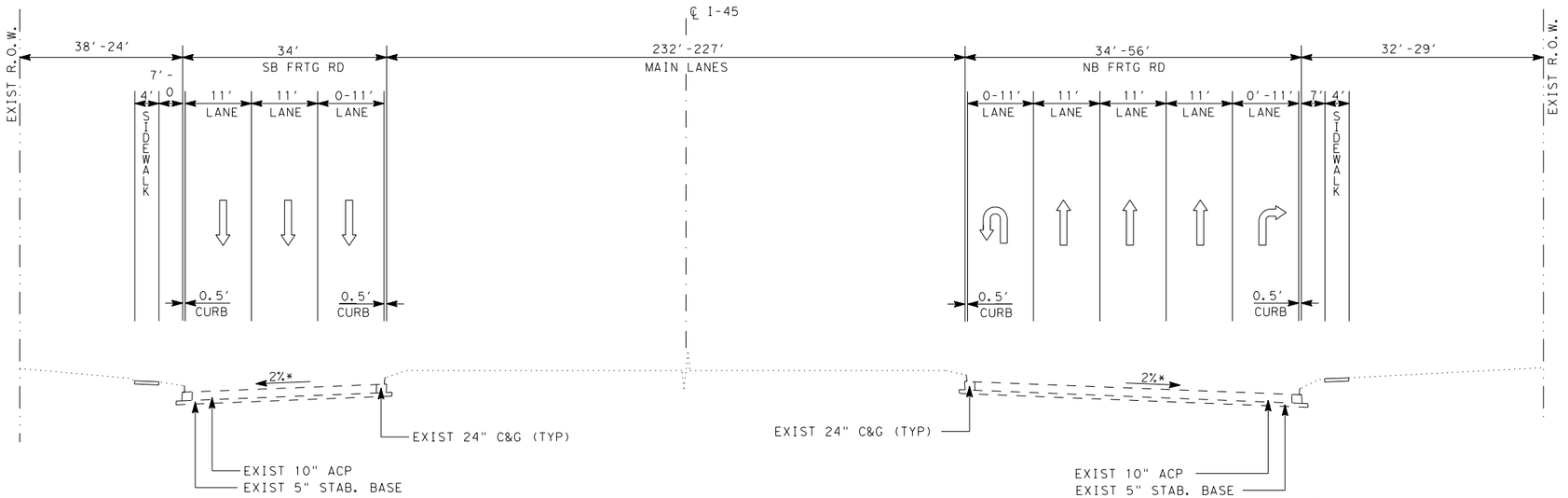
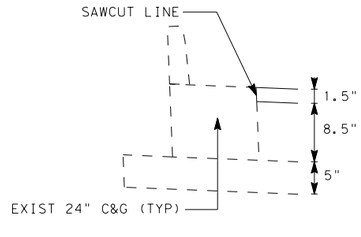
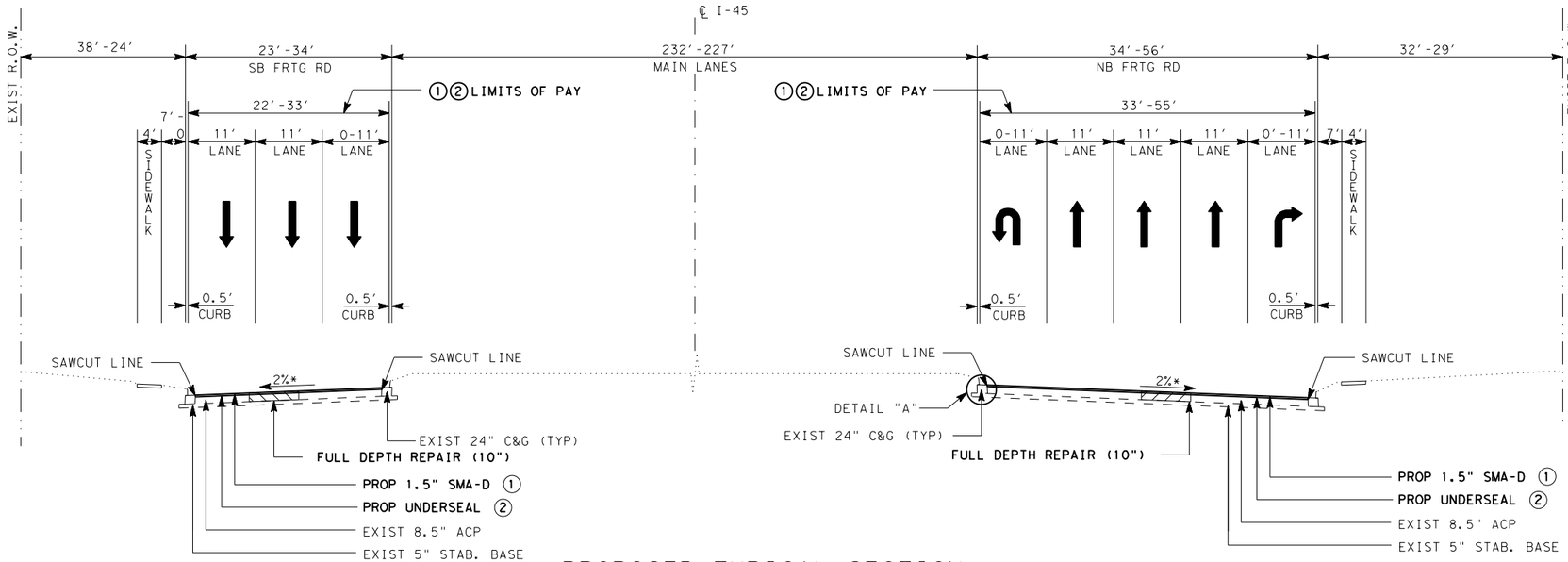


EXISTING TYPICAL SECTION

STA 1286+00.00 - STA 1292+00.00



DETAIL A



PROPOSED TYPICAL SECTION

STA 1286+00.00 - STA 1292+00.00

NOTE: MILL 1.5" EXISTING SURFACE

NOTES:

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② LIMIT OF PROPOSED UNDERSEAL.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
TYPICAL SECTIONS

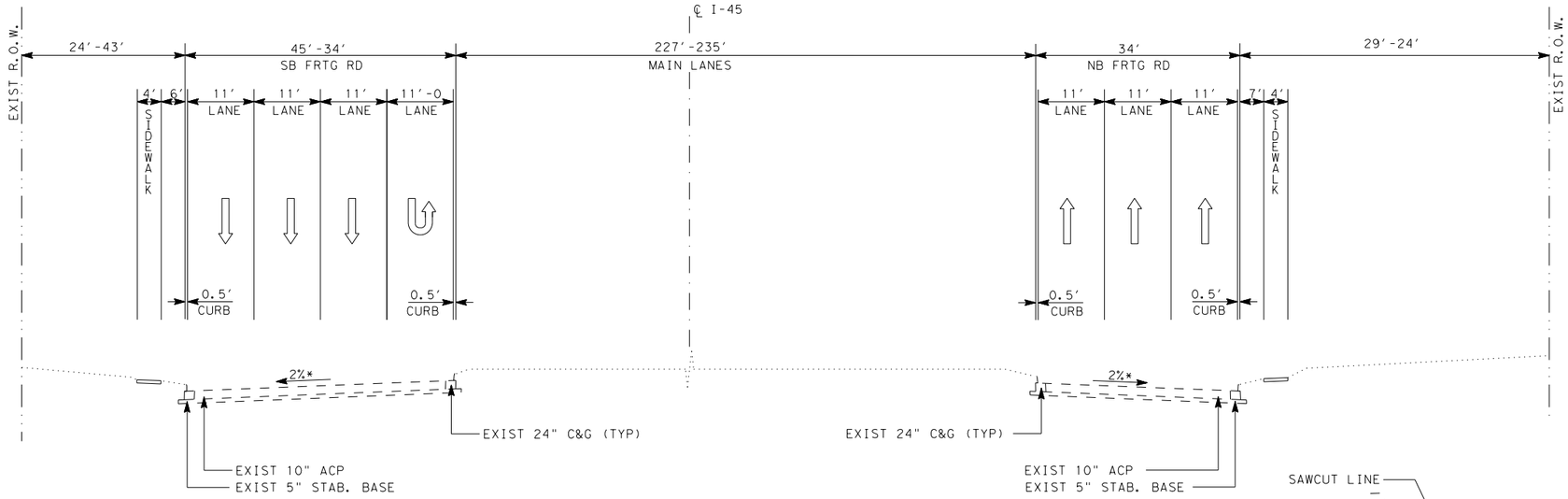
NOT TO SCALE

SHEET 7 OF 11

Texas Department of Transportation

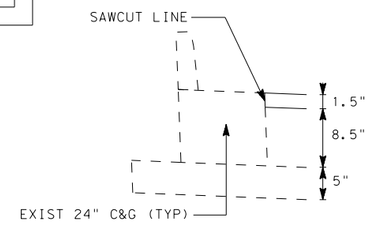
CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		9

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn



EXISTING TYPICAL SECTION

STA 1292+00.00 - STA 1305+00.00



DETAIL A

NOTES:

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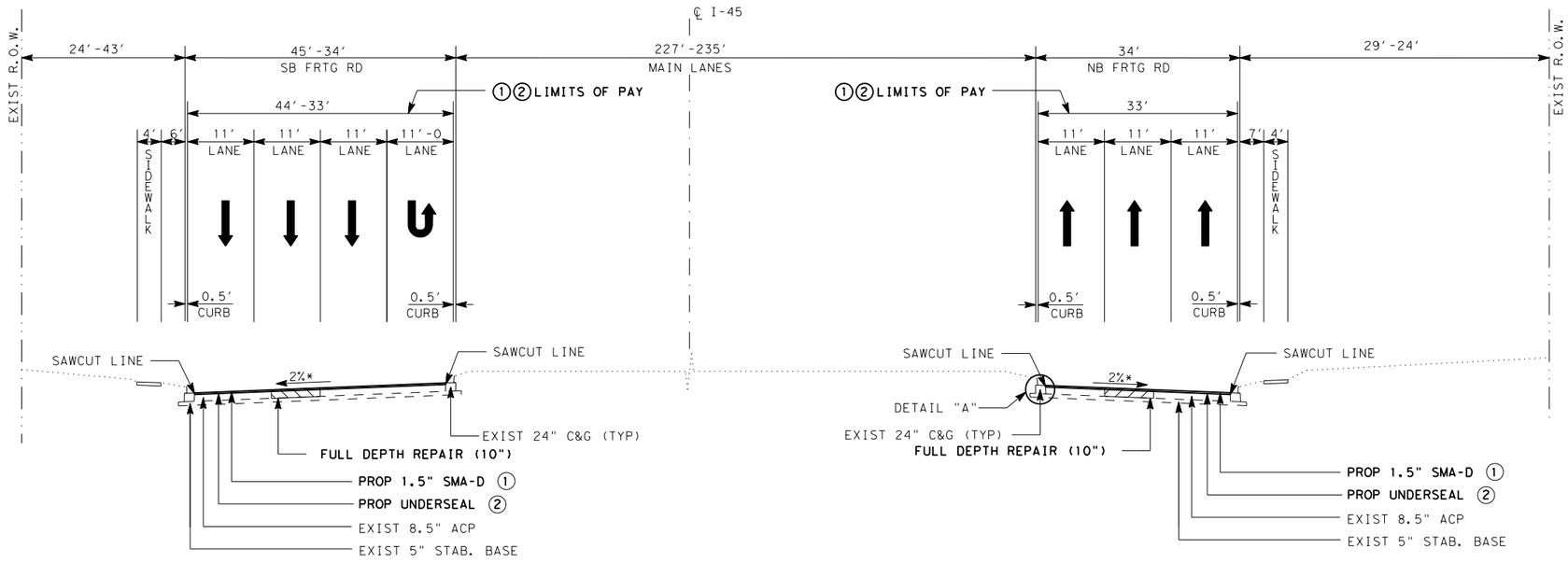
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085



PROPOSED TYPICAL SECTION

STA 1292+00.00 - STA 1305+00.00

NOTE: MILL 1.5" EXISTING SURFACE

NOT TO SCALE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

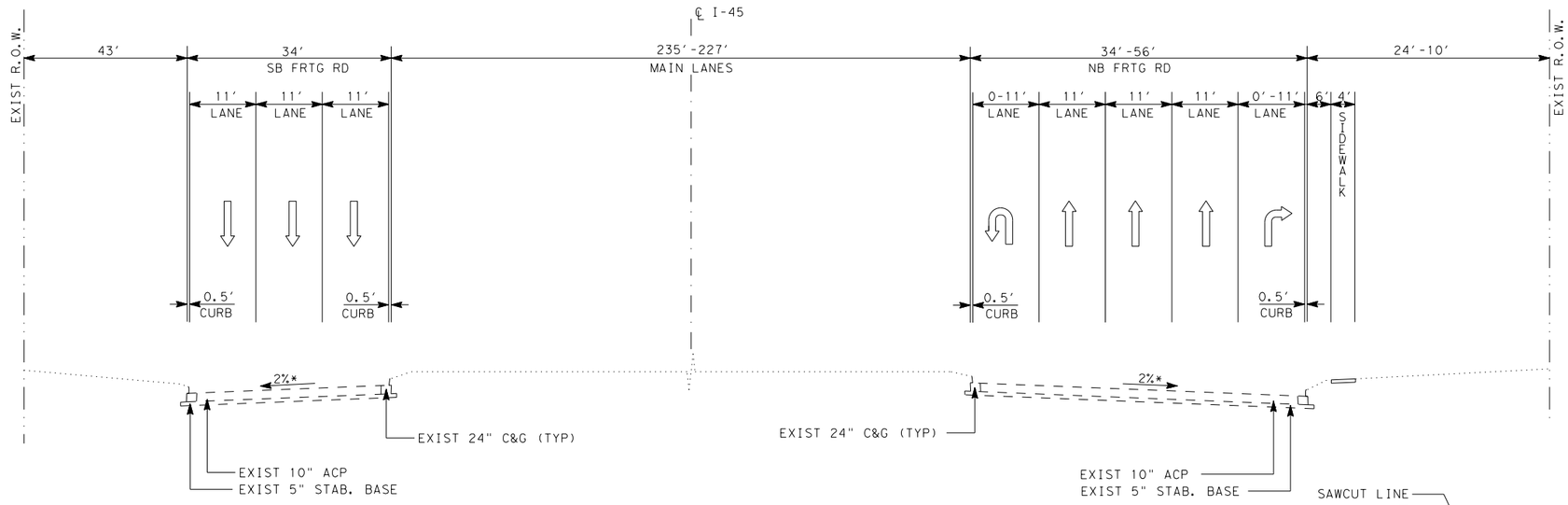
IH-45 TYPICAL SECTIONS

SHEET 8 OF 11

Texas Department of Transportation

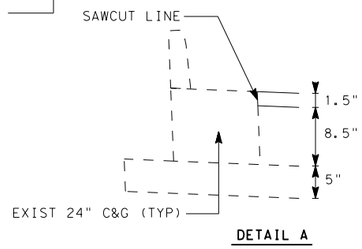
CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		10

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn



EXISTING TYPICAL SECTION

STA 1305+00.00 - STA 1313+00.00



DETAIL A

NOTES:

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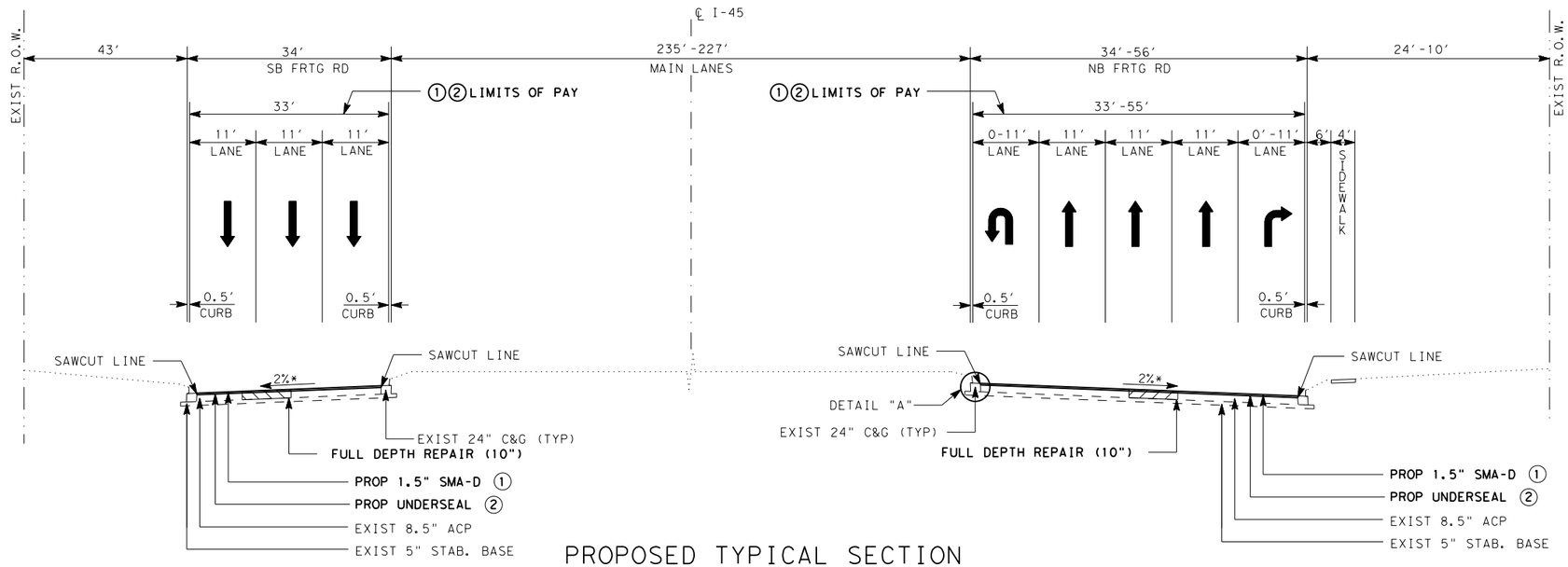
PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
ITEM 3085



PROPOSED TYPICAL SECTION

STA 1305+00.00 - STA 1313+00.00

NOTE: MILL 1.5" EXISTING SURFACE

NOT TO SCALE

STATE OF TEXAS
MICKEY N. BOMER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bomer III
4/22/2024

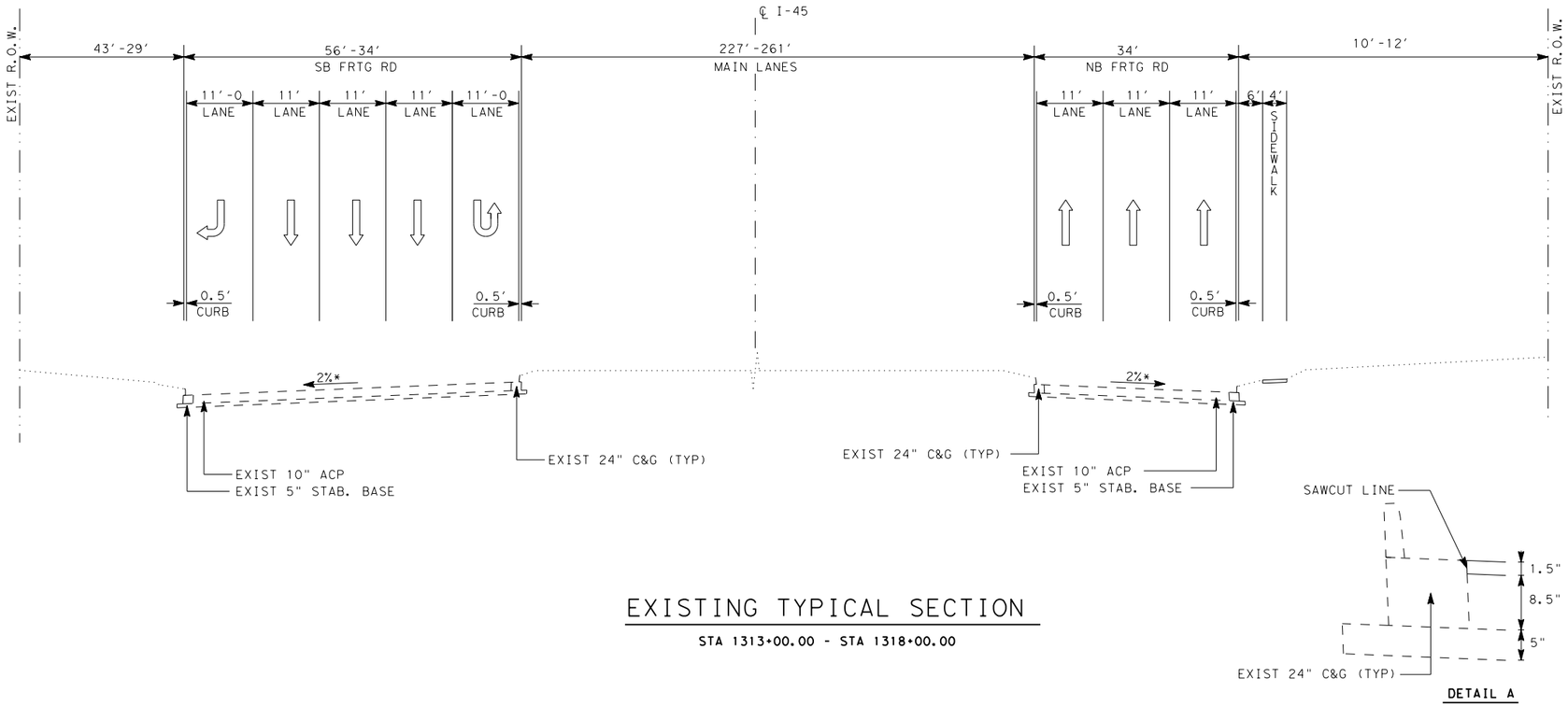
IH-45
TYPICAL SECTIONS

SHEET 9 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		11

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060181\4 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn



EXISTING TYPICAL SECTION

STA 1313+00.00 - STA 1318+00.00

DETAIL A

NOTES:

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PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
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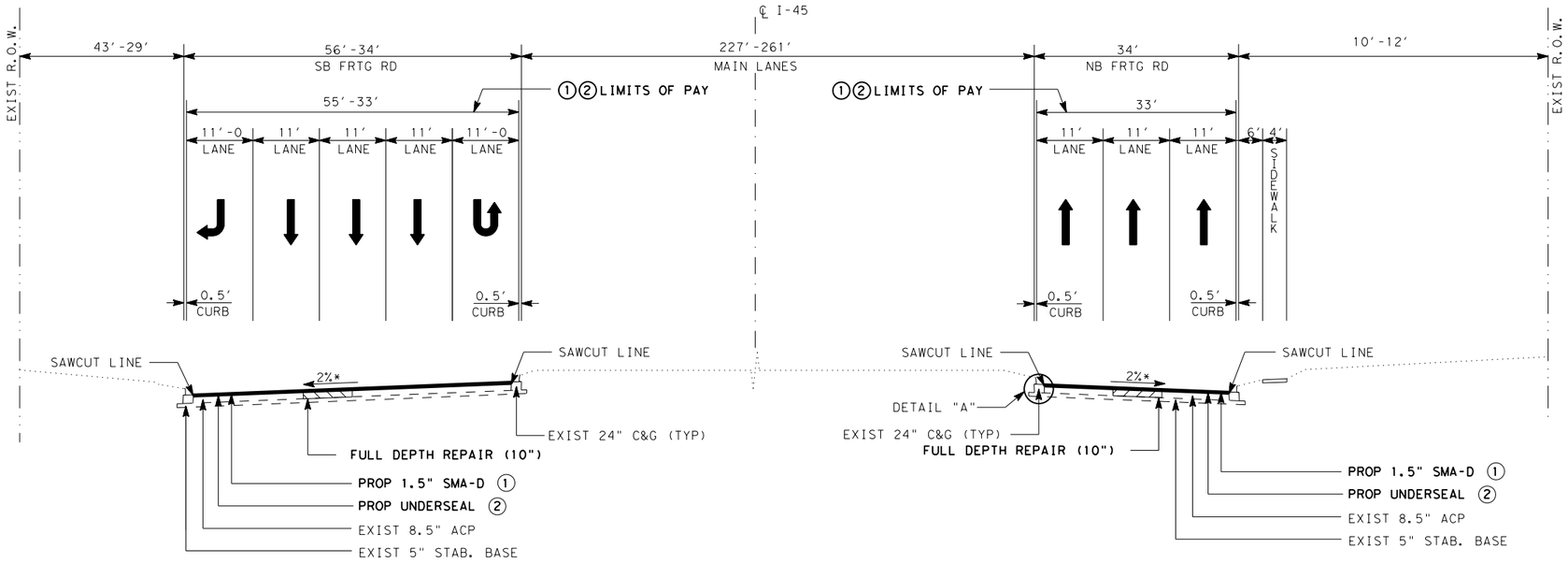


PROPOSED TYPICAL SECTION

STA 1313+00.00 - STA 1318+00.00

NOT TO SCALE

NOTE: MILL 1.5" EXISTING SURFACE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

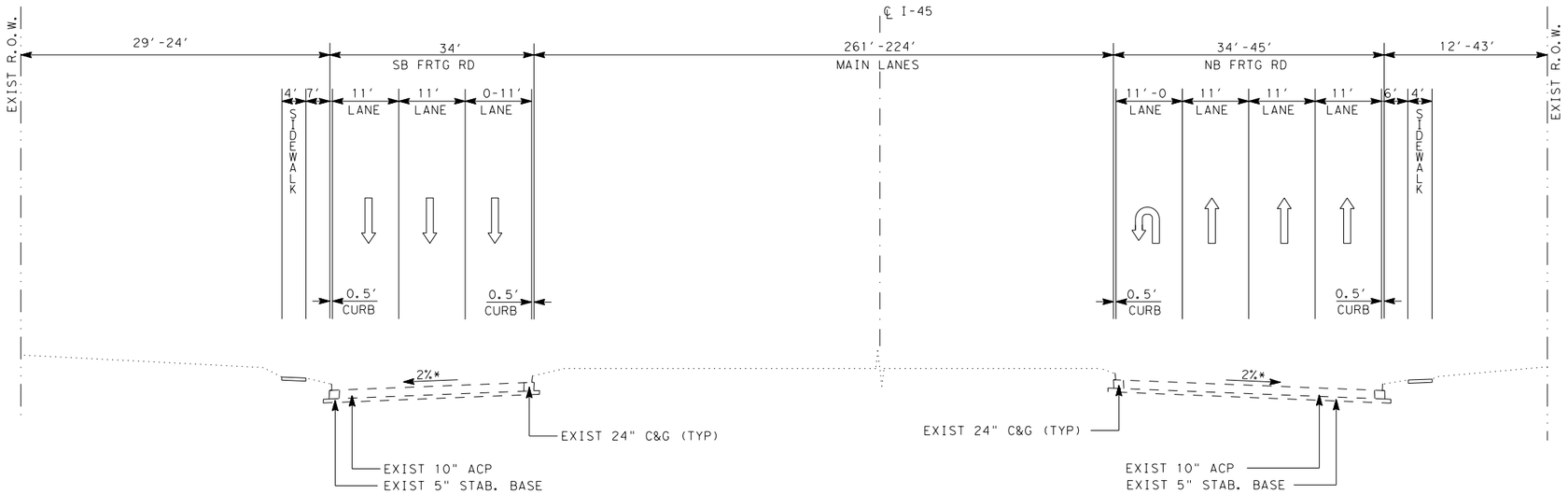
IH-45
TYPICAL SECTIONS

SHEET 10 OF 11

Texas Department of Transportation

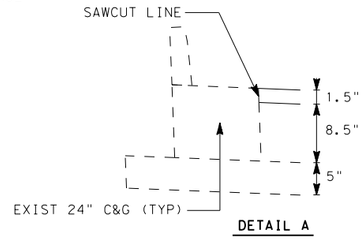
CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		12

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn



EXISTING TYPICAL SECTION

STA 1318+00.00 - STA 1327+70.00



DETAIL A

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PAID BY THE FOLLOWING ITEM:
ITEM 3085

③ LIMIT OF PROPOSED SEAL COAT.
PAID BY THE FOLLOWING ITEM:
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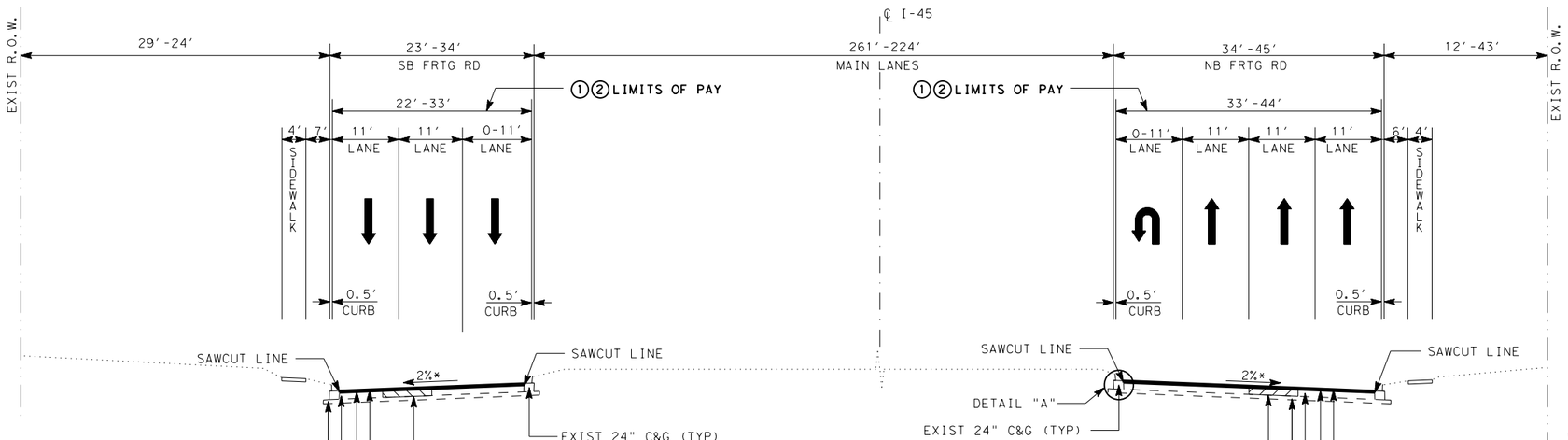

PROPOSED TYPICAL SECTION

STA 1318+00.00 - STA 1327+70.00

NOTE: MILL 1.5" EXISTING SURFACE

NOT TO SCALE

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
TYPICAL SECTIONS

SHEET 11 OF 11

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		13

DATE: 04/15/2024 09:47 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0051060184 - Design\Plan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn

				REFERENCE MARKERS									IRI (IN/MI)			
FY	MESC		RDB							LEN	PTYPE	TEST				
		HIGHWAY		BEGIN			END					MM/DD/YYYY	LEFT	RIGHT	SI	COMMENTS
2023	06	IH0045	A1	0032	+	0.516	0032	+	0.616	0.1	02	9/17/2022	194	187	2.3	
2023	06	IH0045	A1	0032	+	0.616	0032	+	0.716	0.1	02	9/17/2022	162	162	2.7	
2023	06	IH0045	A1	0032	+	0.716	0032	+	0.816	0.1	02	9/17/2022	147	186	2.6	
2023	06	IH0045	A1	0032	+	0.816	0032	+	0.916	0.1	02	9/17/2022	132	160	2.9	
2023	06	IH0045	A1	0032	+	0.916	0032	+	1.016	0.1	02	9/17/2022	171	165	2.6	
2023	06	IH0045	A1	0033	+	0.000	0033	+	0.100	0.1	02	9/17/2022	158	189	2.6	
2023	06	IH0045	A1	0033	+	0.100	0033	+	0.200	0.1	02	9/17/2022	120	147	3.1	
2023	06	IH0045	A1	0033	+	0.200	0033	+	0.300	0.1	02	9/17/2022	140	143	3.0	
2023	06	IH0045	A1	0033	+	0.300	0033	+	0.400	0.1	02	9/17/2022	120	125	3.3	
2023	06	IH0045	A1	0033	+	0.400	0033	+	0.500	0.1	02	9/17/2022	129	128	3.2	
2023	06	IH0045	A1	0033	+	0.500	0033	+	0.600	0.1	02	9/17/2022	119	121	3.3	
2023	06	IH0045	A1	0033	+	0.600	0033	+	0.700	0.1	02	9/17/2022	118	107	3.4	
2023	06	IH0045	A1	0033	+	0.700	0033	+	0.800	0.1	02	9/17/2022	122	159	3.0	
2023	06	IH0045	A1	0033	+	0.800	0033	+	0.900	0.1	02	9/17/2022	118	181	2.9	
2023	06	IH0045	A1	0033	+	0.900	0034	+	0.098	0.1	02	9/17/2022	145	179	2.7	
2023	06	IH0045	A1	0034	+	0.098	0034	+	0.198	0.1	02	9/17/2022	143	154	2.9	
2023	06	IH0045	A1	0034	+	0.198	0034	+	0.298	0.1	02	9/17/2022	191	180	2.4	
2023	06	IH0045	A1	0034	+	0.298	0034	+	0.398	0.1	02	9/17/2022	158	142	2.9	
2023	06	IH0045	A1	0034	+	0.398	0034	+	0.498	0.1	02	9/17/2022	122	133	3.2	
2023	06	IH0045	A1	0034	+	0.498	0034	+	0.598	0.1	02	9/17/2022	198	195	2.3	
2023	06	IH0045	A1	0034	+	0.598	0034	+	0.698	0.1	02	9/17/2022	216	224	2.0	
2023	06	IH0045	A1	0034	+	0.698	0034	+	0.798	0.1	02	9/17/2022	156	202	2.5	
2023	06	IH0045	X1	0032	+	0.551	0032	+	0.651	0.1	02	9/27/2022	200	175	2.4	
2023	06	IH0045	X1	0032	+	0.651	0032	+	0.751	0.1	02	9/27/2022	175	154	2.7	
2023	06	IH0045	X1	0032	+	0.751	0032	+	0.851	0.1	02	9/27/2022	149	149	2.9	
2023	06	IH0045	X1	0032	+	0.851	0032	+	0.951	0.1	02	9/27/2022	154	169	2.7	
2023	06	IH0045	X1	0032	+	0.951	0033	+	0.035	0.1	02	9/27/2022	172	190	2.5	
2023	06	IH0045	X1	0033	+	0.035	0033	+	0.135	0.1	02	9/27/2022	146	154	2.9	
2023	06	IH0045	X1	0033	+	0.135	0033	+	0.235	0.1	02	9/27/2022	160	176	2.6	
2023	06	IH0045	X1	0033	+	0.235	0033	+	0.335	0.1	02	9/27/2022	107	109	3.5	
2023	06	IH0045	X1	0033	+	0.335	0033	+	0.435	0.1	02	9/27/2022	175	153	2.7	
2023	06	IH0045	X1	0033	+	0.435	0033	+	0.535	0.1	02	9/27/2022	129	123	3.2	
2023	09	IH0045	X1	0033	+	0.535	0033	+	0.635	0.1	02	9/27/2022	164	161	2.7	
2023	09	IH0045	X1	0033	+	0.635	0033	+	0.735	0.1	02	9/27/2022	251	204	1.9	
2023	09	IH0045	X1	0033	+	0.735	0033	+	0.835	0.1	02	9/27/2022	133	150	3.0	
2023	09	IH0045	X1	0033	+	0.835	0034	+	0.033	0.1	02	9/27/2022	158	148	2.8	
2023	09	IH0045	X1	0034	+	0.033	0034	+	0.133	0.1	02	9/27/2022	166	170	2.6	
2023	09	IH0045	X1	0034	+	0.133	0034	+	0.233	0.1	02	9/27/2022	133	159	2.9	
2023	09	IH0045	X1	0034	+	0.233	0034	+	0.333	0.1	02	9/27/2022	170	146	2.8	
2023	09	IH0045	X1	0034	+	0.333	0034	+	0.433	0.1	02	9/27/2022	129	137	3.1	
2023	09	IH0045	X1	0034	+	0.433	0034	+	0.533	0.1	02	9/27/2022	200	179	2.4	
2023	09	IH0045	X1	0034	+	0.533	0034	+	0.633	0.1	02	9/27/2022	206	154	2.5	
2023	09	IH0045	X1	0034	+	0.633	0034	+	0.733	0.1	02	9/27/2022	200	195	2.3	
2023	09	IH0045	A1	0049	+	0.500	0050	+	0.014	0.1	07	9/18/2022	186	289	1.8	
2023	09	IH0045	A1	0050	+	0.014	0050	+	0.114	0.1	07	9/18/2022	148	210	2.5	
2023	09	IH0045	A1	0050	+	0.114	0050	+	0.214	0.1	07	9/18/2022	158	279	2.0	
2023	09	IH0045	A1	0050	+	0.214	0050	+	0.314	0.1	07	9/18/2022	168	200	2.4	
2023	09	IH0045	A1	0050	+	0.314	0050	+	0.414	0.1	07	9/18/2022	156	164	2.7	
2023	09	IH0045	A1	0050	+	0.414	0050	+	0.514	0.1	07	9/18/2022	134	194	2.7	
2023	09	IH0045	A1	0050	+	0.514	0050	+	0.614	0.1	07	9/18/2022	188	229	2.1	
2023	09	IH0045	A1	0050	+	0.614	0050	+	0.714	0.1	07	9/18/2022	141	231	2.4	
2023	09	IH0045	A1	0050	+	0.714	0050	+	0.814	0.1	07	9/18/2022	183	244	2.1	
2023	09	IH0045	A1	0050	+	0.814	0051	+	0.074	0.1	07	9/18/2022	110	147	3.2	
2023	09	IH0045	A1	0051	+	0.074	0051	+	0.174	0.1	07	9/18/2022	151	185	2.6	
2023	09	IH0045	A1	0051	+	0.174	0051	+	0.274	0.1	07	9/18/2022	141	190	2.7	
2023	09	IH0045	X1	0049	+	0.306	0050	+	0.084	0.1	07	9/18/2022	148	226	2.4	
2023	09	IH0045	X1	0050	+	0.084	0050	+	0.184	0.1	07	9/18/2022	126	179	2.8	
2023	09	IH0045	X1	0050	+	0.184	0050	+	0.284	0.1	07	9/18/2022	88	131	3.5	
2023	09	IH0045	X1	0050	+	0.284	0050	+	0.384	0.1	07	9/18/2022	125	142	3.1	
2023	09	IH0045	X1	0050	+	0.384	0050	+	0.484	0.1	07	9/18/2022	118	215	2.6	
2023	09	IH0045	X1	0050	+	0.484	0050	+	0.584	0.1	07	9/18/2022	115	201	2.8	
2023	09	IH0045	X1	0050	+	0.584	0050	+	0.684	0.1	07	9/18/2022	124	200	2.7	
2023	09	IH0045	X1	0050	+	0.684	0050	+	0.784	0.1	07	9/18/2022	142	222	2.5	
2023	09	IH0045	X1	0050	+	0.784	0051	+	0.044	0.1	07	9/18/2022	157	221	2.4	
2023	09	IH0045	X1	0051	+	0.044	0051	+	0.144	0.1	07	9/18/2022	117	192	2.8	

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 bBase Pavement (Surface Treatment-Seal Coat Combination)

STATE OF TEXAS
MICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III

4/22/2024

IH-45
IRI DATA

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		14

DATE: 04/16/2024 01:38 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOUDesign Projects\0051060184 - DesignPlan Set\3. Roadway\ROADWAY LAYOUT (SHEET 1 OF 6).dgn

CK: | DW: | CK: | CK:

General Notes:

General:

Area Engineer contact information for this project follows:

Jamal Elahi, P.E.
Area Engineer, Southeast Harris Area Office
Jamal.Elahi@txdot.gov
281-464-5500

Vanessa Bosques
Assistant Area Engineer, Southeast Harris Area Office
Vanessa.Bosques@txdot.gov
281-464-5500

Submit any questions about this project via the Letting Pre-Bid Q&A web page, located at:

https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

The Letting Pre-Bid Q&A web page for each project can be accessed by scrolling or filtering the dashboard using the controls on the left side to navigate to the project. Hover over the blue hyperlink of the project to view the Q&A and click on the link in the window that pops up.

Large files with relevant project documentation, such as Geotech reports, As-Built plans, and cross-sections will continue to be provided on the following FTP site:

Index of /pub/txdot-info/Pre-Letting Responses/Houston District (state.tx.us) or

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

RAP generated by this project will become the property of the State and will be stockpiled by the contractor at the following TxDOT stockpile location – 4225 North Freeway (just south of Crosstimbers Street).

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.

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,

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Highway: IH 45

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.

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

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.

County: Harris **Control:** 0500-03-635, ETC.

Highway: IH 45

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.

Be aware that an operational Computerized Transportation Management System (CTMS) exists within the limits of this project and that the system must remain operational throughout construction. If the Contractor damages or causes damage to this system, repair such damage within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify the Director of Traffic Management Systems at 713-881-3283 within one hour of occurrence. Failure of the Contractor to repair damage to the main fiber optic cable and CCTV cable trunk lines, which convey all corridor information to TranStar, will result in the Contractor being billed for the full cost of emergency repairs.

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: HOU-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.

Notify the Engineer at least 48 hours before constructing junction boxes at storm drain and utility intersections.

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, https://ftp.txdot.gov/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.

County: Harris **Control:** 0500-03-635, ETC.

Highway: IH 45

Key to Reviewing Party

A - Area Office

Area Office	Email Address
North Harris Area Office	HOU-NHAShpDrwgs@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

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

D – Consultant: Submit to Engineer of Record at *email@host.xxx*

TMS – Traffic Management System

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

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

Item 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

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   b. Unsuitable excavation or excess excavation, “Waste” (under the Item, “Excavation”), that is disposed of outside a USACE evaluated area.

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.
The nesting / breeding season for migratory birds is February 15 through September 30.

Conduct any tree removal outside of the migratory bird nesting season. If this is not possible due to scheduling, then exercise caution to remove only those trees with no active nests. Do not destroy nests on structures or in trees within the project limits during the nesting / breeding season.

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

This project is on a hurricane evacuation route. Provide at the pre-construction meeting a written plan outlining procedures to suspend work, secure the job site, and safely handle traffic through and across the project in the event of a hurricane evacuation.

During the hurricane season (June 1 through November 30), do not close any travel lanes except when the Contractor can demonstrate that he/she can provide labor, equipment, material, a work plan, and quality of work to satisfactorily return all lanes to an open, all-weather travel surface within 3 days of receiving written or verbal notice but no later than 3 days before the predicted hurricane landfall. Construction of temporary lanes to an all-weather surface will be paid for in accordance with Article 9.7, “Payment for Extra Work and Force Account Method.”

In addition to lane closures, cease work 3 days before the predicted hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Vehicles of the Contractor, subcontractors, or material suppliers will not be allowed to enter or exit the traffic stream, including those for the purpose of material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

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, convenience, 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 $ 500.00. 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." The time increment for the Lane Closure Assessment fee for this project is one hour.

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 104: Removing Concrete
Item 305: Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement

Case 1 - ACP over asphalt treatment
Removing the Asphalt Concrete Pavement (ACP) and the asphalt treatment/asphalt stabilized base are paid for under the Item, "Salvaging, Hauling, and Stockpiling Reclaimable Asphalt Pavement."

Remove the ACP separately from the asphalt treatment/asphalt stabilized base. Make the removed depth as uniform as possible during each removal pass if the pavement depth being removed is composed of different asphalt layers. Unless otherwise approved, stockpile Reclaimable Asphalt Pavement (RAP) of differing types of quality separately by its intended use such as for the asphalt treatment, cement treatment, lime treatment, or asphalt concrete pavement. Break, crush, or mill the stockpiled materials so that 100 percent pass the 2-in. sieve.

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

Keep the removed depth as uniform as possible during each removal pass if the pavement depth being removed is composed of different asphalt layers. Stockpile the RAP of differing types of quality separately by its intended use such as for asphalt treatment, cement treatment, lime treatment, or asphalt concrete pavement (level up). Break, crush, or mill the stockpiled materials so that 100 percent passes the 2-in. sieve.

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Verify the depth of asphalt pavement to be removed before beginning the removal.

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.

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: Planing and Texturing Pavement
Stockpile the material at 4225 North Freeway (just south of Crosstimbers Street).

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 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."

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Erect temporary signs when exit ramps are closed or moved to new locations during construction.

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.

Coordinate and schedule the work with the appropriate Metro representative if requiring access to the High Occupancy Vehicle lanes.

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:

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Highway: IH 45

One Lane Closure (Frontage Roads)

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Tuesday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Wednesday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Thursday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Friday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Saturday *	07:00 AM - 07:00 PM	12:00 AM - 07:00 AM 07:00 PM - 11:59 PM	N/A
Sunday *	07:00 AM - 07:00 PM	12:00 AM - 07:00 AM 07:00 PM - 11:59 PM	N/A

Two Lane Closure (Frontage Roads)

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Tuesday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Wednesday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Thursday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Friday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Saturday *	07:00 AM - 07:00 PM	12:00 AM - 07:00 AM 07:00 PM - 11:59 PM	N/A
Sunday *	07:00 AM - 07:00 PM	12:00 AM - 07:00 AM 07:00 PM - 11:59 PM	N/A

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Highway: IH 45

Full Closure (Roadway / Ramps)

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Tuesday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Wednesday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Thursday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Friday	09:00 AM - 04:00 PM	12:00 AM - 05:00 AM 09:00 PM - 11:59 PM	05:00 AM - 09:00 AM 04:00 PM - 09:00 PM
Saturday *	07:00 AM - 07:00 PM	12:00 AM - 07:00 AM 07:00 PM - 11:59 PM	N/A
Sunday *	07:00 AM - 07:00 PM	12:00 AM - 07:00 AM 07:00 PM - 11:59 PM	N/A

*As approved by the 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.

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Highway: IH 45

During construction, remove, cover, adjust, or replace overhead sign panels to correspond with each current traffic control phase. The desirable size of letters for freeways is 10 in., the minimum is 8 in. This work is subsidiary to Item 502.

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.

During the various phases of construction, maintain and relocate Logo signs/Specific Service signs located within the project limits. Maintenance and relocation of these signs are subsidiary to the Item, "Barricades, Signs, and Traffic Handling." These signs are Department-owned and administered by LoneStar Logos, a Department signage contractor.

Relocate a logo sign to avoid interference with construction phases as necessary. Assure that relocated signs meet clearance requirements. If clearance requirements cannot be met using the existing sign, contact the logo sign contractor to manufacture and deliver to the jobsite a smaller logo sign within 3 weeks. If there is absolutely no room to display the relocated logo sign, 2 weeks before relocating, contact the logo sign contractor to remove the sign and place it in storage. The telephone number for LoneStar Logos is (512) 462-1310 and the e-mail address for the regional manager, Tyler Starr, is tstarr@lonestarlogos.com.

When relocating a logo sign, provide wooden skid mounted sign supports for the sign that are crashworthy and in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices." Specific information on crash worthy skid mounted signs can be found at: http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/0-6782-2.pdf

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.

Schedule the seeding or sodding work as soon as possible. The project schedule provides for a vegetation management plan.

After completing earthwork operations, restore and reseed the disturbed areas in accordance with the Department's specifications for permanent or temporary erosion control.

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

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."

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 concrete or asphalt curb and gutter sections or frontage roads, use Surface Test Type B and Pay Adjustment Schedule 3 except for the outside lane. Use Surface Test Type B and Pay Adjustment Schedule 3 for the outside lane.

For all other roads (cross streets and intersections), use Surface Test Type A.

Item 618: Conduit
Item 620: Electrical Conductors

If the specifications for electrical items require UL-listed products, this means UL-listed or CSA-listed.

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.

Where PVC, duct cable, and HDPE conduit 1 in. and larger is allowed and installed per Department standards, provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Details standards. Ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected. Use only a flat, high tensile strength polyester fiber pull tape to pull conductors through the PVC conduit system.

Remove conductor and conduit to be abandoned to 1 ft. below the ground level. This work is subsidiary to the various bid items.

Do not use cast iron junction boxes in concrete traffic barriers and single slope traffic barriers. Use polymer concrete junction boxes as shown on standard sheet ED(4)-14. Mount the junction boxes flush (+ 0 in., - 1/2 in.) with the concrete surface of the concrete barrier.

Locate the underground utilities within the project limits. Provide the equipment necessary for locating these utilities, locate, and mark them before starting any excavation work in the area. This work is subsidiary to the various bid items. If the Contractor damages or cause damage to any existing underground utilities, repair such damage at no cost to the Department.

Ensure the interconnection of new equipment to the existing system does not interfere with the operation of the remaining system components. Ensure the system remains completely operational between the hours of 6:00 a.m. Monday and 12:00 a.m. (midnight) Saturday.

Do not interrupt system operation without coordinating with the Department's operations personnel at Houston Transtar at (713) 881-3285.

Perform work to be done on cables during weekends only.

Provide Liquid-Tight Flexible Metal (LTFM) conduit if the plans refer to flexible metal conduit. Do not use flexible metal conduit.

Unless otherwise shown on the plans, place conduit runs behind curbs at locations where curbs exist.

Use schedule 80 PVC conduit to house conductor runs under paved riprap, roadway, or driveways, unless otherwise shown on the plans.

Use Rigid Metal Conduit (RMC) for exposed conduit.

Before backfilling conduit trenches, place a detectable underground metalized mylar marking tape above the conduit and concrete encasement. Imprint the marking tape with, "TxDOT CONDUIT AND FIBER OPTIC CABLE SYSTEM. CALL (713) 802-5909 BEFORE PROCEEDING" every 18 in. Supplying and installing the marking tapes is subsidiary to the various bid items.

Conduit elbows and rigid metal extensions required when installing PVC conduit systems are subsidiary to the various bid items.

Install a continuous bare or green insulated copper wire No. 8 AWG or larger in every conduit throughout the electrical system in accordance with the Electrical Detail Standard Sheets, and the latest edition of the NEC.

Provide a single 1/C #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL-listed solid copper wire with orange color low density polyethylene insulation, suitable for conduit installation, rated for a temperature range of -20 C to +60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."

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 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.

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 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."

Using raised markers for removable work zone pavement markings on final concrete surfaces is optional.

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
Item 668: Prefabricated Pavement Markings
Item 6038: Multipolymer Pavement Markings (MPM)

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 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.

In addition to the shadow vehicles with TMAs/TAs that are specified as being required on the TCP layout sheets for this project, provide additional shadow vehicles with TMAs/TAs as shown on the TCP Standard sheets. 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.

Item 6306: Video Imaging Vehicle Detection System

Furnish the cable to operate the Video Imaging Vehicle Detection System (VIVDS) in accordance with the manufacturer's recommendations or purchase it from the same manufacturer as the VIVDS equipment.

Supply VIVDS equipment that can process up to a maximum of 6 camera inputs per intersection. Additional equipment to accommodate up to 6 camera inputs is subsidiary to the various bid items. No extra compensation will be allowed for additional equipment needed to make the VIVDS equipment fully operational under this Item.

Supply a laptop computer and a video monitor as described in this Special Specification Item.

Detector zone videotaping for this project will not be required.

Supply 2 video channel VIVDS processor cards equipped with a NEMA TS1 detector interface and a 332 cabinet detector interface for a minimum of 4 detector outputs that are compatible with the City of Houston COH 2070 traffic signal controller.

Special Specification 6306 Video Imaging Vehicle Detection System Requirements

Specification Items	Description	Not Required	Required	State Supplied
1	**Description**		**X**	
	Variable Focal Cameras		**X**	
	VIVDS Card Rack Processor System		**X**	
	Field Setup Computer (1 Required) (Laptop)	**X**		
	Field Setup Video Monitor (1 Ea. Controller)		**X**	
	Connectors and Camera Mounting Hardware		**X**	
3	**Functional Capabilities**			
	System Software		**X**	
4	**Vehicle Detection**			
	Detection Zone Video Taping	**X**		
5	**VIVDS Processor Unit**			

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	Provide both TS1 and TS2 Environmental Requirements		**X**	
	12 Volt/5 Amp Power Supply		**X**	
6	**Camera Assembly**			
	Camera Interface Panel		**X**	
7	**Field Communications Link**			
	Lightning and Transient Surge Suppression Devices		**X**	
9	**Temporary Use and Retesting**		**X**	
10	**Operation from Central Control**	**X**		
	Telephone Interconnect	**X**		
	ISDN Interconnect	**X**		
11	**Installation and Training**		**X**	

Other items not specifically listed in this table are required. When shown in the plans, remove and deliver temporary VIVDS equipment to the Department's Signal Shop, 6810 Old Katy Rd., Houston, Texas, or as directed.

VIVDS devices covered under the Department's Purchasing Special Specification T.O.-6291 (http://www.dot.state.tx.us/gsd/purchasing/supps.htm#divspecs) will also be allowed for use.

Basis of Estimate

Item	Description	Limit and Rate	Unit
316	Seal Coat		
	• Asphalt	0.32 Gal. / Sq. Yd.	GAL
	• Aggregate (Gr 4)	1/130 Cu. Yd. / Sq. Yd.	CY
	A-R Binder		
	• Asphalt	0.42 Gal. / Sq. Yd.	GAL
	• Aggregate (Gr 4)	1/130 Cu. Yd. / Sq. Yd.	CY

* If used in existing roadway base, rate will be determined on a case by case basis.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0500-03-635 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 45

			CONTROL SECTION JOB		**0500-03-635**		**0500-03-636**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00130739**		**A00130740**			
			COUNTY		**Harris**		**Harris**			
			HIGHWAY		**IH 45**		**IH 45**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	104-6021	REMOVING CONC (CURB)		LF	300.000		200.000		500.000	
	305-6015	SALV, HAUL & STKPL RCL APH PV (1 1/2")		SY			58,259.000		58,259.000	
	351-6028	FLEX PAVE STRUCTURE REPAIR (8"-10")		SY	120.000		80.000		200.000	
	354-6015	PLAN & TEXT CONC PAV(0" TO 1")		SY	3,965.000				3,965.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)		LF	12,542.000				12,542.000	
	500-6001	MOBILIZATION		LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	5.000		3.000		8.000	
	529-6011	CONC CURB (DOWEL)		LF	300.000		200.000		500.000	
	618-6046	CONDT (PVC) (SCH 80) (2")		LF	160.000				160.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)		LF	180.000				180.000	
	618-6070	CONDT (RM) (2")		LF	45.000				45.000	
	620-6007	ELEC CONDR (NO.8) BARE		LF	340.000				340.000	
	624-6009	GROUND BOX TY D (162922)		EA	5.000				5.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)		EA			47.000		47.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA			2.000		2.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)		EA	1.000		12.000		13.000	
	644-6034	IN SM RD SN SUP&AM TYS80(1)SA(U-1EXT)		EA			2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM		EA			4.000		4.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)		LF			920.000		920.000	
	662-6064	WK ZN PAV MRK REMOV (W)6"(BRK)		LF	8,637.000		5,078.000		13,715.000	
	662-6065	WK ZN PAV MRK REMOV (W)6"(DOT)		LF	48.000		898.000		946.000	
	662-6067	WK ZN PAV MRK REMOV (W)6"(SLD)		LF	480.000		2,455.000		2,935.000	
	662-6069	WK ZN PAV MRK REMOV (W)8"(DOT)		LF	372.000		305.000		677.000	
	662-6070	WK ZN PAV MRK REMOV (W)8"(LNDP)		LF	241.000		120.000		361.000	
	662-6071	WK ZN PAV MRK REMOV (W)8"(SLD)		LF	4,017.000		3,880.000		7,897.000	
	662-6072	WK ZN PAV MRK REMOV (W)12"(LNDP)		LF	555.000				555.000	
	662-6073	WK ZN PAV MRK REMOV (W)12"(SLD)		LF	1,608.000		220.000		1,828.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)		LF	90.000		3,537.000		3,627.000	
	662-6080	WK ZN PAV MRK REMOV (W)(ARROW)		EA	11.000		63.000		74.000	
	662-6081	WK ZN PAV MRK REMOV (W)(DBL ARROW)		EA	1.000		34.000		35.000	
	662-6089	WK ZN PAV MRK REMOV (W)(UTURN ARROW)		EA	1.000		12.000		13.000	
	662-6090	WK ZN PAV MRK REMOV (W)(WORD)		EA	12.000		75.000		87.000	
	662-6092	WK ZN PAV MRK REMOV (W)36"(YLD TRI)		EA			70.000		70.000	
	662-6097	WK ZN PAV MRK REMOV (Y)6"(DOT)		LF			34.000		34.000	
	662-6098	WK ZN PAV MRK REMOV (Y)6"(SLD)		LF	480.000		5,680.000		6,160.000	
	662-6099	WK ZN PAV MRK REMOV (Y)8"(SLD)		LF	726.000		1,442.000		2,168.000	
	662-6100	WK ZN PAV MRK REMOV (Y)12"(SLD)		LF	452.000		1,594.000		2,046.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0500-03-635 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 45

			CONTROL SECTION JOB		**0500-03-635**		**0500-03-636**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00130739**		**A00130740**			
			COUNTY		**Harris**		**Harris**			
			HIGHWAY		**IH 45**		**IH 45**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)		LF	48.000		898.000		946.000	
	666-6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)		LF	372.000		305.000		677.000	
	666-6033	REFL PAV MRK TY I (W)8"(LNDP)(100MIL)		LF	241.000		120.000		361.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)		LF	4,017.000		4,580.000		8,597.000	
	666-6039	REFL PAV MRK TY I (W)12"(LNDP)(100MIL)		LF	555.000				555.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)		LF	1,608.000		220.000		1,828.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)		LF	90.000		3,457.000		3,547.000	
	666-6132	REFL PAV MRK TY I (Y)6"(DOT)(100MIL)		LF			34.000		34.000	
	666-6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)		LF	726.000		1,442.000		2,168.000	
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)		LF	452.000		750.000		1,202.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)		LF	8,637.000		5,078.000		13,715.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)		LF			80.000		80.000	
	666-6212	REFL PAV MRK TY II (Y) 12" (SLD)		LF			844.000		844.000	
	666-6214	REFL PAV MRK TY II (Y) 24" (SLD)		LF			340.000		340.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)		LF			920.000		920.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)		LF	8,637.000		5,078.000		13,715.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)		LF	480.000		2,455.000		2,935.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)		LF			3,225.000		3,225.000	
	668-6018	PREFAB PAV MRK TY B (W)(24")(SLD)		LF	20.000		50.000		70.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)		EA	11.000		63.000		74.000	
	668-6078	PREFAB PAV MRK TY C (W) (DBL ARROW)		EA	1.000		34.000		35.000	
	668-6080	PREFAB PAV MRK TY C (W) (UTURN ARROW)		EA	1.000		12.000		13.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)		EA	12.000		75.000		87.000	
	668-6090	PREFAB PAV MRK TY C (W) (SYMBOL)		EA			4.000		4.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)		EA			70.000		70.000	
	668-6094	PREFAB PAV MRK TY C (W)(BIKE ARROW)		EA			5.000		5.000	
	668-6096	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)		EA			5.000		5.000	
	672-6006	REFL PAV MRKR TY I-A		EA	39.000		75.000		114.000	
	672-6007	REFL PAV MRKR TY I-C		EA			38.000		38.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA			72.000		72.000	
	672-6010	REFL PAV MRKR TY II-C-R		EA	848.000		643.000		1,491.000	
	688-6004	VEH LP DETECT (SAWCUT)		LF	288.000		324.000		612.000	
	3080-6007	STONE-MTRX-ASPH SMA-D SAC-A PG76-22		TON	8,803.000		4,806.000		13,609.000	
	3085-6001	UNDERSEAL COURSE		GAL	25,610.000		18,643.000		44,253.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN		DAY	180.000		180.000		360.000	
	6038-6004	MULTIPOLYMER PAV MRK (W)(6")(SLD)		LF			80.000		80.000	
	6038-6005	MULTIPOLYMER PAV MRK (W)(6")(BRK)		LF			68.000		68.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0500-03-635 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 45

			CONTROL SECTION JOB		**0500-03-635**		**0500-03-636**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00130739**		**A00130740**			
			COUNTY		**Harris**		**Harris**			
			HIGHWAY		**IH 45**		**IH 45**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	6038-6006	MULTIPOLYMER PAV MRK (W)(6")(DOT)		LF			15.000		15.000	
	6038-6007	MULTIPOLYMER PAV MRK (W)(8")(SLD)		LF			563.000		563.000	
	6038-6009	MULTIPOLYMER PAV MRK (W)(8")(DOT)		LF			15.000		15.000	
	6038-6011	MULTIPOLYMER PAV MRK (W)(12")(SLD)		LF			150.000		150.000	
	6038-6013	MULTIPOLYMER PAV MRK (W)(24")(SLD)		LF			104.000		104.000	
	6038-6017	MULTIPOLYMER PAV MRK (Y)(6")(SLD)		LF			748.000		748.000	
	6038-6024	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)		LF			68.000		68.000	
	6185-6002	TMA (STATIONARY)		DAY	160.000		160.000		320.000	
	6185-6005	TMA (MOBILE OPERATION)		DAY	10.000		10.000		20.000	
	6306-6009	VIVDS PROSR SYS (INSTALL ONLY)		EA	2.000				2.000	
	6306-6010	VIVDS CAM ASSY (INSTALL ONLY)		EA	2.000				2.000	
	6306-6012	VIVDS CABLING (INSTALL ONLY)		LF	510.000				510.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)		LS	1.000				1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)		LS	1.000				1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)		LS	1.000				1.000	

CK:
DW:
CK:
DN:

SUMMARY OF WORKZONE QUANTITIES

ROADWAY SHEET NO.	STATION	500 6001 MOBILIZATION	502 6001 BARRICADES SIGNS AND TRAFFIC HANDLING	6001 6001 PORTABLE CHANGEABLE MESSAGE SIGN	662 6063 WK ZN PAV MRK REMOV (W)4" (SLD)	662 6064 WK ZN PAV MRK REMOV (W)6" (BRK)	662 6065 WK ZN PAV MRK REMOV (W)6" (DOT)	662 6067 WK ZN PAV MRK REMOV (W)6" (SLD)	662 6069 WK ZN PAV MRK REMOV (W)8" (DOT)	662 6070 WK ZN PAV MRK REMOV (W)8" (LDNP)	662 6071 WK ZN PAV MRK REMOV (W)8" (SLD)	662 6072 WK ZN PAV MRK REMOV (W)12" (LDNP)	662 6073 WK ZN PAV MRK REMOV (W)12" (SLD)	662 6075 WK ZN PAV MRK REMOV (W)24" (SLD)	662 6080 WK ZN PAV MRK REMOV (W) (ARROW)	662 6081 WK ZN PAV MRK REMOV (W) (DBL ARW)	662 6089 WK ZN PAV MRK REMOV (W) (UTURN ARW)	662 6090 WK ZN PAV MRK REMOV (W) (WORD)	662 6092 WK ZN PAV MRK REMOV (Y)36" (YLD TRI)	662 6097 WK ZN PAV MRK REMOV (Y)6" (DOT)	662 6098 WK ZN PAV MRK REMOV (Y)6" (SLD)	662 6099 WK ZN PAV MRK REMOV (Y)8" (SLD)	662 6100 WK ZN PAV MRK REMOV (Y)12" (SLD)	6185 6002 TMA (STATIONARY)	6185 6005 TMA (MOBILE OPERATION)
		LS	MO	DAY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	LF	LF	LF	LF	DAY	DAY
1 of 9	STA 1348+01.54 - STA 360+00.00					638			372		505		34		4		1	5							
2 of 9	STA 360+00.00 - STA 372+00.00					1201					480	6	417					1							
3 of 9	STA 372+00.00 - STA 384+00.00					1201						549	207		2			2							
4 of 9	STA 385+00.00 - STA 396+00.00					1201					1190		760	40	2			1			160				
5 of 9	STA 396+00.00 - STA 408+00.00					983		160			324				1	1		1			160	260	160		
6 of 9	STA 408+00.00 - STA 420+00.00					748		160		133	718		140	25	2			2				260	150		
7 of 9	STA 420+00.00 - STA 432+00.00					1094				108				25											
8 of 9	STA 432+00.00 - STA 444+00.00					1108	48	160			800		50								160	206	142		
9 of 9	STA 444+00.00 - STA 456+00.00					463																			
	TOTAL CSJ: 0500-03-635		5	180	0	8637	48	480	372	241	4017	555	1608	90	11	1	1	12	0	0	480	726	452	160	10

ROADWAY SHEET NO.	STATION	500 6001 MOBILIZATION	502 6001 BARRICADES SIGNS AND TRAFFIC HANDLING	6001 6001 PORTABLE CHANGEABLE MESSAGE SIGN	662 6063 WK ZN PAV MRK REMOV (W)4" (SLD)	662 6064 WK ZN PAV MRK REMOV (W)6" (BRK)	662 6065 WK ZN PAV MRK REMOV (W)6" (DOT)	662 6067 WK ZN PAV MRK REMOV (W)6" (SLD)	662 6069 WK ZN PAV MRK REMOV (W)8" (DOT)	662 6070 WK ZN PAV MRK REMOV (W)8" (LDNP)	662 6071 WK ZN PAV MRK REMOV (W)8" (SLD)	662 6072 WK ZN PAV MRK REMOV (W)12" (LDNP)	662 6073 WK ZN PAV MRK REMOV (W)12" (SLD)	662 6075 WK ZN PAV MRK REMOV (W)24" (SLD)	662 6080 WK ZN PAV MRK REMOV (W) (ARROW)	662 6081 WK ZN PAV MRK REMOV (W) (DBL ARW)	662 6089 WK ZN PAV MRK REMOV (W) (UTURN ARW)	662 6090 WK ZN PAV MRK REMOV (W) (WORD)	662 6092 WK ZN PAV MRK REMOV (Y)36" (YLD TRI)	662 6097 WK ZN PAV MRK REMOV (Y)6" (DOT)	662 6098 WK ZN PAV MRK REMOV (Y)6" (SLD)	662 6099 WK ZN PAV MRK REMOV (Y)8" (SLD)	662 6100 WK ZN PAV MRK REMOV (Y)12" (SLD)	6185 6002 TMA (STATIONARY)	6185 6005 TMA (MOBILE OPERATION)
		LS	MO	DAY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	LF	LF	LF	LF	DAY	DAY
1 of 6	STA 1263+15.37 - STA 1272+00.00					520	125	40		120	192			811	13	10		13	17	34	40		148		
2 of 6	STA 1272+00.00 - STA 1284+00.00					997	165	445			451		51	62							1366	370	190		
3 of 6	STA 1284+00.00 - STA 1296+00.00					885	73	327	157		1024		72	799	12	11	4	16	14		1073	390	193		
4 of 6	STA 1296+00.00 - STA 1308+00.00					989	127	186			138			91	2			2			447	381	195		
5 of 6	STA 1308+00.00 - STA 1320+00.00				920	786	289	1214	88		1184		97	1227	22	5	4	26	23		2013	56	742		
6 of 6	STA 1320+00.00 - STA 1332+00.00					901	119	243	60		891			547	14	8	4	18	16		741	245	126		
	TOTAL CSJ: 0500-03-636		3	180	920	5078	898	2455	305	120	3880	0	220	3537	63	34	12	75	70	34	5680	1442	1594	160	10
	PROJECT TOTAL	1	8	360	920	13715	946	2935	677	361	7897	555	1828	3627	74	35	13	87	70	34	6160	2168	2046	320	20

SUMMARY OF ROADWAY QUANTITIES

ROADWAY SHEET NO.	STATION	104 6021 REMOVING CONC (CURB)	305 6015 SALV, HAUL & STKPL RCL APH PV (1 1/2")	316** 6434 AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC B)	351 6028 FLEX PAVE STRUCTURE REPAIR (8"-10")	354 6015 PLAN & TEXT CONC PAV (0"-1")	438 6002 CLEANING AND SEALING EXIST JOINTS (CL3)	529 6011 CONC CURB (DOWELL)	3080 6007 STONE-MTRX ASPH SMA-D SAC-A PG76-22	3085 6001 UNDERSEAL COURSE
		LF	SY	CY	SY	SY	LF	LF	TON	GAL
1 of 9	STA 1348+01.54 - STA 360+00.00			56		1557	861		613	1784
2 of 9	STA 360+00.00 - STA 372+00.00			104		573	1591		1139	3314
3 of 9	STA 372+00.00 - STA 384+00.00			121		0	1983		1334	3882
4 of 9	STA 385+00.00 - STA 396+00.00			107		454	1678		1177	3424
5 of 9	STA 396+00.00 - STA 408+00.00			84		0	1356		920	2676
6 of 9	STA 408+00.00 - STA 420+00.00			80		0	1306		885	2575
7 of 9	STA 420+00.00 - STA 432+00.00			93		0	1507		1022	2974
8 of 9	STA 432+00.00 - STA 444+00.00			104		530	1524		1148	3339
9 of 9	STA 444+00.00 - STA 456+00.00			51		851	736		565	1642
	TOTAL CSJ: 0500-03-635	300	0	800	120	3965	12542	300	8803	25610

ROADWAY SHEET NO.	STATION	104 6021 REMOVING CONC (CURB)	305 6015 SALV, HAUL & STKPL RCL APH PV (1 1/2")	316** 6434 AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC B)	351 6028 FLEX PAVE STRUCTURE REPAIR (8"-10")	354 6015 PLAN & TEXT CONC PAV (0"-1")	438 6002 CLEANING AND SEALING EXIST JOINTS (CL3)	529 6011 CONC CURB (DOWELL)	3080 6007 STONE-MTRX ASPH SMA-D SAC-A PG76-22	3085 6001 UNDERSEAL COURSE
		LF	SY	CY	SY	SY	LF	LF	TON	GAL
1 of 6	STA 1263+15.37 - STA 1272+00.00		6131	61					505	1962
2 of 6	STA 1272+00.00 - STA 1284+00.00		9126	91					753	2920
3 of 6	STA 1284+00.00 - STA 1296+00.00		12491	125					1031	3997
4 of 6	STA 1296+00.00 - STA 1308+00.00		8867	89					731	2837
5 of 6	STA 1308+00.00 - STA 1320+00.00		14116	141					1165	4517
6 of 6	STA 1320+00.00 - STA 1332+00.00		7528	75					621	2410
	TOTAL CSJ: 0500-03-636	200	58259	583	80	0	0	200	4806	18643
	PROJECT TOTAL	500	58259	1383	200	3965	12542	500	13609	44253

** FOR CONTRACTOR INFORMATION ONLY

STATE OF TEXAS
MICKEY N. BOMER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bomer III
4/22/2024

IH 45
SUMMARY OF WORK ZONE AND ROADWAY QUANTITIES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		17

DATE: 04/17/2024 08:19 AM
FILE: pw:\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\1. General\Summary of Quantities\SUMMARY OF WORK ZONE, ROADWAY, AND SWP3 QUANTITIES

SUMMARY OF PAVEMENT MARKING ITEMS 0500-03-635 (IH 45 FRONTAGE ROAD)

LOCATION	666 6018	666 6030	666 6033	666 6036	666 6039	666 6042	666 6048	666 6132	666 6138	666 6141	666 6162	666 6182	666 6212
	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(LNDP)(100MIL)	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (W)12"(LNDP)(100MIL)	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	REFL PAV MRK TY I (Y)6"(DOT)(100MIL)	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (Y) 12" (SLD)
	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF
Sheet 01	0	372	0	505	0	34	0	0	0	0	638	0	0
Sheet 02	0	0	0	480	6	417	0	0	0	0	1201	0	0
Sheet 03	0	0	0	0	549	207	0	0	0	0	1201	0	0
Sheet 04	0	0	0	1190	0	760	40	0	0	0	1201	0	0
Sheet 05	0	0	0	324	0	0	0	0	260	160	983	0	0
Sheet 06	0	0	133	718	0	140	25	0	260	150	748	0	0
Sheet 07	0	0	108	0	0	0	25	0	0	0	1094	0	0
Sheet 08	48	0	0	800	0	50	0	0	206	142	1108	0	0
Sheet 09	0	0	0	0	0	0	0	0	0	0	463	0	0
PROJECT TOTALS	**48**	**372**	**241**	**4017**	**555**	**1608**	**90**	**0**	**726**	**452**	**8637**	**0**	**0**

SUMMARY OF PAVEMENT MARKING ITEMS 0500-03-636 (IH 45 FRONTAGE ROAD)

LOCATION	666 6018	666 6030	666 6033	666 6036	666 6039	666 6042	666 6048	666 6132	666 6138	666 6141	666 6162	666 6182	666 6212
	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(LNDP)(100MIL)	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (W)12"(LNDP)(100MIL)	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	REFL PAV MRK TY I (Y)6"(DOT)(100MIL)	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (Y) 12" (SLD)
	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF
Sheet 10	125	0	120	192	0	0	811	34	0	0	520	0	148
Sheet 11	165	0	0	451	0	51	62	0	370	190	997	0	0
Sheet 12	73	157	0	1024	0	72	799	0	390	193	885	0	0
Sheet 13	127	0	0	138	0	0	91	0	381	195	989	0	0
Sheet 14	289	88	0	1884	0	97	1147	0	56	46	786	80	696
Sheet 15	119	60	0	891	0	0	547	0	245	126	901	0	0
PROJECT TOTALS	**898**	**305**	**120**	**4580**	**0**	**220**	**3457**	**34**	**1442**	**750**	**5078**	**80**	**844**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING QUANTITIES (IH 45 FRONTAGE ROAD)

SCALE: N.T.S

SHEET 1 OF 3

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN: CK: DW: CK: REVISIONS	HOU	6				18
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	HARRIS		0500	03	635,Etc.	IH 45

SUMMARY OF PAVEMENT MARKING ITEMS 0500-03-635 (IH 45 FRONTAGE ROAD)

LOCATION	666 6214	666 6303	666 6306	666 6309	666 6321	668 6077	668 6078	668 6080	668 6085	668 6090	668 6092	668 6094	668 6096
	REFL PAV MRK TY II (Y) 24" (SLD)	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (DBL ARROW)	PREFAB PAV MRK TY C (W) (UTURN ARROW)	PREFAB PAV MRK TY C (W) (WORD)	PREFAB PAV MRK TY C (W) (SYMBOL)	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	PREFAB PAV MRK TY C (W)(BIKE ARROW)	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA
Sheet 01	0	0	638	0	0	4	0	1	5	0	0	0	0
Sheet 02	0	0	1201	0	0	0	0	0	1	0	0	0	0
Sheet 03	0	0	1201	0	0	2	0	0	2	0	0	0	0
Sheet 04	0	0	1201	0	0	2	0	0	1	0	0	0	0
Sheet 05	0	0	983	160	0	1	1	0	1	0	0	0	0
Sheet 06	0	0	748	160	0	2	0	0	2	0	0	0	0
Sheet 07	0	0	1094	0	0	0	0	0	0	0	0	0	0
Sheet 08	0	0	1108	160	0	0	0	0	0	0	0	0	0
Sheet 09	0	0	463	0	0	0	0	0	0	0	0	0	0
PROJECT TOTALS	**0**	**0**	**8637**	**480**	**0**	**11**	**1**	**1**	**12**	**0**	**0**	**0**	**0**

SUMMARY OF PAVEMENT MARKING ITEMS 0500-03-636 (IH 45 FRONTAGE ROAD)

LOCATION	666 6214	666 6303	666 6306	666 6309	666 6321	668 6077	668 6078	668 6080	668 6085	668 6090	668 6092	668 6094	668 6096
	REFL PAV MRK TY II (Y) 24" (SLD)	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (DBL ARROW)	PREFAB PAV MRK TY C (W) (UTURN ARROW)	PREFAB PAV MRK TY C (W) (WORD)	PREFAB PAV MRK TY C (W) (SYMBOL)	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	PREFAB PAV MRK TY C (W)(BIKE ARROW)	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA
Sheet 10	0	0	520	40	0	13	10	0	13	0	17	0	0
Sheet 11	0	0	997	445	921	0	0	0	0	0	0	0	0
Sheet 12	160	0	885	327	746	12	11	4	16	0	14	0	0
Sheet 13	0	0	989	186	261	2	0	0	2	0	0	0	0
Sheet 14	0	920	786	1214	799	22	5	4	26	4	23	5	5
Sheet 15	180	0	901	243	498	14	8	4	18	0	16	0	0
PROJECT TOTALS	**340**	**920**	**5078**	**2455**	**3225**	**63**	**34**	**12**	**75**	**4**	**70**	**5**	**5**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING QUANTITIES (IH 45 FRONTAGE ROAD)

SCALE: N.T.S

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN: CS	HOU	6				19
CK: -	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DW: -	HARRIS		0500	03	635, Etc.	IH 45
CK: -						

REVISIONS

SUMMARY OF PAVEMENT MARKING ITEMS 0500-03-635 (IH 45 FRONTAGE ROAD)

LOCATION	672 6006	672 6007	672 6009	672 6010	6038 6004	6038 6005	6038 6006	6038 6007	6038 6011	6038 6013	6038 6017	6038 6024	6038 6009
	REFL PAV MRKR TY I-A	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	MULTIPOLYMER PAV MRK (W)(6")(SLD)	MULTIPOLYMER PAV MRK (W)(6")(BRK)	MULTIPOLYMER PAV MRK (W)(6")(DOT)	MULTIPOLYMER PAV MRK (W)(8")(SLD)	MULTIPOLYMER PAV MRK (W)(12")(SLD)	MULTIPOLYMER PAV MRK (W)(24")(SLD)	MULTIPOLYMER PAV MRK (Y)(6")(SLD)	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)	MULTIPOLYMER PAV MRK (W)(8")(DOT)
	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF
Sheet 01	0	0	0	54	0	0	0	0	0	0	0	0	0
Sheet 02	0	0	0	119	0	0	0	0	0	0	0	0	0
Sheet 03	0	0	0	164	0	0	0	0	0	0	0	0	0
Sheet 04	0	0	0	178	0	0	0	0	0	0	0	0	0
Sheet 05	14	0	0	62	0	0	0	0	0	0	0	0	0
Sheet 06	14	0	0	84	0	0	0	0	0	0	0	0	0
Sheet 07	0	0	0	65	0	0	0	0	0	0	0	0	0
Sheet 08	11	0	0	96	0	0	0	0	0	0	0	0	0
Sheet 09	0	0	0	26	0	0	0	0	0	0	0	0	0
PROJECT TOTALS	**39**	**0**	**0**	**848**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SUMMARY OF PAVEMENT MARKING ITEMS 0500-03-636 (IH 45 FRONTAGE ROAD)

LOCATION	672 6006	672 6007	672 6009	672 6010	6038 6004	6038 6005	6038 6006	6038 6007	6038 6011	6038 6013	6038 6017	6038 6024	6038 6009
	REFL PAV MRKR TY I-A	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	MULTIPOLYMER PAV MRK (W)(6")(SLD)	MULTIPOLYMER PAV MRK (W)(6")(BRK)	MULTIPOLYMER PAV MRK (W)(6")(DOT)	MULTIPOLYMER PAV MRK (W)(8")(SLD)	MULTIPOLYMER PAV MRK (W)(12")(SLD)	MULTIPOLYMER PAV MRK (W)(24")(SLD)	MULTIPOLYMER PAV MRK (Y)(6")(SLD)	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)	MULTIPOLYMER PAV MRK (W)(8")(DOT)
	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF
Sheet 10	0	34	28	56	80	68	15	563	150	104	748	68	15
Sheet 11	19	0	0	124	0	0	0	0	0	0	0	0	0
Sheet 12	20	4	22	105	0	0	0	0	0	0	0	0	0
Sheet 13	20	0	0	67	0	0	0	0	0	0	0	0	0
Sheet 14	3	0	0	186	0	0	0	0	0	0	0	0	0
Sheet 15	13	0	22	105	0	0	0	0	0	0	0	0	0
PROJECT TOTALS	**75**	**38**	**72**	**643**	**80**	**68**	**15**	**563**	**150**	**104**	**748**	**68**	**15**

TEXAS DEPARTMENT OF TRANSPORTATION

SUMMARY OF PAVEMENT MARKING QUANTITIES (IH 45 FRONTAGE ROAD)

SCALE: N.T.S

SHEET 3 OF 3

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.GS REVISIONS	HOU	6				20
CK.I-	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DR.I-	HARRIS		0500	03	635,Etc.	IH 45
CK.I-						

DATE: 4/18/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\05000363 5v4 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\04 SUMMARY AND ESTIMATE\IH 45+FR+PAVEMENT MARKING SUMMARY.dgn

MATERIALS FOR HIGHWAY TRAFFIC SIGNAL				
ITEM	**DESC CODE**	**DESCRIPTION**	**UNIT**	**QUANTITY**
618	6046	CONDT (PVC) (SCH 80) (2")	LF	160
618	6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	180
618	6070	CONDT (RM) (2")	LF	45
620	6007	ELEC CONDR (NO.8) BARE	LF	340
624	6009	GROUND BOX TY D (162922)	EA	5
6306	6009	VIVDS PROSR SYS (INSTALL ONLY)	EA	2
6306	6010	VIVDS CAM ASSY (INSTALL ONLY)	EA	2
6306	6012	VIVDS CABLING (INSTALL ONLY)	LF	510
	****	TRF SIG CBL (TY A)(16 AWG)(3 CONDR)	LF	510
	****	R-59 COAXIAL CABLE	LF	510

**** MATERIAL(S) SUBSIDIARY TO PERTINENT PAY ITEM

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

04/24/2024

IH 45 AT ALMEDA GENOA RD VIVDS DETECTION SUMMARY OF QUANTITIES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		21

DN: CK: DW: CK:

DATE: 4/24/2024 2:29:31 PM
FILE: H:\Traffic Signals\Armando\Projects\IH 45 Overlay - CSJ 0500 03 635\455_ Almeda Genoa to BW8\635_I-45 Frtg_TRAFFIC_MDF.dgn

CSJ 0500-03-635
IH-45 (GULF FREEWAY)

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
668	6018	PREFAB PAV MRK TY B(W)(24")(SLD)	LF	40.00
688	6004	VEH LP DETECT (SAWCUT)	LF	288.00

Texas Department of Transportation

IH-45 (GULF FREEWAY)

COMPUTERIZED
TRANSPORTATION
MANAGEMENT SYSTEM
QUANTITIES

CONT	SECT	JOB	HIGHWAY
0500	03	635	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		22

CSJ 0500-03-636
IH-45 (NORTH FREEWAY)

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
668	6018	PREFAB PAV MRK TY B(W)(24")(SLD)	LF	90.00
688	6004	VEH LP DETECT (SAWCUT)	LF	580.00

Texas Department of Transportation

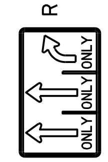
IH-45 (NORTH FREEWAY)

COMPUTERIZED
TRANSPORTATION
MANAGEMENT SYSTEM
QUANTITIES

CONT	SECT	JOB	HIGHWAY
0500	03	636	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		23

SUMMARY OF SMALL SIGNS (CSJ# -0500-03-635)

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS	ALUMINUM TYPE A	644 - IN SM RD SN SUP&AM															
						6001	6002	6004	6005	6007	6009	6012	6027	6028	6030	6031	6033	6034	6036	6037	6076
						TY10BWG(1)SA(P)	TY 10BWG (1) SA (P-BM)	TY10BWG(1)SA(T)	TY10BWG(1)SA(T-2EXT)	TY10BWG(1)SA(U)	TY 10BWG (1) SB (P)	TY 10BWG (1) SB (T)	TY S80 (1) SA (P)	TYS80(1)SA(P-BM)	TYS80(1)SA(T)	TYS80(1)SA(T-2EXT)	TYS80(1)SA(U)	TYS80(1)SA(U-1EXT)	TYS80(1)SA(U-BM)	TYS80(1)SA(U-WC)	REMOVE SM RD SN SUP&AM
						EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
6	1	R3-8SSR	STRAIGHT, STRAIGHT, RIGHT	48 x 30	X					X											
CSJ 0500-03-635 (SHT 1 OF 1)										1											



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

(IH 45 FRONTAGE ROAD)

 SHEET 1 OF 5

STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
HOU	6				24
COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.
HARRIS		0500	03	635, Etc.	IH 45

STD-N29

DATE: 2/27/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\04 SUMMARY AND ESTIMATE\IH 45*FR*SUMMARY OF SMALL SIGNS.dgn

DATE: 2/27/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\050003635\4 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\04 SUMMARY AND ESTIMATE\IH 45*FR*SUMMARY OF SMALL SIGNS.dgn

SUMMARY OF SMALL SIGNS (CSJ# -0500-03-636)

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS	ALUMINUM TYPE A	644 - IN SM RD SN SUP&AM															
						6001	6002	6004	6005	6007	6009	6012	6027	6028	6030	6031	6033	6034	6036	6037	6076
						TY10BWG(1)SA(P)	TY 10BWG (1) SA (P-BM)	TY10BWG(1)SA(T)	TY10BWG(1)SA(T-2EXT)	TY10BWG(1)SA(U)	TY 10BWG (1) SB (P)	TY 10BWG (1) SB (T)	TY S80 (1) SA (P)	TYS80(1)SA(P-BM)	TYS80(1)SA(T)	TYS80(1)SA(T-2EXT)	TYS80(1)SA(U)	TYS80(1)SA(U-1EXT)	TYS80(1)SA(U-BM)	TYS80(1)SA(U-WC)	REMOVE SM RD SN SUP&AM
						EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
10	1	D3-2 (2)	(ADVANCED STREET NAME) 2 lines 	54x30	X					X											
	2	R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X	X															
	3	R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X	X															
	4	D3-2 (2)	(ADVANCED STREET NAME) 2 lines 	78x30	X					X											
	5	R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X	X															
	6	R3-6R	<ARROWS - OPTIONAL RIGHT>	30 x 36	X	X															
	7	R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X	X															
	8	R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X	X															
11	1	R3-6R	<ARROWS - OPTIONAL RIGHT>	30 x 36	X	X															
	2	R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X	X															
	3	D3-2 (2)	(ADVANCED STREET NAME) 2 lines 	78x30	X					X											
	4	M3-3B M1-1T M6-2BL	SOUTH (BLUE) INTERSTATE (ROUTE # 45) <ARROW - ANGLED UP LEFT> (BLUE) 	24 x 12 24 x 24 21 x 15	X X X	X																
	5	W9-1L	LEFT LANE ENDS	36 x 36	X	X															
	6	W9-2TR	LANE ENDS MERGE RIGHT	36 x 36	X	X															
	7	R4-3bT	DO NOT CROSS DOUBLE WHITE LINE	36 x 36	X	X															
CSJ 0500-03-636 (SHT 1 OF 4)						12				3											

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

(IH 45 FRONTAGE ROAD)

 SHEET 2 OF 5

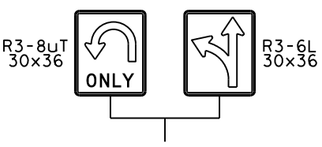
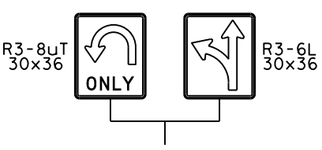
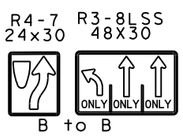
DISTRICT	REGION	PROJECT NO.	SHEET
HOU	6		25
COUNTY	CONTROL	SECTION	JOB
HARRIS	0500	03	635,Etc.

IH 45

STD-N29

DATE: 2/27/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\050003635\4 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\04 SUMMARY AND ESTIMATE\IH 45*FR*SUMMARY OF SMALL SIGNS.dgn

SUMMARY OF SMALL SIGNS (CSJ# -0500-03-636)

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS	ALUMINUM TYPE A	644 - IN SM RD SN SUP&AM															
						6001	6002	6004	6005	6007	6009	6012	6027	6028	6030	6031	6033	6034	6036	6037	6076
						TY10BWG(1)SA(P)	TY 10BWG (1) SA (P-BM)	TY10BWG(1)SA(T)	TY10BWG(1)SA(T-2EXT)	TY10BWG(1)SA(U)	TY 10BWG (1) SB (P)	TY 10BWG (1) SB (T)	TY S80 (1) SA (P)	TYS80(1)SA(P-BM)	TYS80(1)SA(T)	TYS80(1)SA(T-2EXT)	TYS80(1)SA(U)	TYS80(1)SA(U-1EXT)	TYS80(1)SA(U-BM)	TYS80(1)SA(U-JWC)	REMOVE SM RD SN SUP&AM
						EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
12	1	R4-3bT	DO NOT CROSS DOUBLE WHITE LINE	36 x 36	X	X															
	2	W9-2TR	LANE ENDS MERGE RIGHT	36 x 36	X	X															
	3	W9-1L	LEFT LANE ENDS	36 x 36	X	X															
	4	R3-8MS	LEFT AND STRAIGHT, STRAIGHT	36 x 30	X	X															
	5	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X					X											
		R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X																
																					
	6	R3-6R	<ARROWS - OPTIONAL RIGHT>	30 x 36	X	X															
	7	R3-8MS	LEFT AND STRAIGHT, STRAIGHT	36 x 30	X	X															
	8	W3-1	SYMBOL - STOP AHEAD	30 x 30	X	X															
	9	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X	X															
	10	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X					X											
		R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X																
																					
	11	R3-8MS	LEFT AND STRAIGHT, STRAIGHT	36 x 30	X	X															
	12	R3-8MS	LEFT AND STRAIGHT, STRAIGHT	36 x 30	X	X															
13	1	W3-1	SYMBOL - STOP AHEAD	30 x 30	X	X															
	2	W9-1L	LEFT LANE ENDS	36 x 36	X	X															
	R-1	W4-2L	SYMBOL - LANE ENDS, MERGE LEFT	36 x 36	X																X
	3	W9-2TR	LANE ENDS MERGE RIGHT	36 x 36	X	X															
14	1	R6-1R	ONE WAY <IN RIGHT ARROW>	54 x 18	X			X													
	2	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X					X											
		R3-8LSS	LEFT, STRAIGHT, STRAIGHT	48 x 30	X																
																					
	3	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X	X															
	4	R3-5R	<RIGHT TURN ARROW> ONLY	30 x 36	X	X															
	5	R3-7R	RIGHT LANE MUST TURN RIGHT	36 x 36	X	X															
CSJ 0500-03-636 (SHT 2 OF 4)						16		1		3											1

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

(IH 45 FRONTAGE ROAD)

DISTRICT	REGION	PROJECT NO.	SHEET
HOU	6		26
COUNTY	CONTROL	SECTION	JOB
HARRIS	0500	03	635,Etc.

IH 45

STD-N29

DATE: 2/27/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\050003635\4 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\04 SUMMARY AND ESTIMATE\IH 45*FR*SUMMARY OF SMALL SIGNS.dgn

SUMMARY OF SMALL SIGNS (CSJ# -0500-03-636)

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS	ALUMINUM TYPE A	644 - IN SM RD SN SUP&AM															
						6001	6002	6004	6005	6007	6009	6012	6027	6028	6030	6031	6033	6034	6036	6037	6076
						TY10BWG(1)SA(P)	TY 10BWG (1) SA (P-BM)	TY10BWG(1)SA(T)	TY10BWG(1)SA(T-2EXT)	TY10BWG(1)SA(U)	TY 10BWG (1) SB (P)	TY 10BWG (1) SB (T)	TY S80 (1) SA (P)	TYS80(1)SA(P-BM)	TYS80(1)SA(T)	TYS80(1)SA(T-2EXT)	TYS80(1)SA(U)	TYS80(1)SA(U-1EXT)	TYS80(1)SA(U-BM)	TYS80(1)SA(U-WC)	REMOVE SM RD SN SUP&AM
						EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
14	6	W3-3	SYMBOL - SIGNALIZED INTERSECTION AHEAD	30 x 30	X	X															
CONT.	7	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X					X											
		R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X																
			R3-8uT 30x36 ONLY R3-6L 30x36																		
	8	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X	X															
	9	W3-3	SYMBOL - SIGNALIZED INTERSECTION AHEAD	30 x 30	X	X															
	10	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X	X															
	11	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X					X											
		R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X																
			R3-8uT 30x36 ONLY R3-6L 30x36																		
	R-1	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X																X
	12	R3-7R	RIGHT LANE MUST TURN RIGHT	36 x 36	X	X															
	13	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X	X															
	14	R3-8LSS	LEFT, STRAIGHT, STRAIGHT	48 x 30	X					X											
	15	R6-1R	ONE WAY <IN RIGHT ARROW>	54 x 18	X			X													
	16	R4-7	<SYMBOL - KEEP RIGHT OF FEATURE>	24 x 30	X	X															
	17	R2-1	SPEED LIMIT (40)	30 x 36	X	X															
15	1	R2-1	SPEED LIMIT (40)	30 x 36	X	X															
	2	W9-2TR	LANE ENDS MERGE RIGHT	36 x 36	X	X															
	R-1	W4-2L	SYMBOL - LANE ENDS, MERGE LEFT	36 x 36	X																X
	3	W9-1L	LEFT LANE ENDS	36 x 36	X	X															
	4	EM-1aT	EVACUATION ROUTE <w/ HURRICANE SYMBL>	24 x 24	X													X			
		M3-1B	NORTH (BLUE)	24 x 12	X																
		M1-1T	INTERSTATE (ROUTE # 45)	24 x 24	X																
		M5-1BL	<ARROW - STRAIGHT THEN LEFT> (BLUE)	21 x 15	X																
		M3-3B	SOUTH (BLUE)	24 x 12	X																
		M1-1T	INTERSTATE (ROUTE # 45)	24 x 24	X																
		M6-1B	<ARROW - HORIZ. STRGHT> (BLUE)	21 x 15	X																
			EM-1aT 24X24 EVACUATION ROUTE M3-1B 24X12 NORTH M3-3B 24X12 SOUTH M1-1T 24X24 INTERSTATE TEXAS 45 M1-1T 24X24 M5-1BL 21X15 M6-1B 21X15																		
CSJ 0500-03-636 (SHT 3 OF 4)						11		1		3								1			2

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

(IH 45 FRONTAGE ROAD)

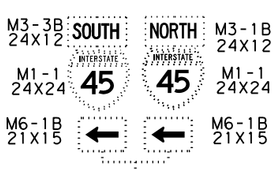
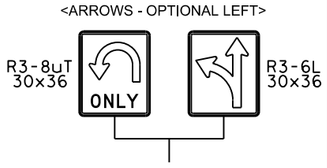
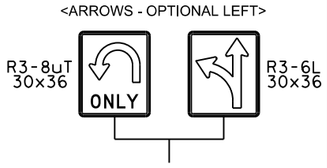
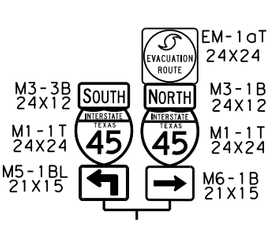
 SHEET 4 OF 5

DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET
HOU	HARRIS	0500	03	635,Etc.	27

STD-N29

DATE: 2/27/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\050003635\4 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\04 SUMMARY AND ESTIMATE\IH 45*FR*SUMMARY OF SMALL SIGNS.dgn

SUMMARY OF SMALL SIGNS (CSJ# -0500-03-636)

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS	ALUMINUM TYPE A	644 - IN SM RD SN SUP&AM															
						6001	6002	6004	6005	6007	6009	6012	6027	6028	6030	6031	6033	6034	6036	6037	6076
						TY10BWG(1)SA(P)	TY 10BWG (1) SA (P-BM)	TY10BWG(1)SA(T)	TY10BWG(1)SA(T-2EXT)	TY10BWG(1)SA(U)	TY 10BWG (1) SB (P)	TY 10BWG (1) SB (T)	TY S80 (1) SA (P)	TYS80(1)SA(P-BM)	TYS80(1)SA(T)	TYS80(1)SA(T-2EXT)	TYS80(1)SA(U)	TYS80(1)SA(U-1EXT)	TYS80(1)SA(U-BM)	TYS80(1)SA(U-WC)	REMOVE SM RD SN SUP&AM
						EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
15 CONT.	R-2	M3-3B	SOUTH (BLUE)	24 x 12	X																X
		M1-1	INTERSTATE (ROUTE # 45)	24 x 24	X																
		M6-1B	<ARROW - HORIZ. STRGHT> (BLUE)	21 x 15	X																
		M3-3B	NORTH (BLUE)	24 x 12	X																
		M1-1	INTERSTATE (ROUTE # 45)	24 x 24	X																
		M6-1B	<ARROW - HORIZ. STRGHT> (BLUE)	21 x 15	X																
																					
	5	R3-6R	<ARROWS - OPTIONAL RIGHT>	30 x 36	X	X															
	6	W3-1	SYMBOL - STOP AHEAD	30 x 30	X	X															
	7	R3-8LS	LEFT, STRAIGHT	30 x 30	X	X															
	8	R3-8LS	LEFT, STRAIGHT	30 x 30	X	X															
	9	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X					X											
		R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X																
																					
	10	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X	X															
	11	R3-6R	<ARROWS - OPTIONAL RIGHT>	30 x 36	X	X															
	12	R3-8uT	<U-TURN ARROW> ONLY	30 x 36	X					X											
		R3-6L	<ARROWS - OPTIONAL LEFT>	30 x 36	X																
																					
	13	R3-8LS	LEFT, STRAIGHT	30 x 30	X	X															
	14	R3-8LS	LEFT, STRAIGHT	30 x 30	X	X															
	15	M3-3B	INTERSTATE (ROUTE # 45)	24 x 24	X													X			
		M1-1T	INTERSTATE (ROUTE # 45)	24 x 24	X																
		M5-1BL	<ARROW - STRAIGHT THEN LEFT> (BLUE)	21 x 15	X																
		EM-1aT	EVACUATION ROUTE <w/ HURRICANE SYMBL>	24 x 24	X																
		M3-1B	NORTH (BLUE)	24 x 12	X																
		M1-1T	INTERSTATE (ROUTE # 45)	24 x 24	X																
		M6-1B	<ARROW - HORIZ. STRGHT> (BLUE)	21 x 15	X																
																					
CSJ 0500-03-636 (SHT 4 OF 4)						8				2								1			1
CSJ 0500-03-636 (IH 45 FRONTAGE ROAD) TOTAL						47		2		12								2			4

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

(IH 45 FRONTAGE ROAD)

DISTRICT	COUNTY	CONTROL	SECTION	JOB	HIGHWAY	SHEET
HOU	HARRIS	0500	03	635,Etc.	IH 45	28

STD-N29

1. MINIMIZE IMPACT TO IH-45 TRAFFIC.
2. MAINTAIN ALL MOVEMENTS IN ALL PHASES.
3. ENSURE ACCESS TO ADJACENT PROPERTY.
4. THE CONTRACTOR MAY COMBINE OR ALTER PHASING TO IMPROVE OPERATIONS BASED ON FIELD CONDITIONS AND UPON ENGINEER'S APPROVAL.
5. SET UP TRAFFIC CONTROL FOR ALL PHASES PER TRAFFIC CONTROL STANDARD SHEETS AND/OR THE TEXAS MUTCD AND/OR AS DIRECTED BY THE ENGINEER.
6. BEFORE ROAD WORK: INSTALL BARRICADES, SIGNS AND TRAFFIC CONTROL DEVICES. INSTALL SWP3 DEVICES.
7. DURING ROAD WORK: AS NEEDED AND AS PER THE ENGINEER, PERFORM FULL DEPTH FLEXIBLE PAVEMENT REPAIRS (8"-10").
8. MILL EXISTING 1.5" HMA BETWEEN N MAIN ST AND LINK RD. WORK PAID UNDER ITEM 305-6015
9. INSTALL TEMPORARY WORK ZONE PAVEMENT MARKINGS AS THEY ARE REMOVED BY MILLING WORK.
10. PLACE UNDERSEAL BETWEEN N MAIN ST AND LINK RD.
11. PLACE 1.5" OF HMA WITHIN 3 CALENDAR DAYS OF PLACING UNDERSEAL BETWEEN N MAIN ST AND LINK RD.
12. PLANE AND TEXTURE CONCRETE PAVEMENT AS DIRECTED IN THE ROADWAY LAYOUT BETWEEN ALMEDA-GENOA RD AND SL 8.
13. PLACE 2" HMA OVERLAY BETWEEN ALMEDA-GENOA RD AND SL 8.
14. AFTER ALL ROAD WORK HAS BEEN COMPLETED AND ASPHALT PAVMENT HAS CURED: INSTALL PERMANENT STRIPING & REFLECTIVE PAVEMENT MARKINGS.
15. REMOVE SWP3 DEVICES.
16. REMOVE BARRICADES, SIGNS AND TRAFFIC CONTROL DEVICES.

GENERAL NOTES:

1. THE CONTRACTOR MAY BEGIN AND END MILL AND OVERLAY WORK ANYWHERE ON THE PROJECT AS APPROVED BY THE ENGINEER.
2. ALL WORK THAT REQUIRES DETOURS AS DESCRIBED IN THE PLANS SHALL BE LIMITED TO WEEKEND WORK AND ROAD CLOSURES REMOVED BY THE END OF THE WEEKEND.

LINK RD STEP 1

1. MILL AND OVERLAY THE LINK RD EASTBOUND LANE FROM THE BEGINNING AND END OF THE IH 45 UNDERPASS.
2. PRINCIPAL OBJECTIVE: TEMPORARILY CLOSE THE LINK RD EASTBOUND LANE, AND PERFORM MILL AND OVERLAY.
3. PLACE WORK ZONE PAVEMENT MARKINGS.

LINK RD STEP 2

1. MILL AND OVERLAY THE LINK RD WESTBOUND LANE FROM THE BEGINNING AND END OF THE IH 45 UNDERPASS.
2. PRINCIPAL OBJECTIVE: TEMPORARILY CLOSE THE LINK RD WESTBOUND LANE, AND PERFORM MILL AND OVERLAY.

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH 45
CONSTRUCTION SEQUENCE OVERVIEW

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		29

DATE: 04/15/2024 09:47 AM
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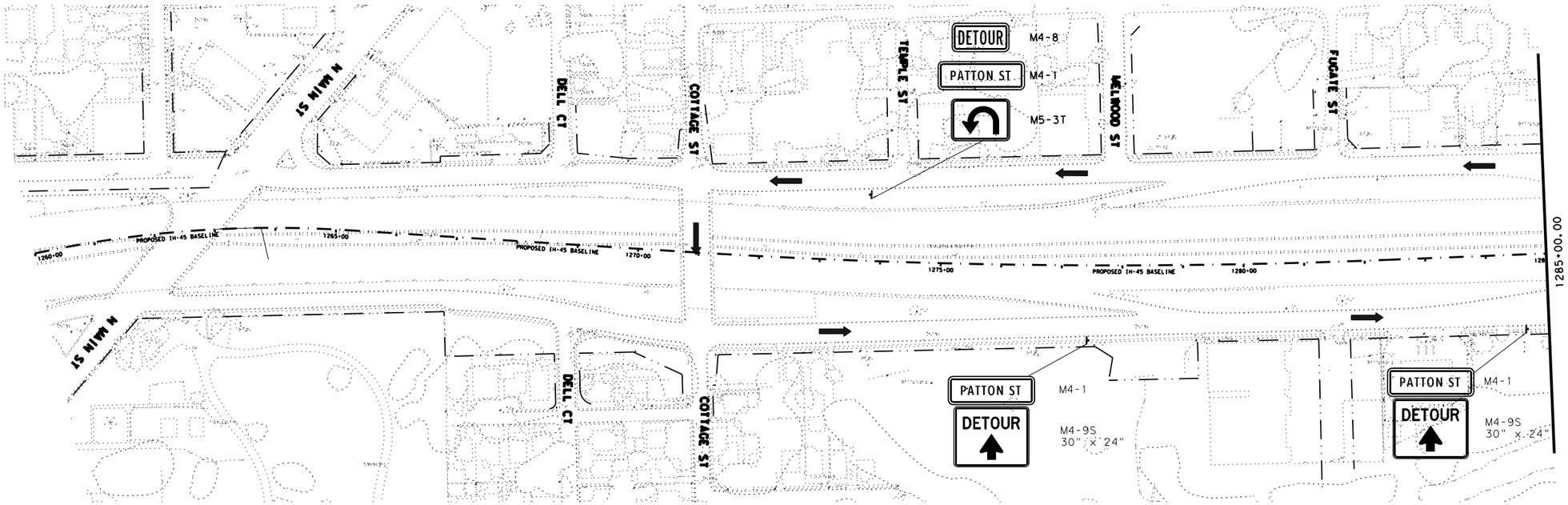
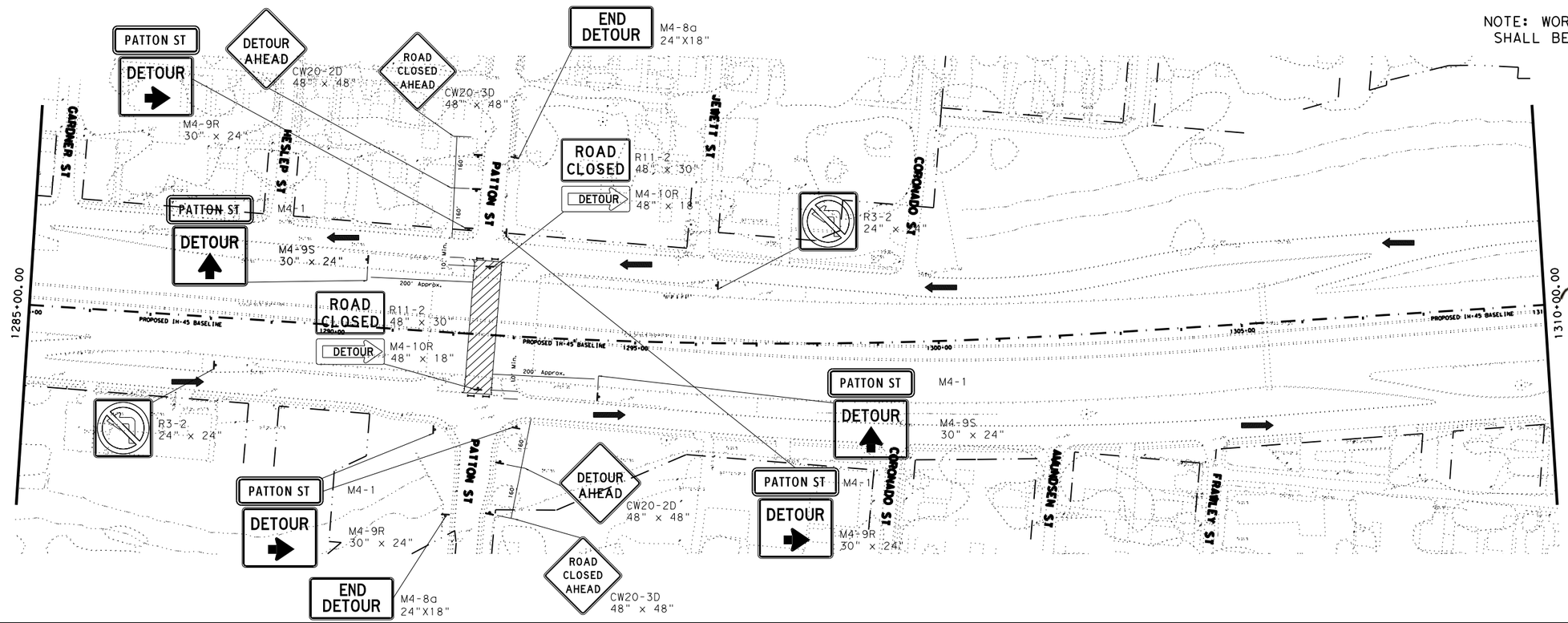


LEGEND

TYPE III BARRICADE
CONSTRUCTION SIGN
DIRECTION OF TRAFFIC FLOW



NOTE: WORK AT THIS INTERSECTION SHALL BE LIMITED TO WEEKENDS ONLY

STATE OF TEXAS
MICKEY H. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

4/22/2024

IH 45
PATTON DETOUR TRAFFIC CONTROL PLAN

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		30

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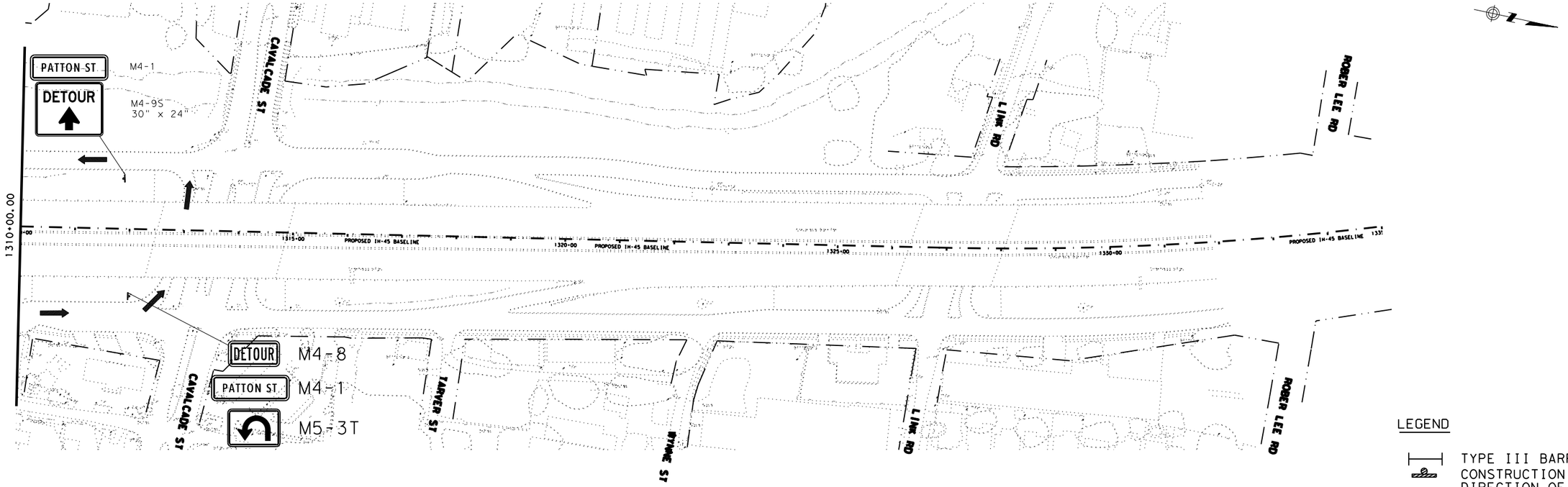


LEGEND

TYPE III BARRICADE
CONSTRUCTION SIGN
DIRECTION OF TRAFFIC FLOW

NOTE: WORK AT THIS INTERSECTION SHALL BE LIMITED TO WEEKENDS ONLY

STATE OF TEXAS
MICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

4/22/2024

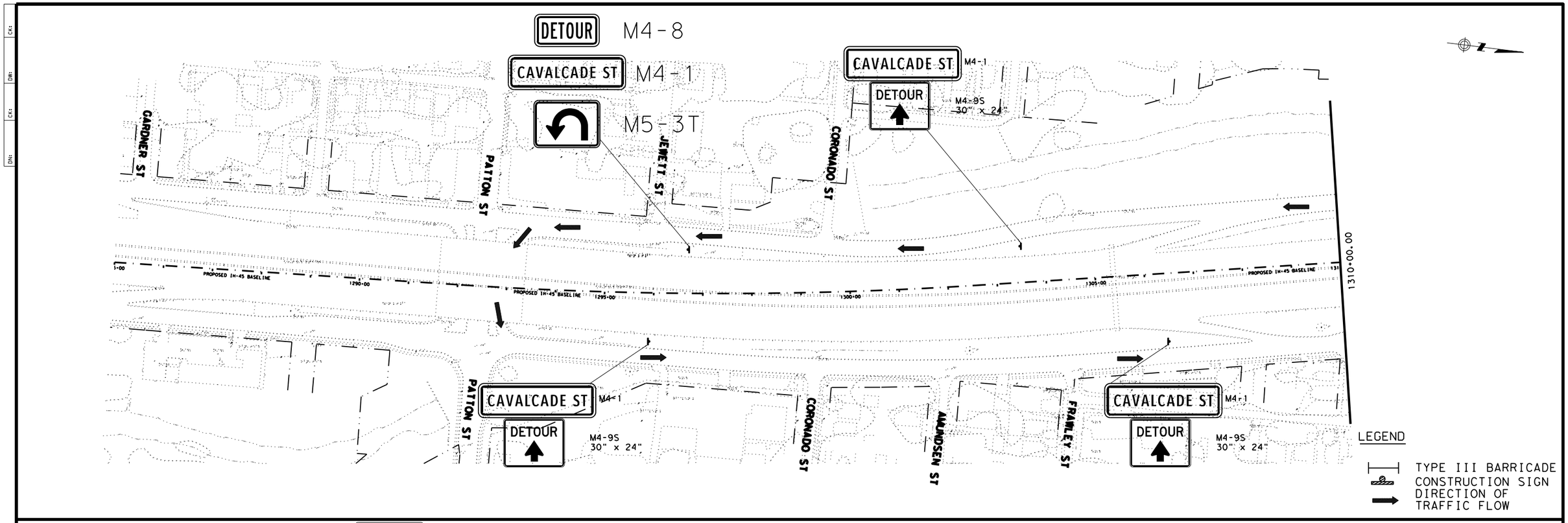
IH-45
PATTON DETOUR TRAFFIC CONTROL PLAN

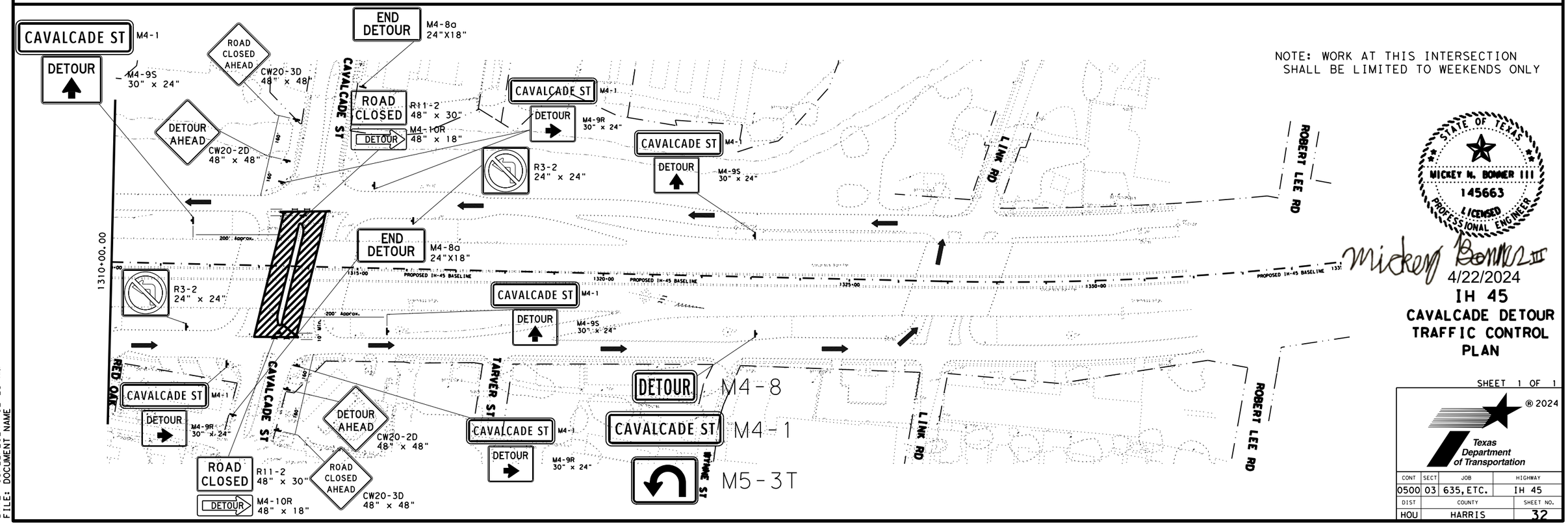
SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		31

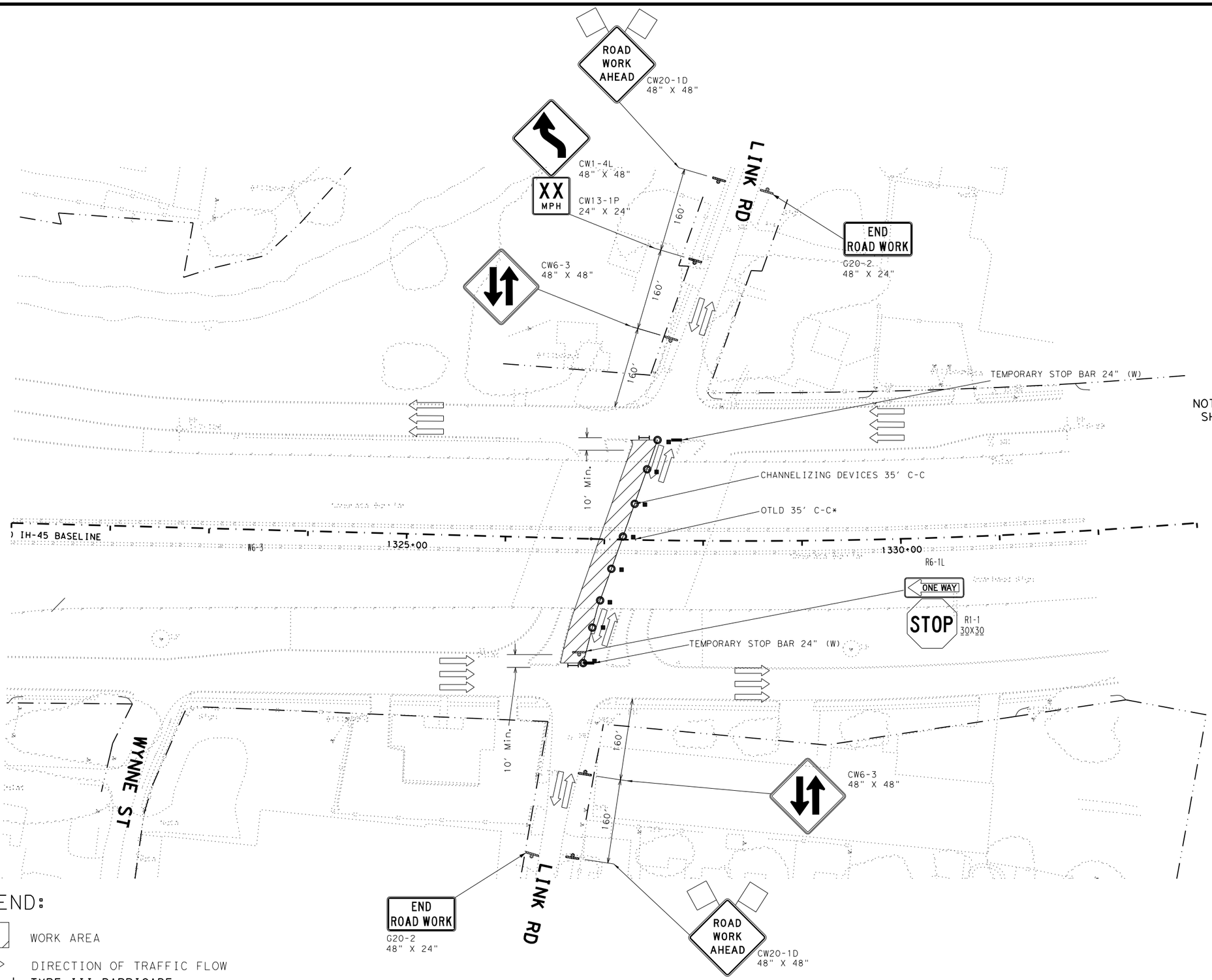
DATE: 04/16/2024 02:33 PM
FILE: DOCUMENT NAME



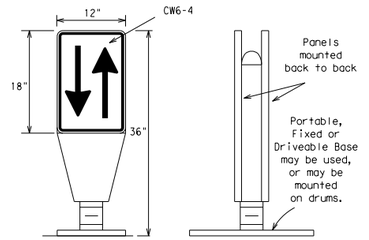


CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		32

DATE: 03/22/2024 02:25 AM
FILE: DOCUMENT NAME



*OPPOSING TRAFFIC LANE DIVIDERS (OTLD) PLEASE SEE TCP STANDARD BC(9)-21 FOR ADDITIONAL DETAILS



NOTE: WORK AT THIS INTERSECTION SHALL BE LIMITED TO WEEKENDS ONLY

LEGEND:

- WORK AREA
- DIRECTION OF TRAFFIC FLOW
- TYPE III BARRICADE
- CONSTRUCTION SIGN

STATE OF TEXAS
MICKEY N. BOMER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bomer III
4/22/2024

IH 45
LINK RD UNDERPASS
TRAFFIC CONTROL PLAN STEP 1

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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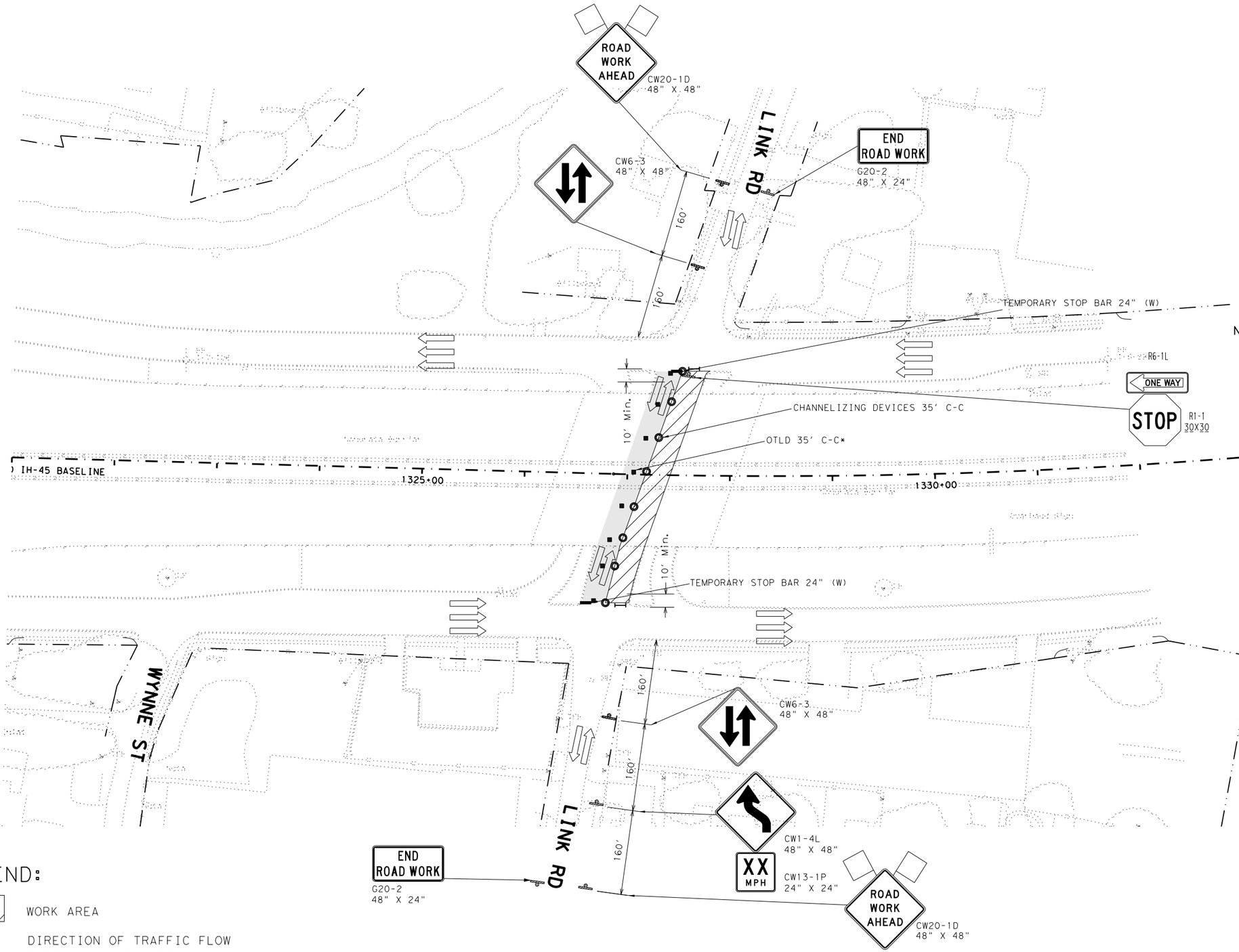
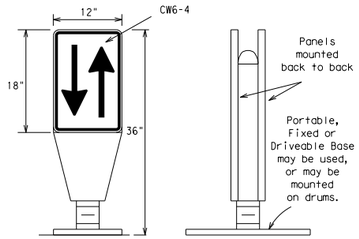
DIST	COUNTY		SHEET NO.
HOU	HARRIS		33

DATE: 03/22/2024 11:06 AM
FILE: DOCUMENT NAME



*OPPOSING TRAFFIC LANE DIVIDERS (OTLD) PLEASE SEE TCP STANDARD BC(9)-21 FOR ADDITIONAL DETAILS



NOTE: WORK AT THIS INTERSECTION SHALL BE LIMITED TO WEEKENDS ONLY

LEGEND:

- WORK AREA
- DIRECTION OF TRAFFIC FLOW
- TYPE III BARRICADE
- CONSTRUCTION SIGN

STATE OF TEXAS
MICKEY N. BOMER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bomer III
4/22/2024

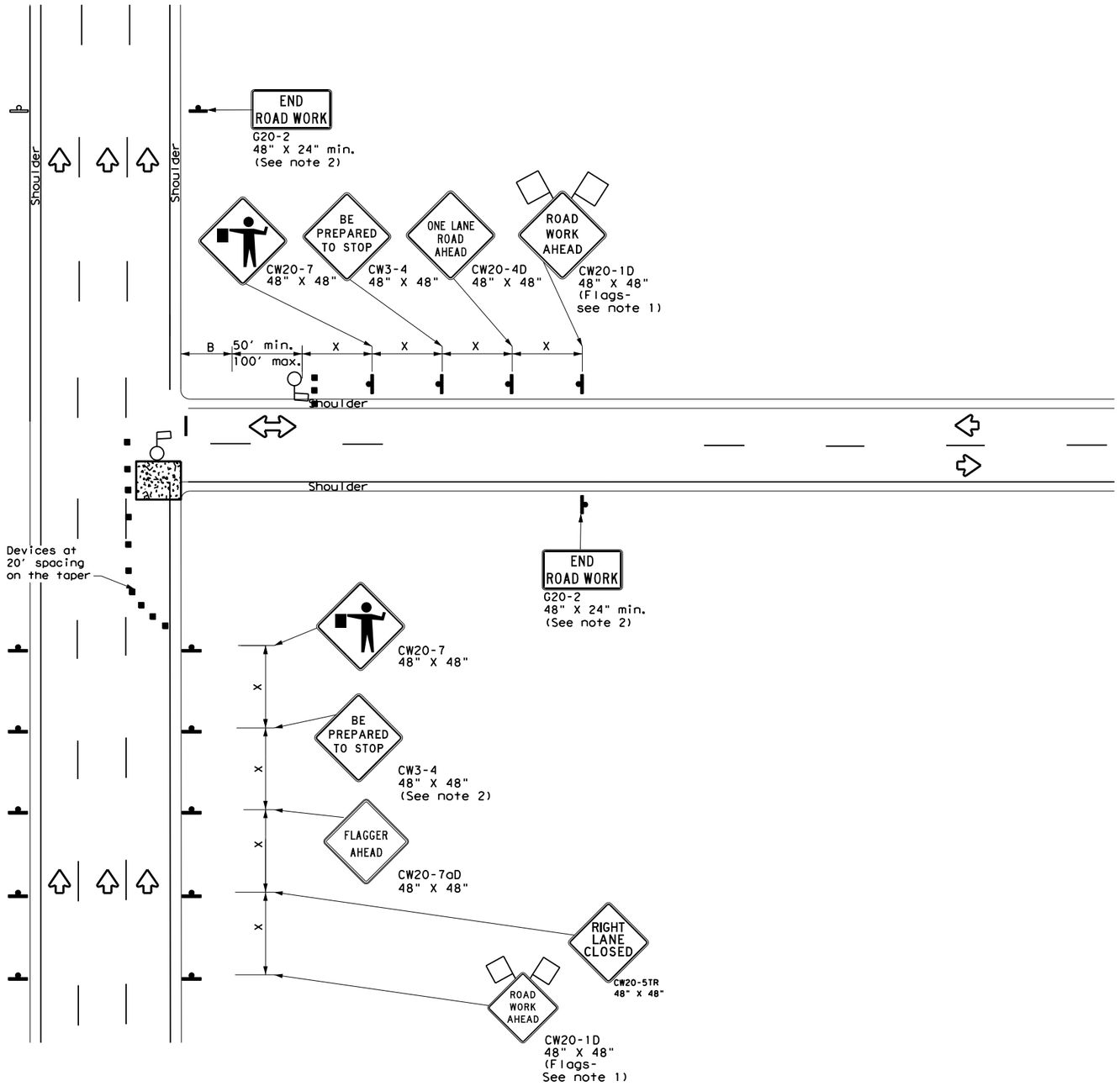
IH 45
LINK RD UNDERPASS
TRAFFIC CONTROL PLAN STEP 2

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		34

DATE: 03/22/2024 01:34 PM
FILE: DOCUMENT NAME



SIDE STREET TRAFFIC CONTROL PLANS (SHEET 1 OF 2)

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 Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L = Length of Taper (FT) W = Width of Offset (FT) S = Posted Speed (MPH)

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
4. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
5. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
6. Temporary rumble strips are not required on seal coat operations.
7. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

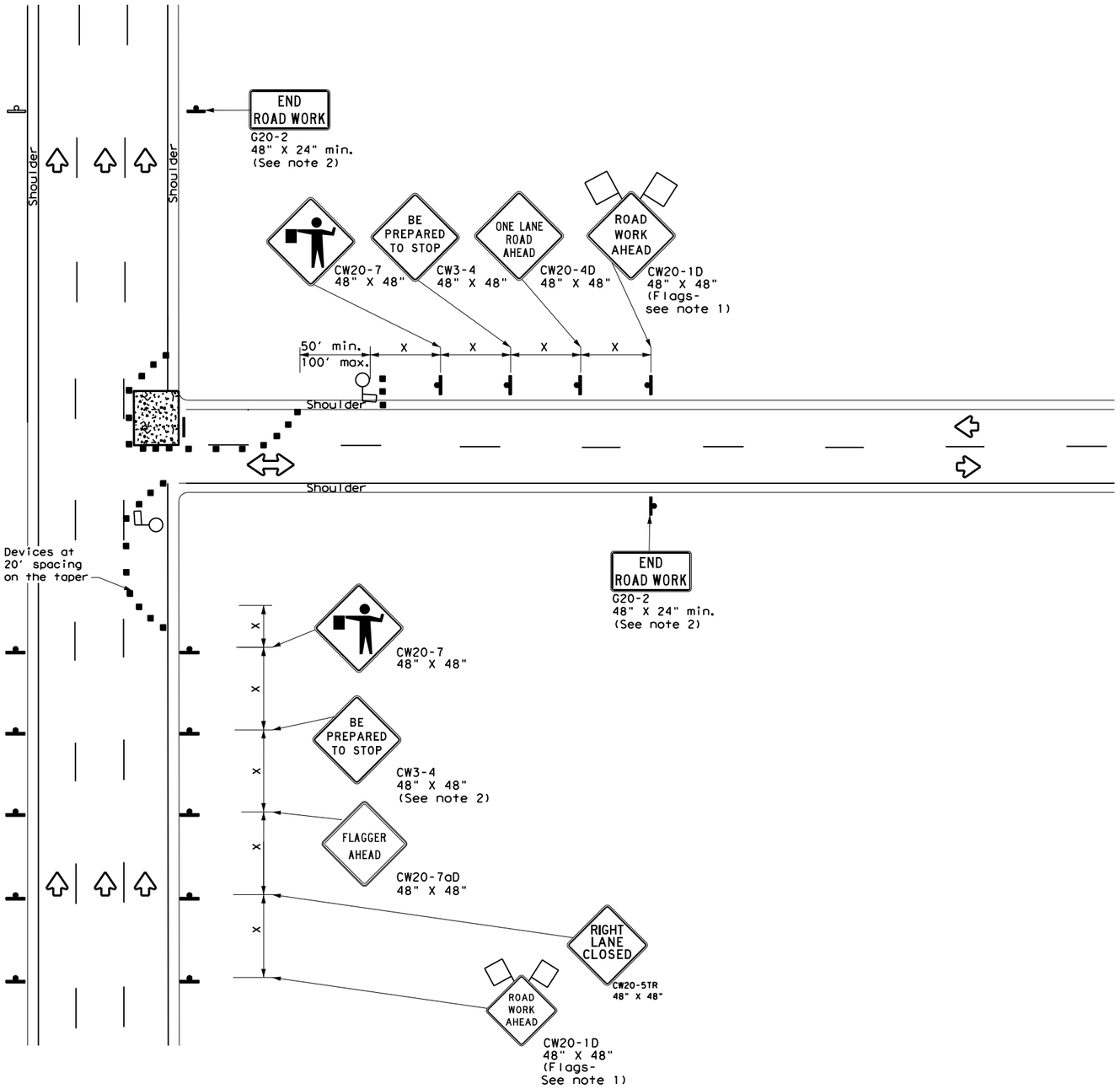
SHEET 1 OF 2

Texas Department of Transportation

TRAFFIC CONTROL PLAN FRONTAGE RD OPERATIONS NEAR INTERSECTION

FILE:	DN:	CK:	DW:	CK:
© TxDOT January 2024 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		35

DATE: 02/01/2024 10:30 PM
FILE: DOCUMENT NAME



SIDE STREET TRAFFIC CONTROL PLANS (SHEET 2 OF 2)

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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 Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L = Length of Taper (FT) W = Width of Offset (FT) S = Posted Speed (MPH)

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
4. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
5. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
6. Temporary rumble strips are not required on seal coat operations.
7. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

Texas Department of Transportation

TRAFFIC CONTROL PLAN FRONTAGE RD OPERATIONS NEAR INTERSECTION

FILE:	DN:	CK:	DW:	CK:
© TxDOT January 2024 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		36

DATE: 02/01/2024 10:30 PM
FILE: DOCUMENT NAME

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

DATE:
FILE:

SHEET 1 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

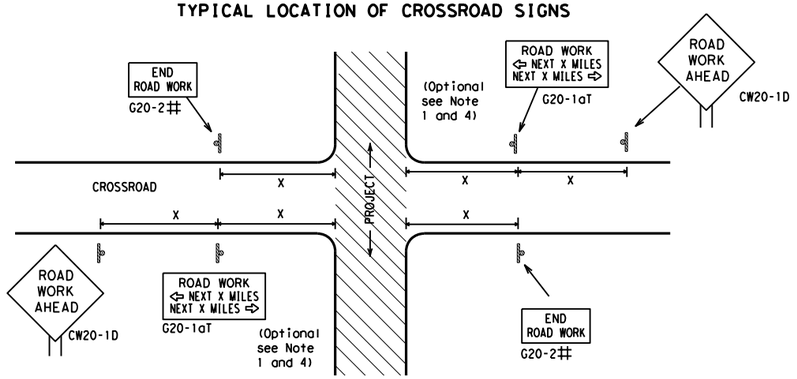
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

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	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		37

DATE:
FILE:

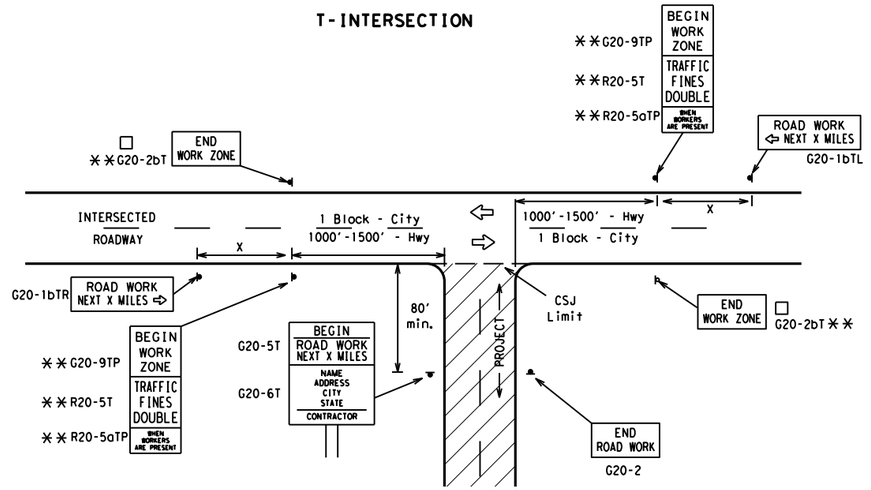
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

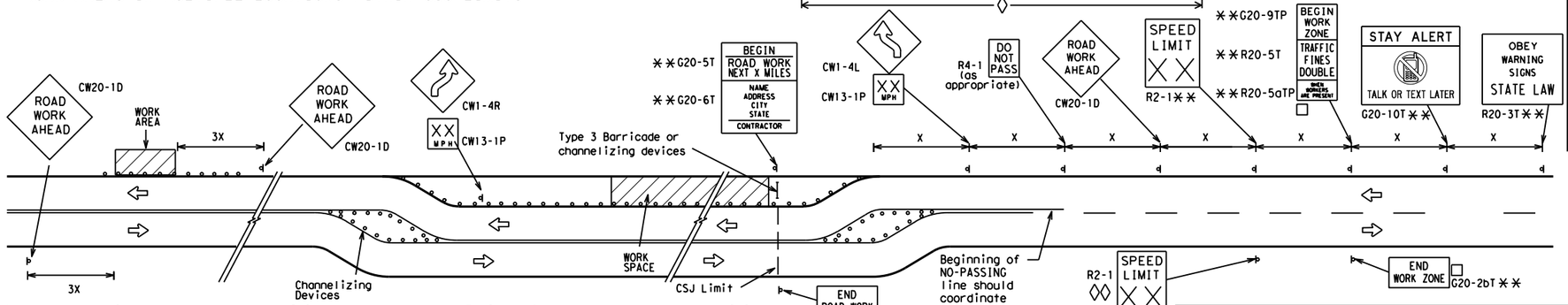
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

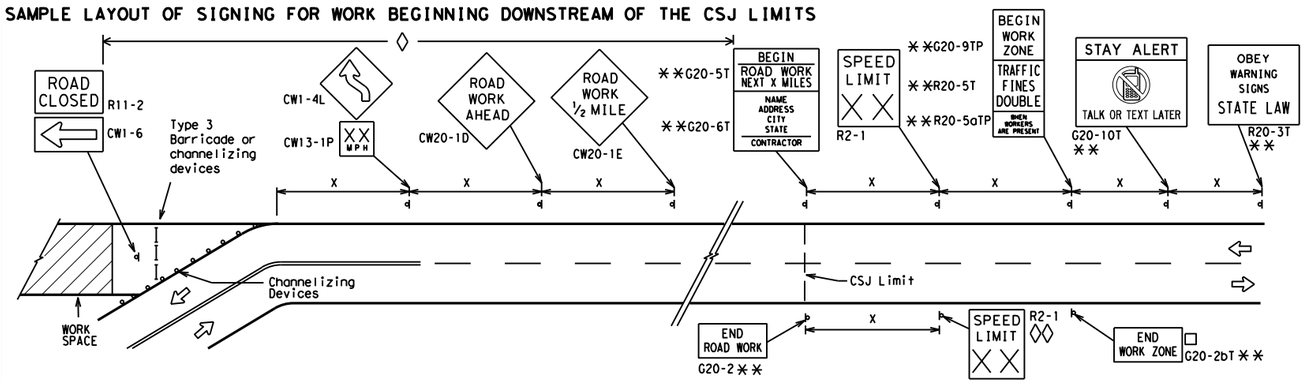
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		38

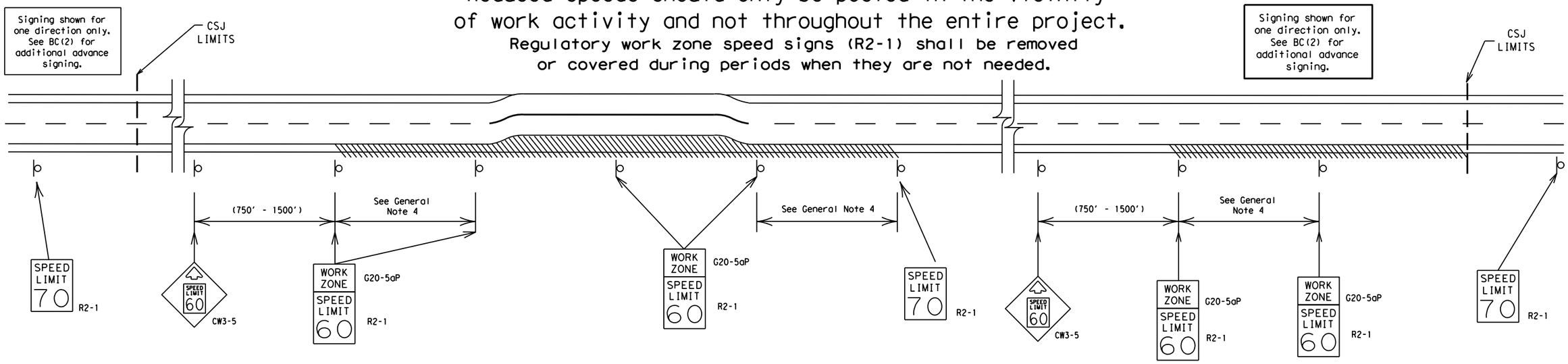
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

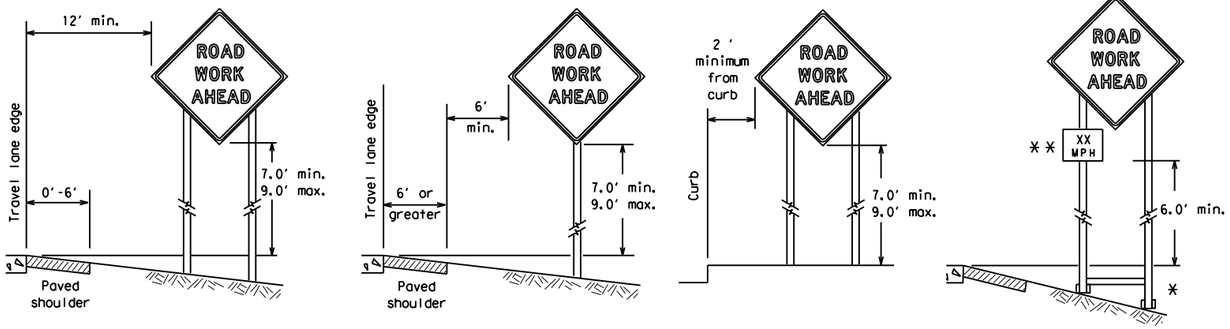
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		39

DATE:
FILE:

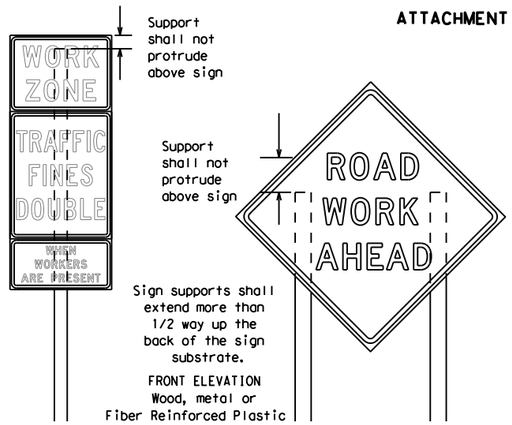
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

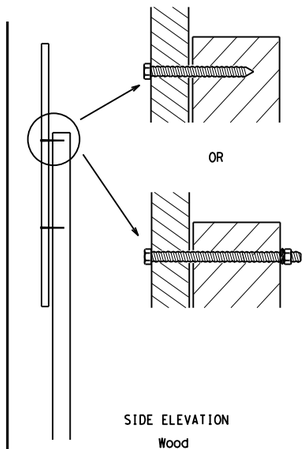


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





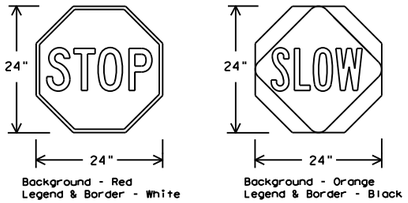
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

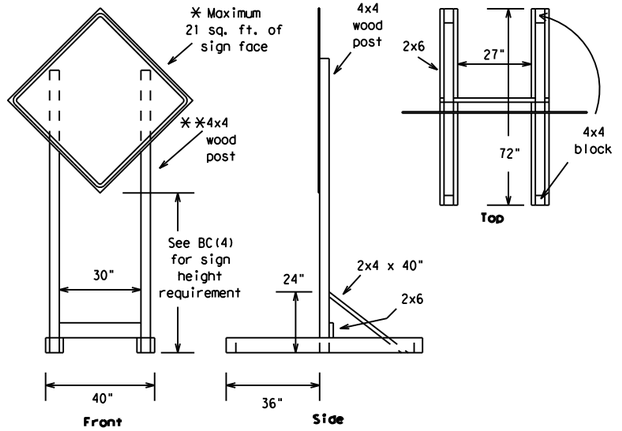
Texas Department of Transportation

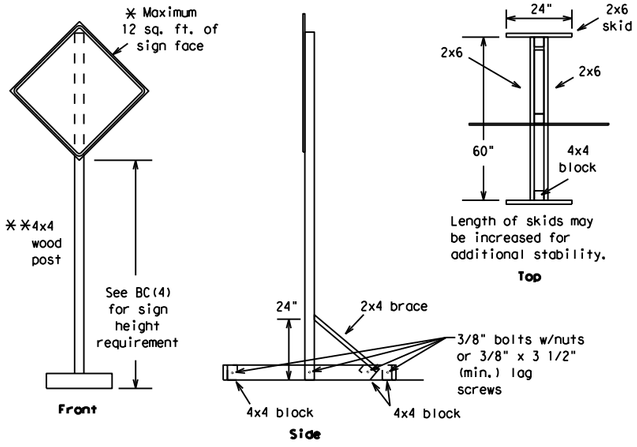
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

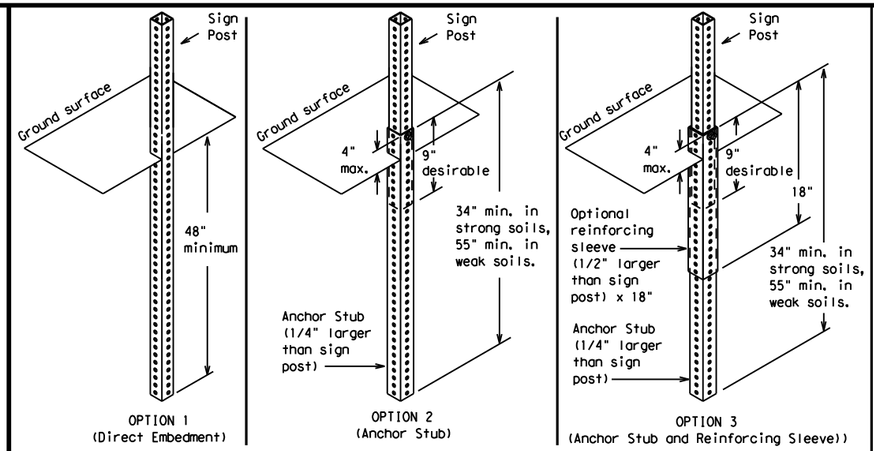
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		40





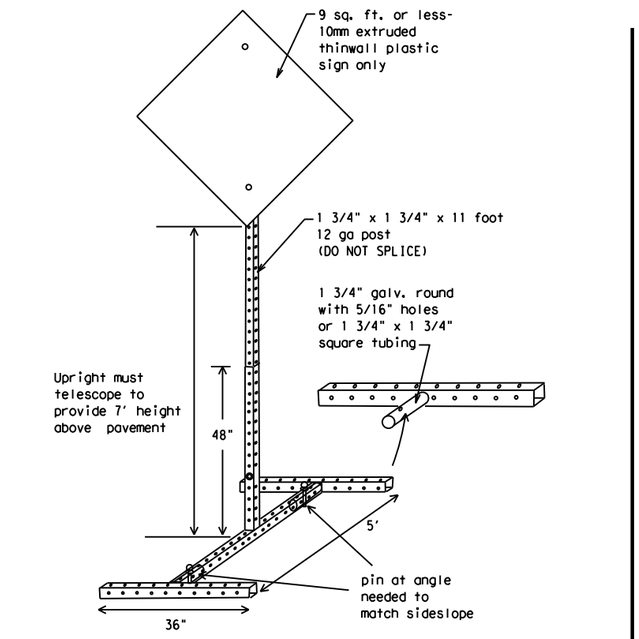
SKID MOUNTED WOOD SIGN SUPPORTS

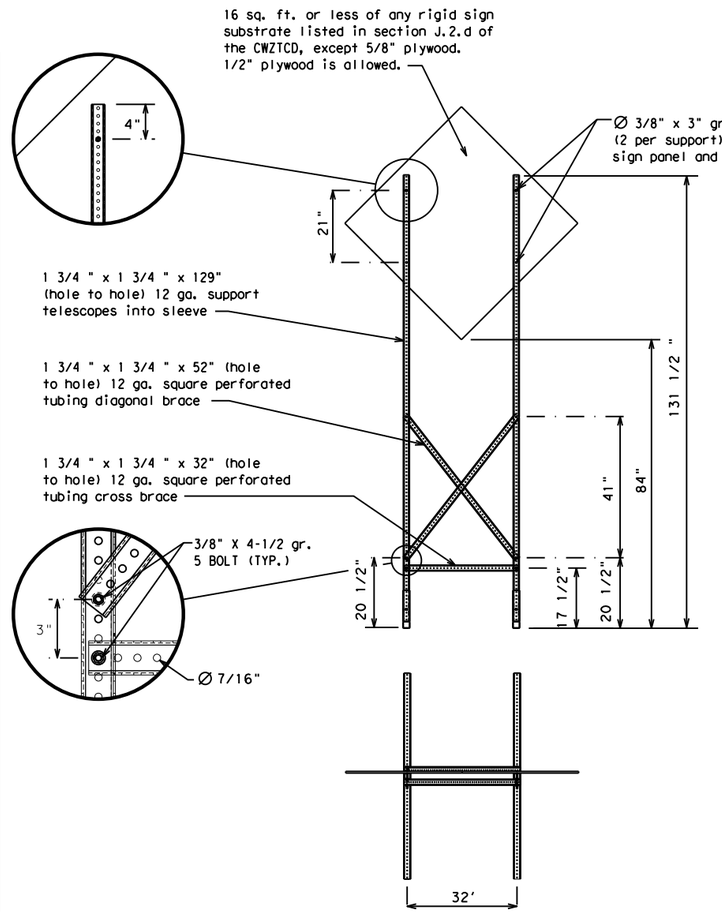
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

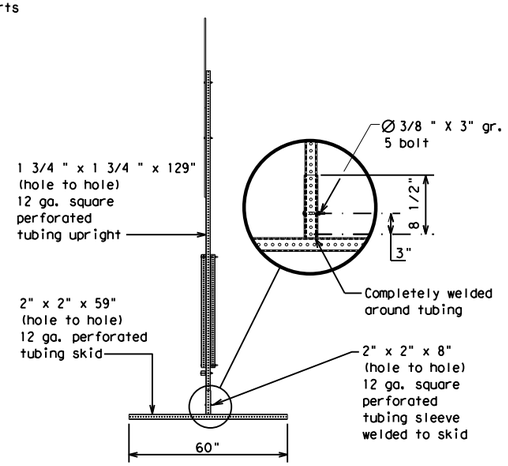


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		41

DATE:
FILE:

DATE:
FILE:

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		42

100

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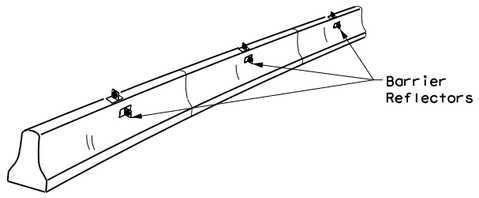
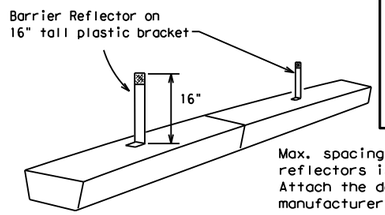
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

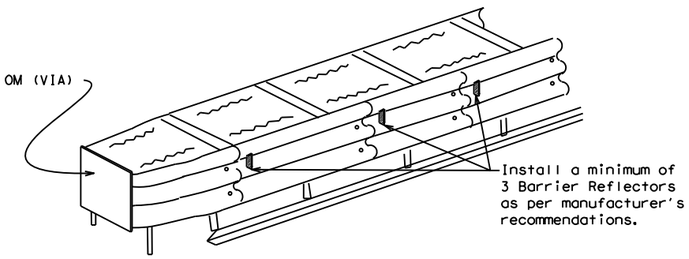


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

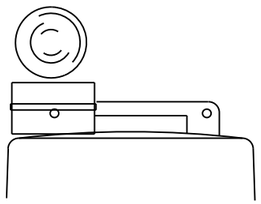


DELINEATION OF END TREATMENTS

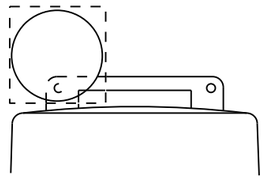
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

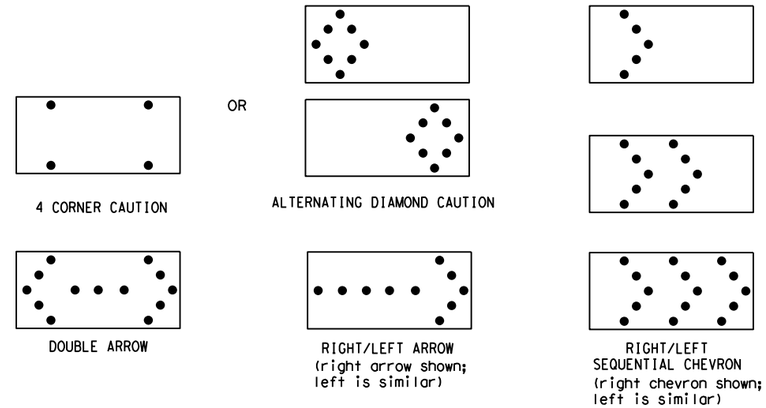
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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	0500	03	635,ETC.	IH 45
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	HOU	HARRIS		43

101

DATE:
FILE:

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

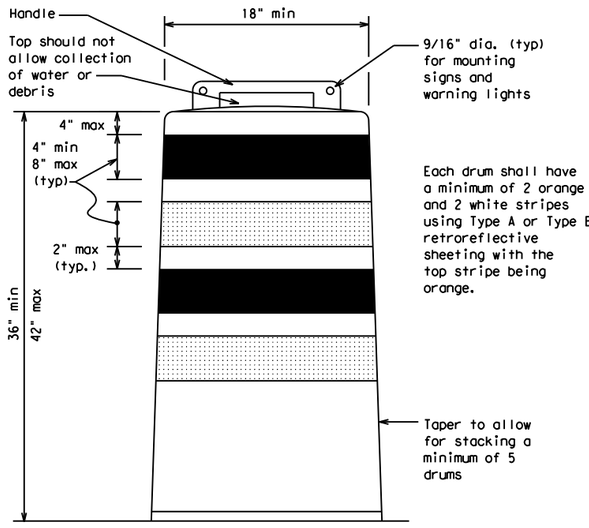
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

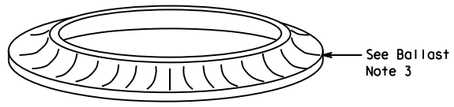
RETROREFLECTIVE SHEETING

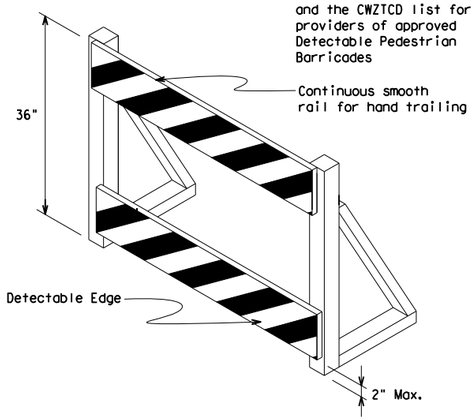
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

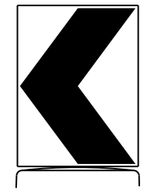




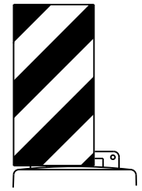


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	HOU	HARRIS		44
7-13				

102

DATE:
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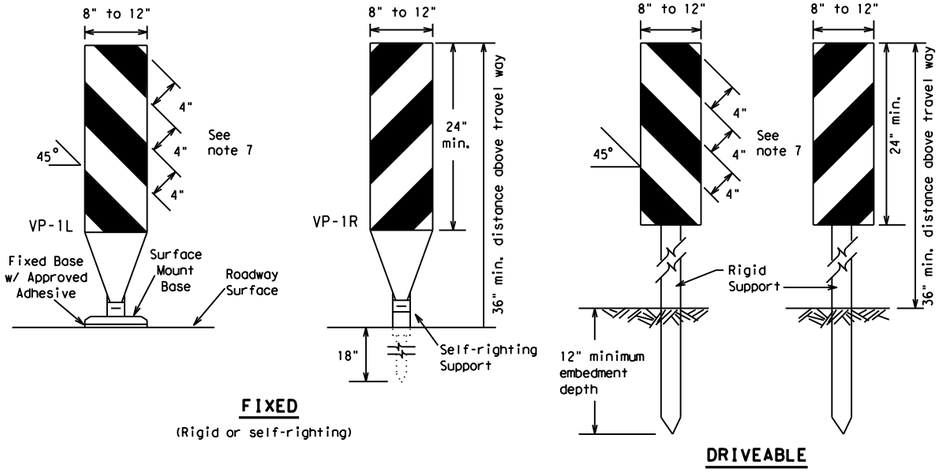
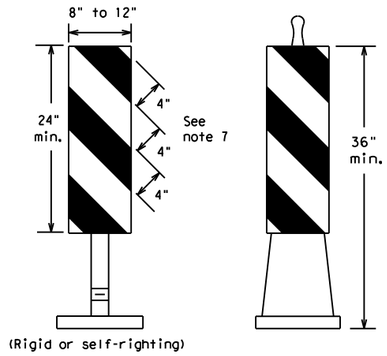


FIXED
(Rigid or self-righting)

DRIVEABLE

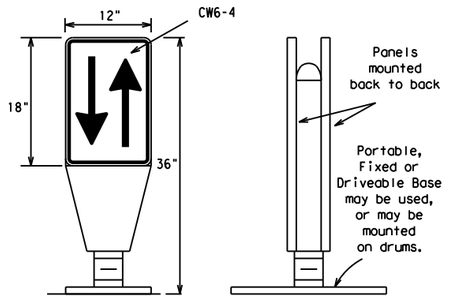


(Rigid or self-righting)

PORTABLE

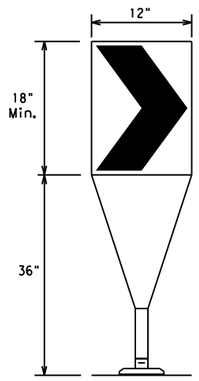
VERTICAL PANELS (VPs)

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)



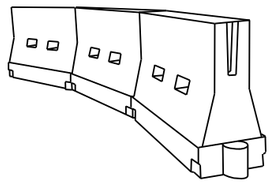
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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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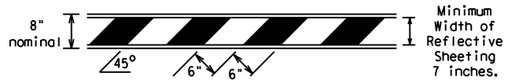
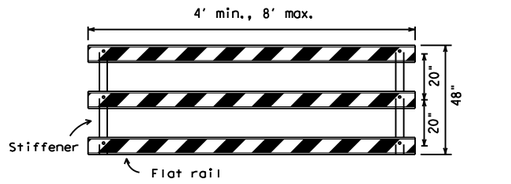
TYPE 3 BARRICADES

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.



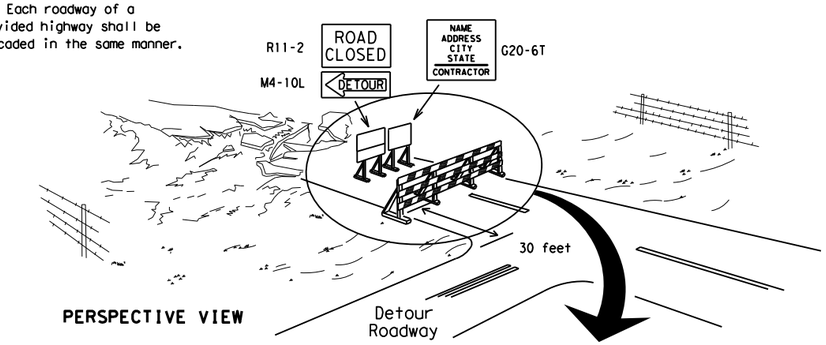
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

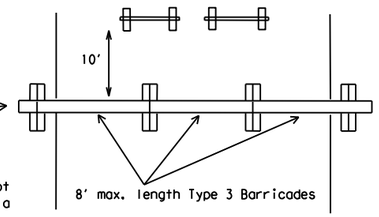
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

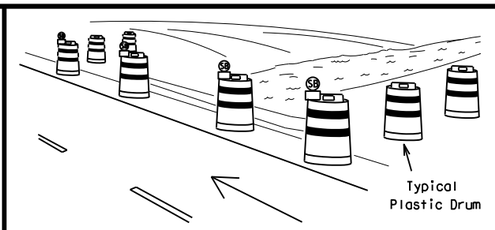
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

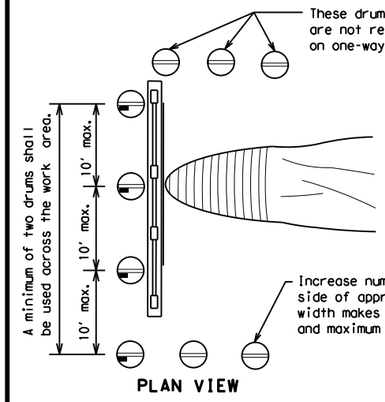
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

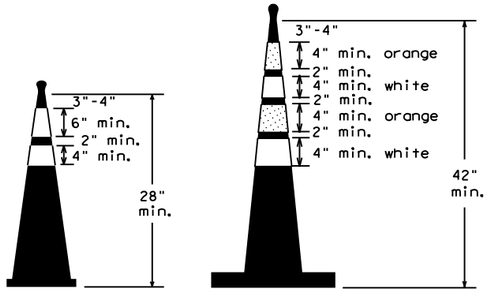
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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

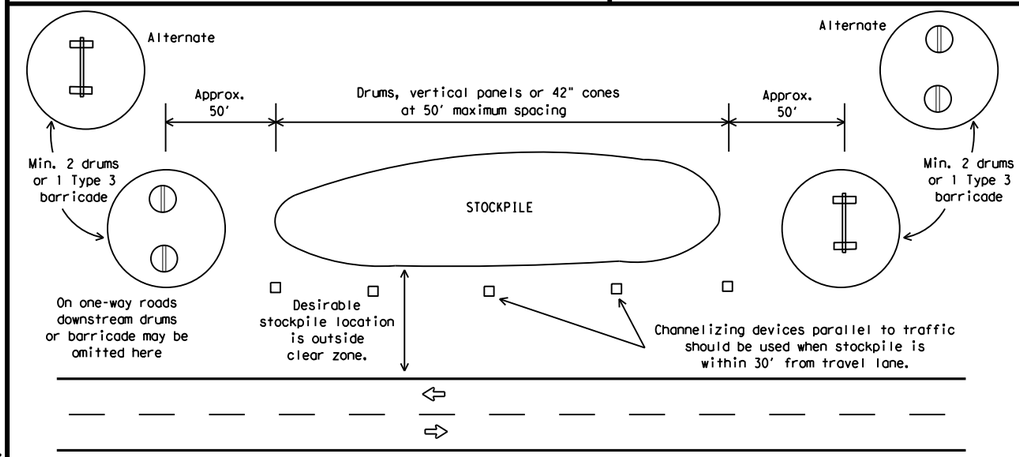
PLAN VIEW

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

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SHEET 10 OF 12

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.

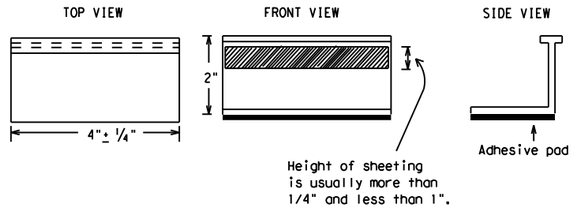
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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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11-02 8-14				

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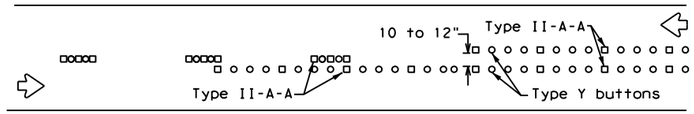
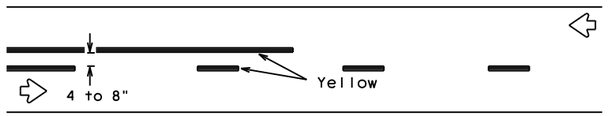
FILE:

PAVEMENT MARKING PATTERNS

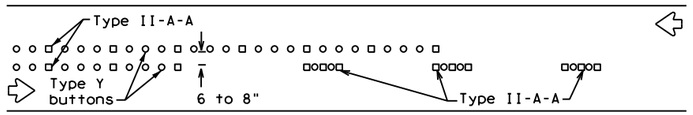
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



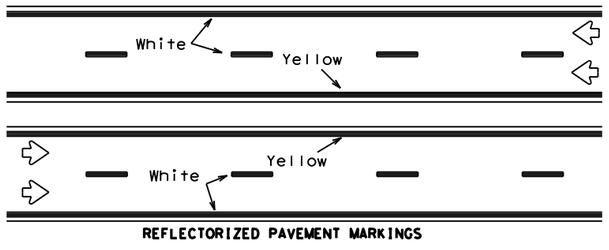
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



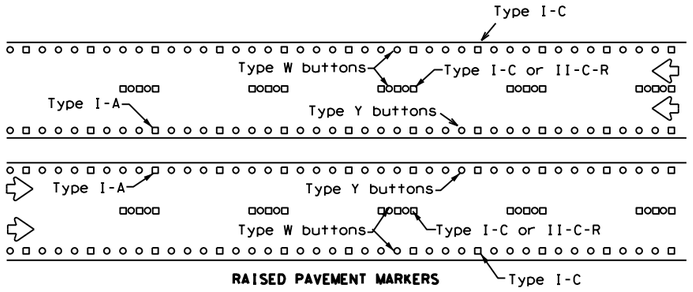
RAISED PAVEMENT MARKERS - PATTERN B

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

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



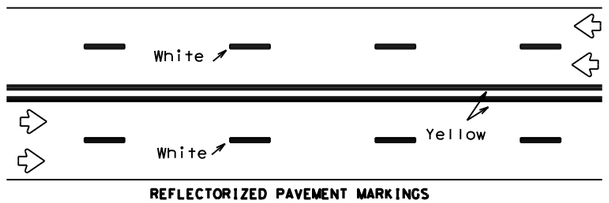
REFLECTORIZED PAVEMENT MARKINGS



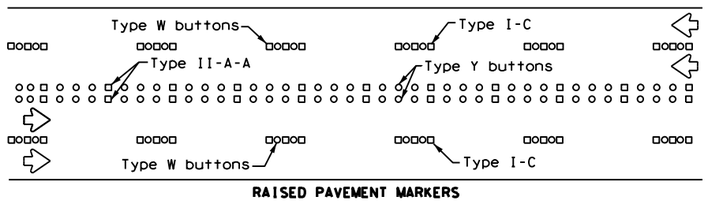
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



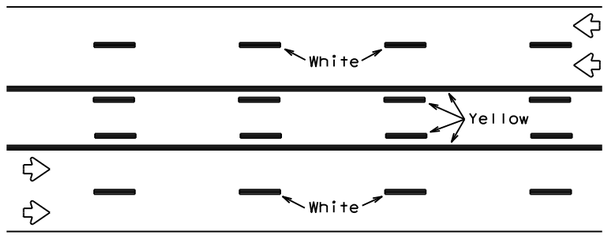
REFLECTORIZED PAVEMENT MARKINGS



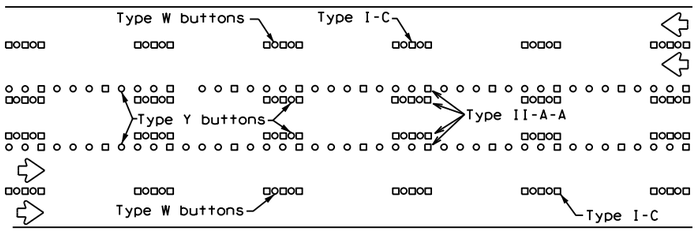
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

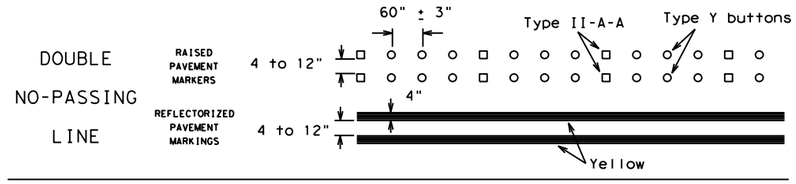
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

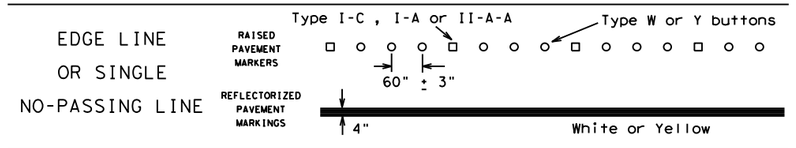
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

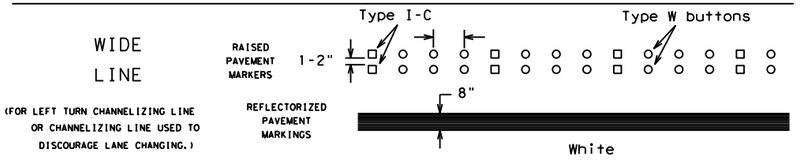


EDGE LINE OR SINGLE NO-PASSING LINE



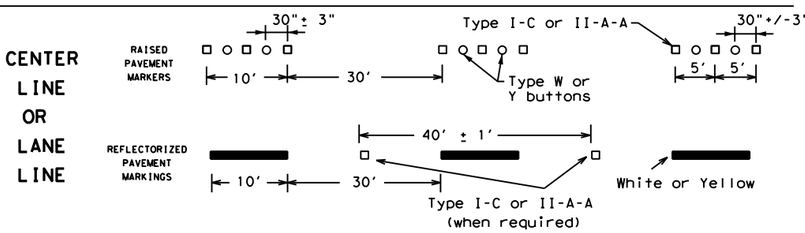
WIDE LINE

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

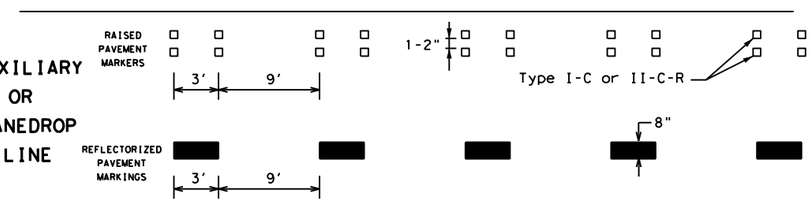


BROKEN LINES

CENTER LINE OR LANE LINE

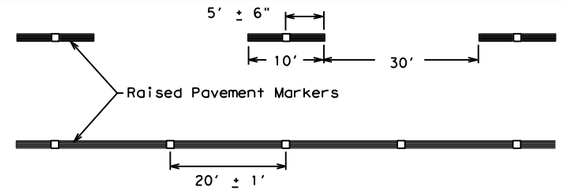


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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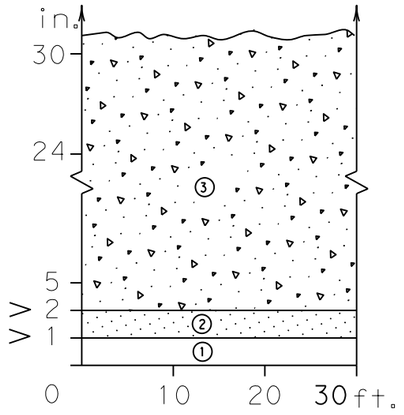
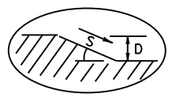
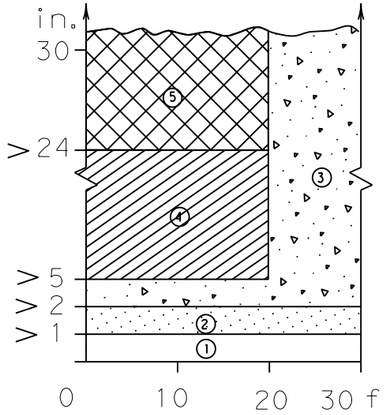
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

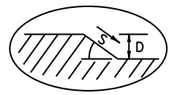


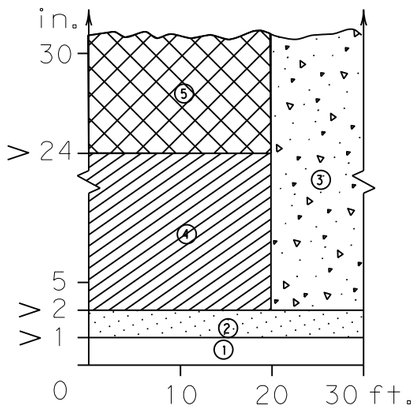
Edge Condition I
S = (3:1) (or flatter)



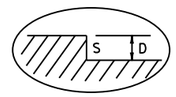


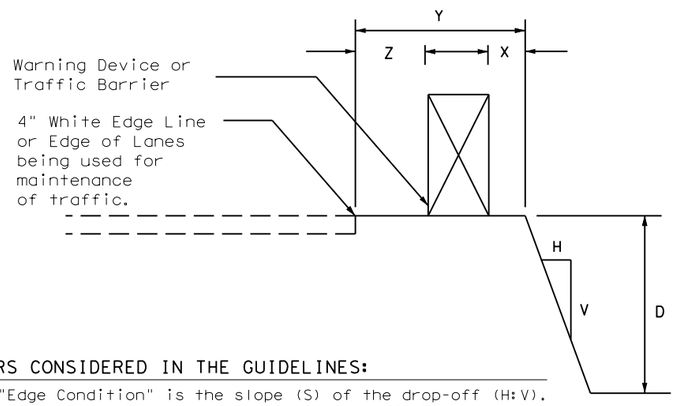
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

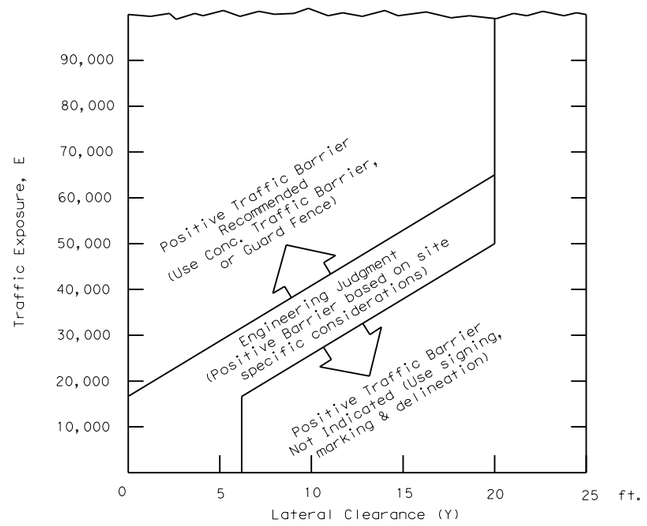
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Date 6/22/2024

Texas Department of Transportation

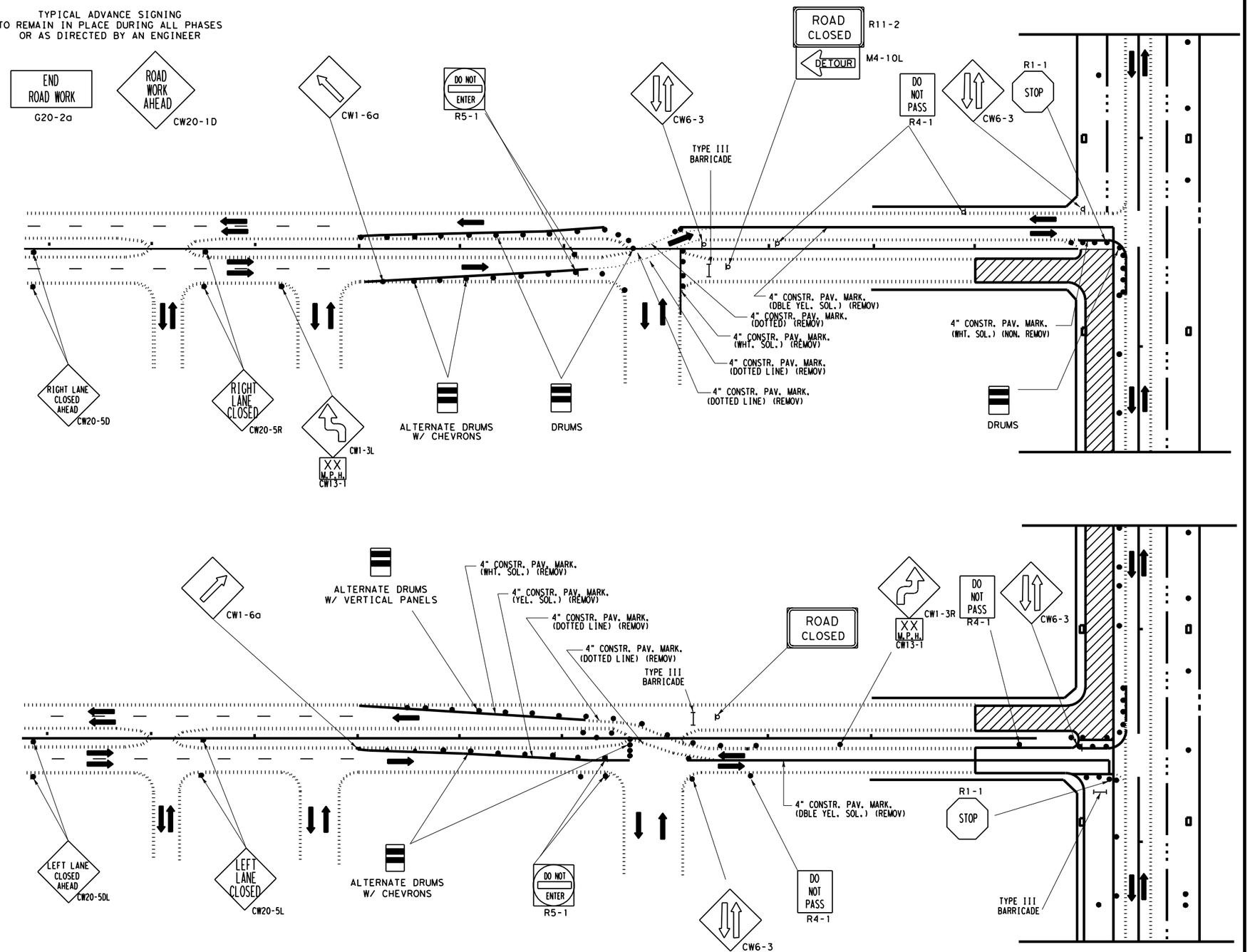
Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		49

DATE: 02/14/2024 03:03 PM
FILE: DOCUMENT NAME

TYPICAL ADVANCE SIGNING
TO REMAIN IN PLACE DURING ALL PHASES
OR AS DIRECTED BY AN ENGINEER



TYPICAL TRANSITION LENGTHS
AND
SUGGESTED MAXIMUM SPACING OF DEVICES

POSTED SPEED	FORMULA	MINIMUM DESIRABLE TAPER LENGTHS Ⓜ Ⓝ 10′ OFFSET	11′ OFFSET	12′ OFFSET	SUGGESTED MAX. SPAC. OF DEVICE ON A TAPER	ON A TANGENT	MINIMUM SIGN SPACING x DISTANCE
30	$L=\frac{WS^2}{60}$	150′	165′	180′	30′	60′-75′	120′
35		205′	225′	245′	35′	70′-90′	160′
40		265′	295′	320′	40′	80′-100′	240′
45	L=WS	450′	495′	540′	45′	90′-110′	320′
50		500′	550′	600′	50′	100′-125′	400′
55		550′	605′	660′	55′	110′-140′	500′
60		600′	660′	720′	60′	120′-150′	Ⓜ 600′
65		650′	715′	780′	65′	130′-165′	Ⓜ 700′
70		700′	770′	840′	70′	140′-175′	Ⓜ 800′

Ⓜ CONVENTIONAL ROADS ONLY

ⓂⓃ TAPER LENGTHS HAVE BEEN ROUNDED OFF.

CONSTRUCTION WARNING
SIGN SPACING

POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	120
40	240
45	320
50	400
55	500
60	600
65	700
70	800

LEGEND

CONSTRUCTION AREA

OPEN TO TRAFFIC

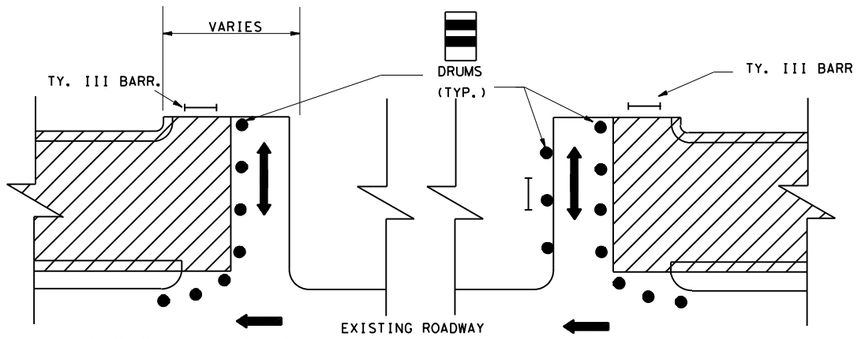
Texas Department of Transportation
Houston District

BOULEVARD CLOSURES

TCPTC 3050-96

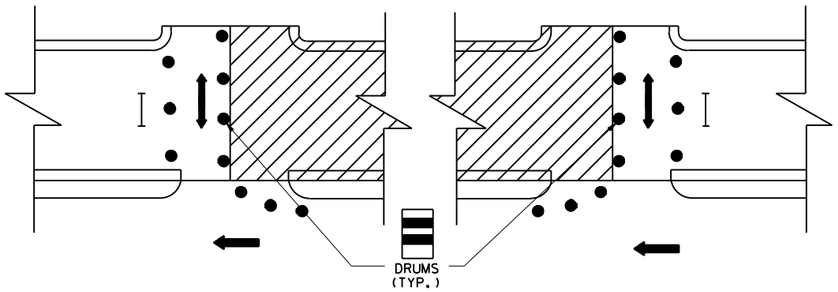
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2006	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS REV. 5/2006	HOU	6	0500-03-635, ETC.	50
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	0500	03 635	IH 45

STD H-15

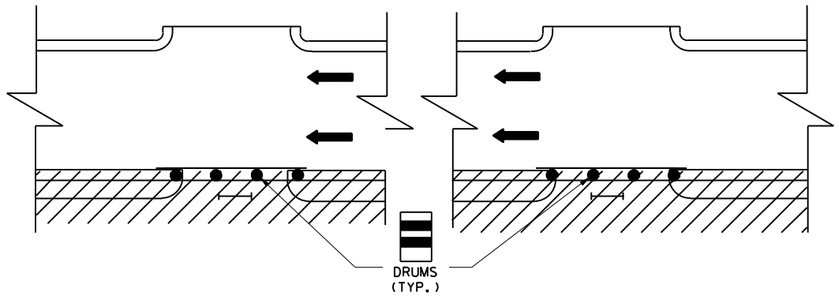


1) WITH TRAFFIC ON EXISTING
BUILD ONE-HALF OF DRIVE.

2) BUILD OTHER HALF OF DRIVE



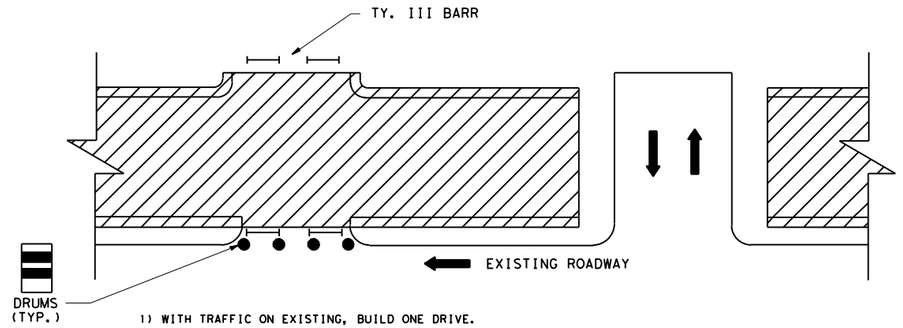
2) BUILD OTHER HALF OF DRIVE



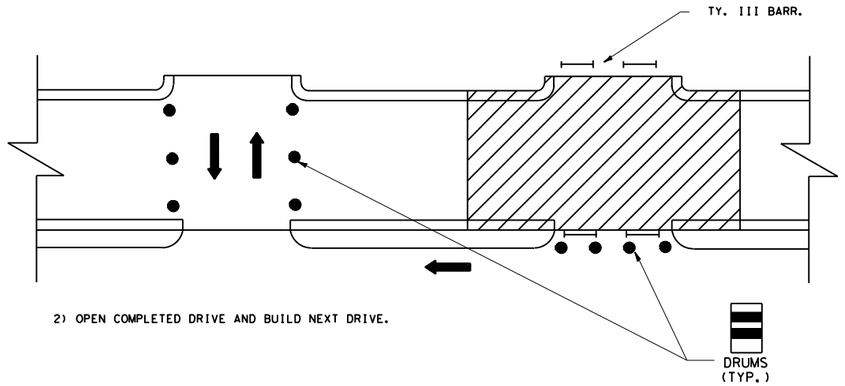
3) OPEN DRIVE

4) AFTER TRAFFIC MOVES TO NEW ROADWAY,
BUILD REMAINING CURB.

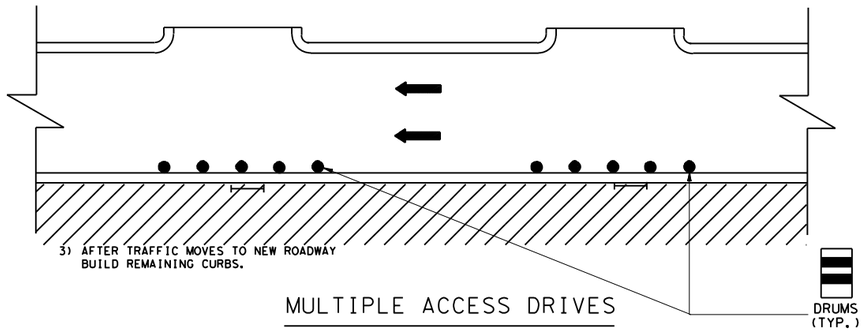
SINGLE ACCESS DRIVES



1) WITH TRAFFIC ON EXISTING, BUILD ONE DRIVE.



2) OPEN COMPLETED DRIVE AND BUILD NEXT DRIVE.



3) AFTER TRAFFIC MOVES TO NEW ROADWAY
BUILD REMAINING CURBS.

MULTIPLE ACCESS DRIVES

Texas Department of Transportation
Houston District

CONSTRUCTION SEQUENCE FOR MISCELLANEOUS DRIVES

CSMD TC8010-2020

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2020	DIST	FED REG	PROJECT NO.	SHEET
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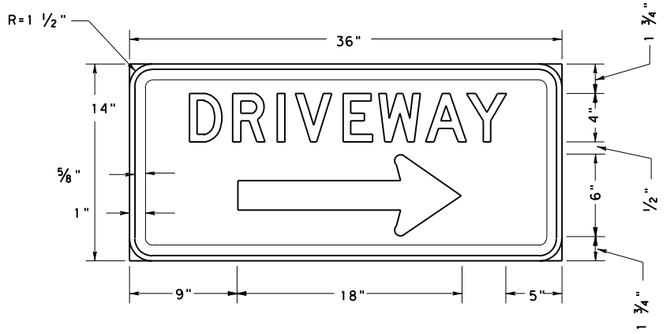
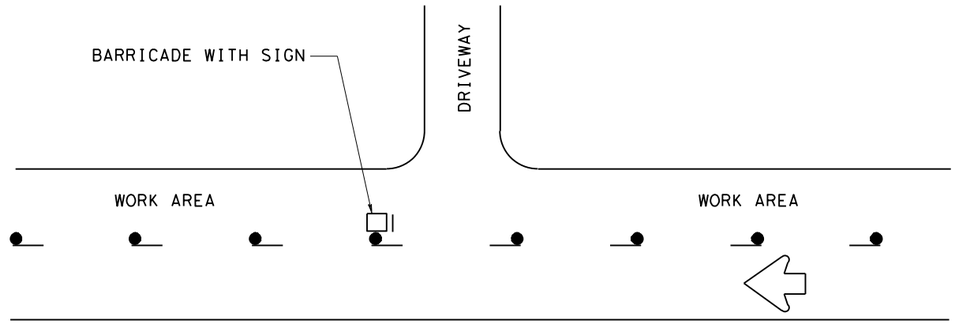
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	0500	03 635	IH 45

STD H-29



LETTERS: WHITE
BORDER: WHITE
BACKGROUND: BLUE



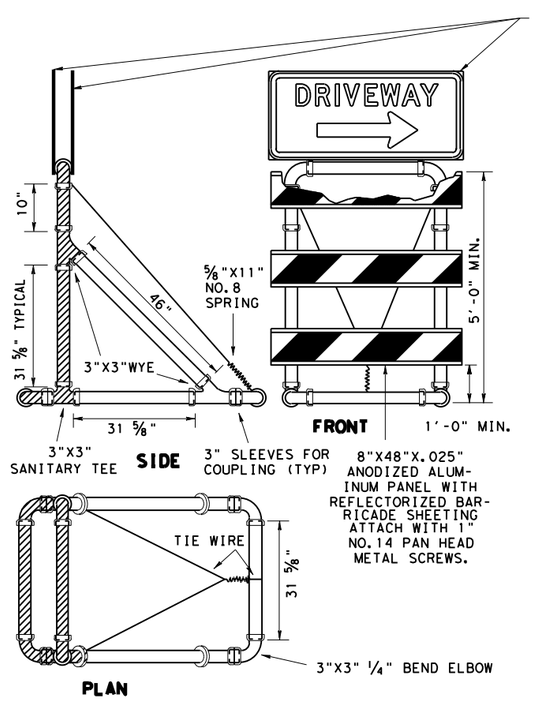
TYPICAL LOCATION OF DRIVEWAY SIGN

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 BUTADIENE 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 ⅜" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.



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:	DN:	CK:	DW:	CK:
© TxDOT 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6	0500-03-635, ETC.	52
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	0500	03 635	IH 45

STD H-30

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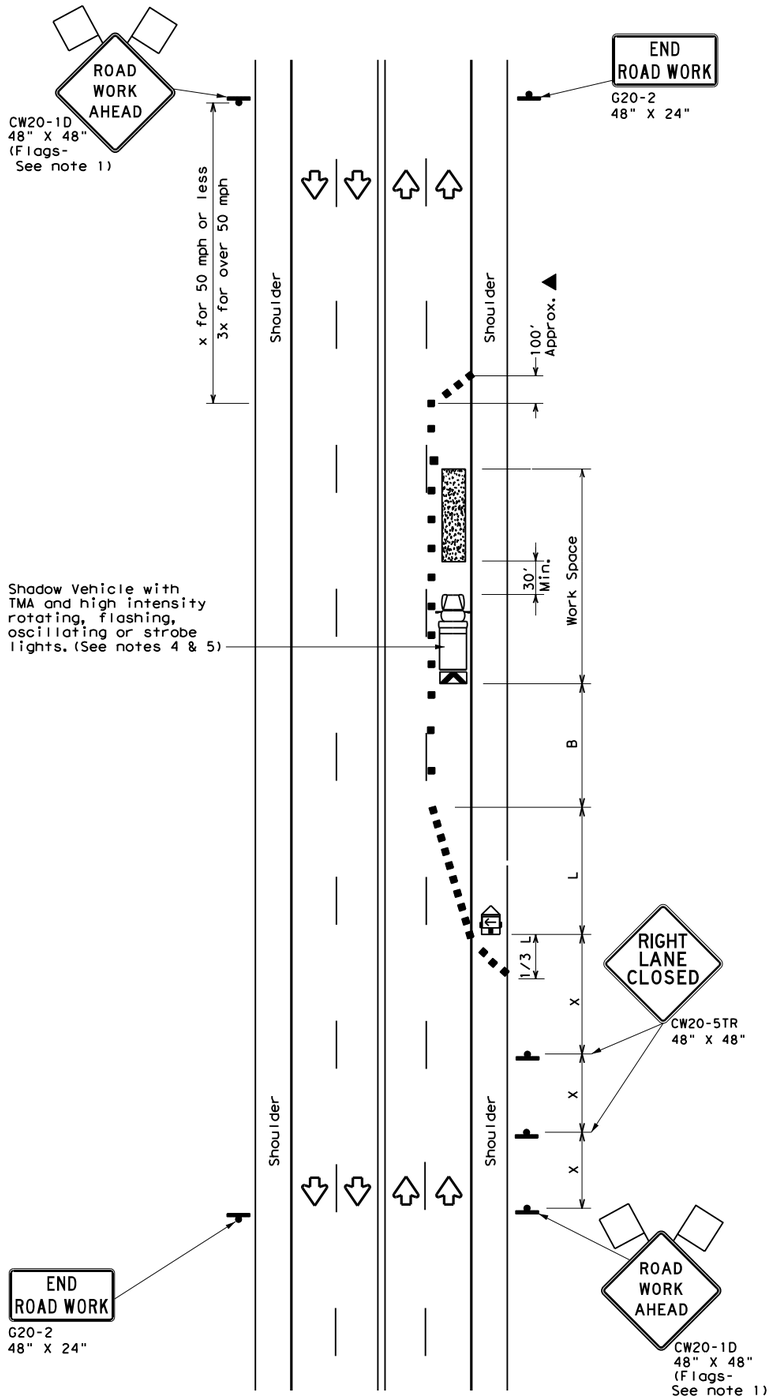
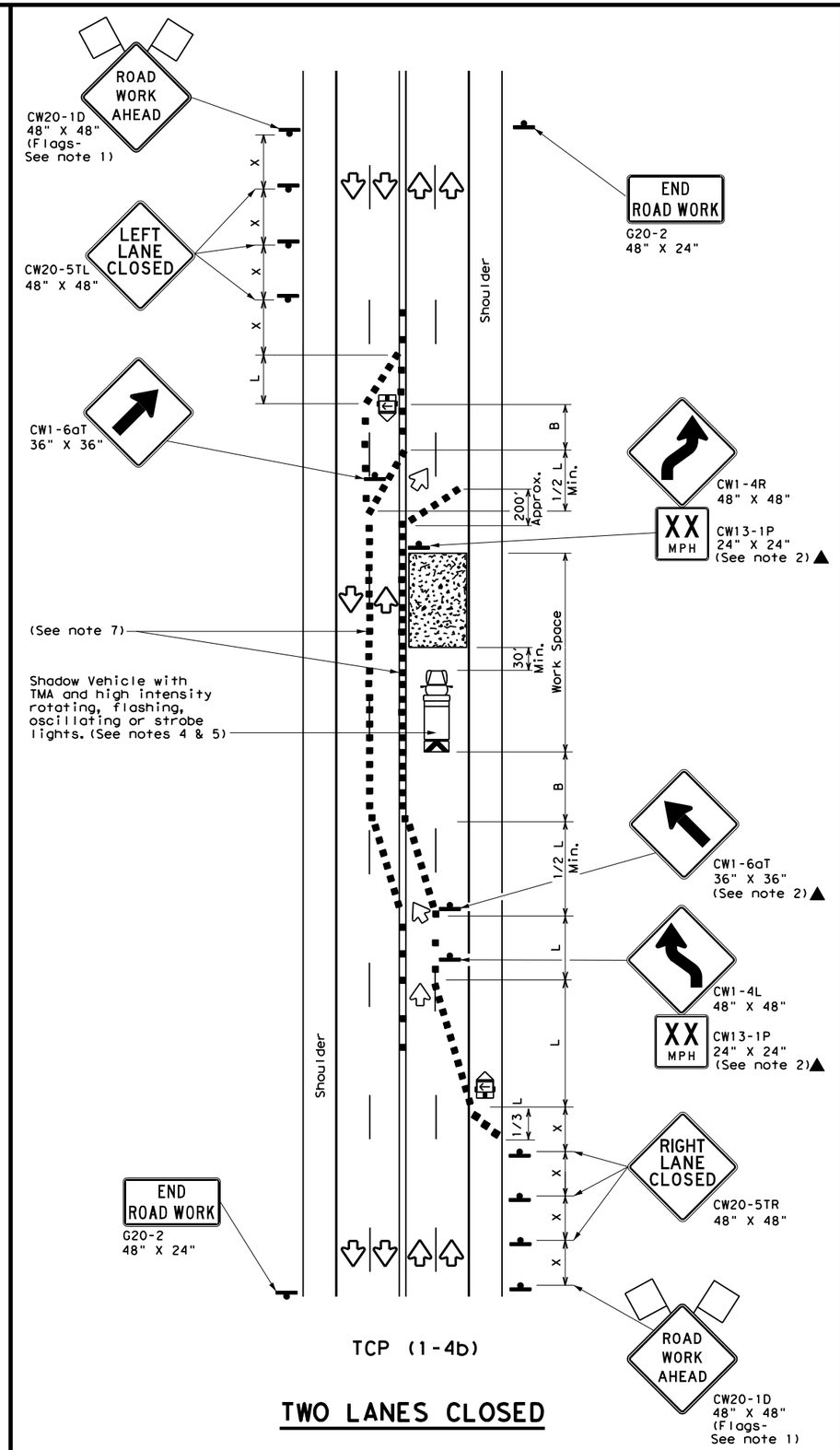
DATE: 02/26/2024 07:55 PM
FILE: DOCUMENT NAME



TCP (1-4a)

ONE LANE CLOSED



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

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	HOU	HARRIS		53
1-97 2-18				

DATE: 02/15/2024 09:31 AM
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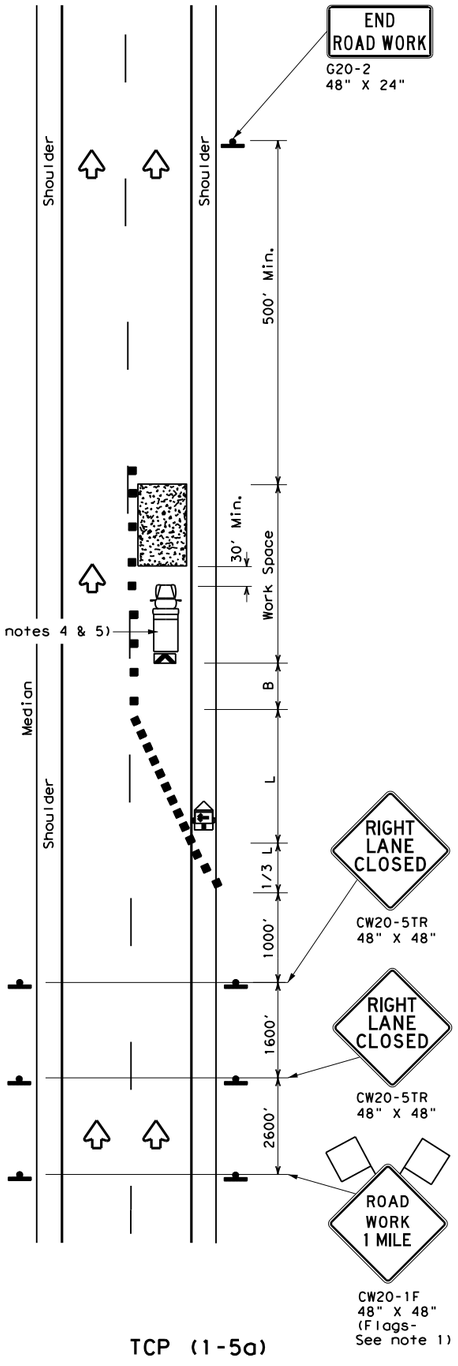
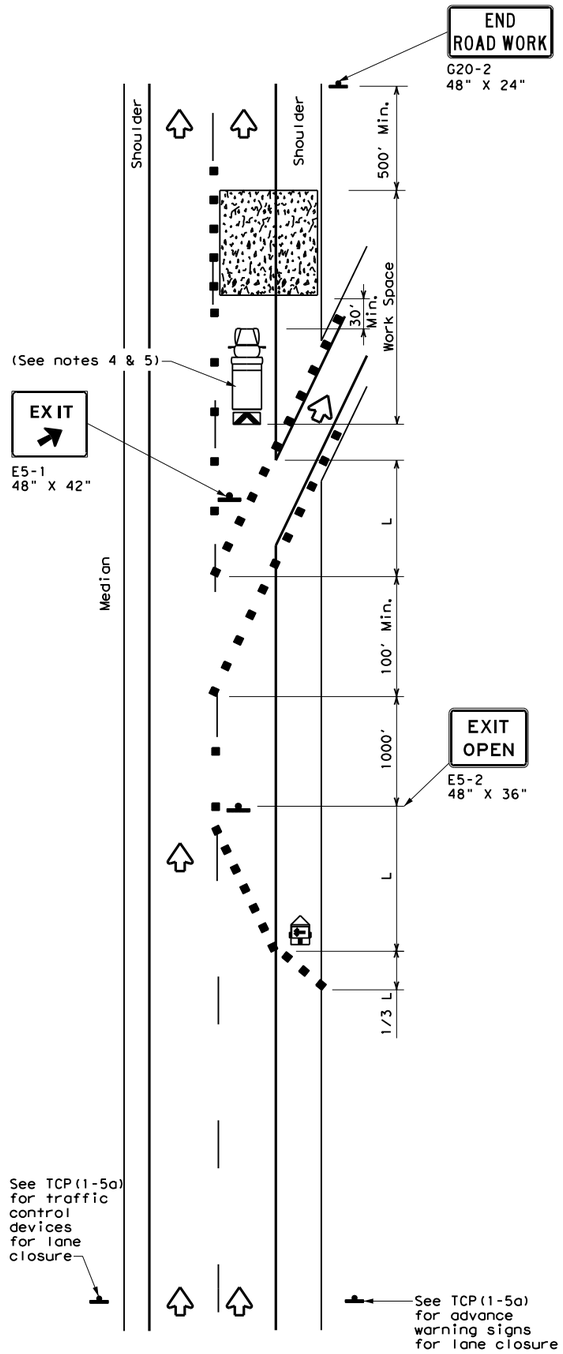


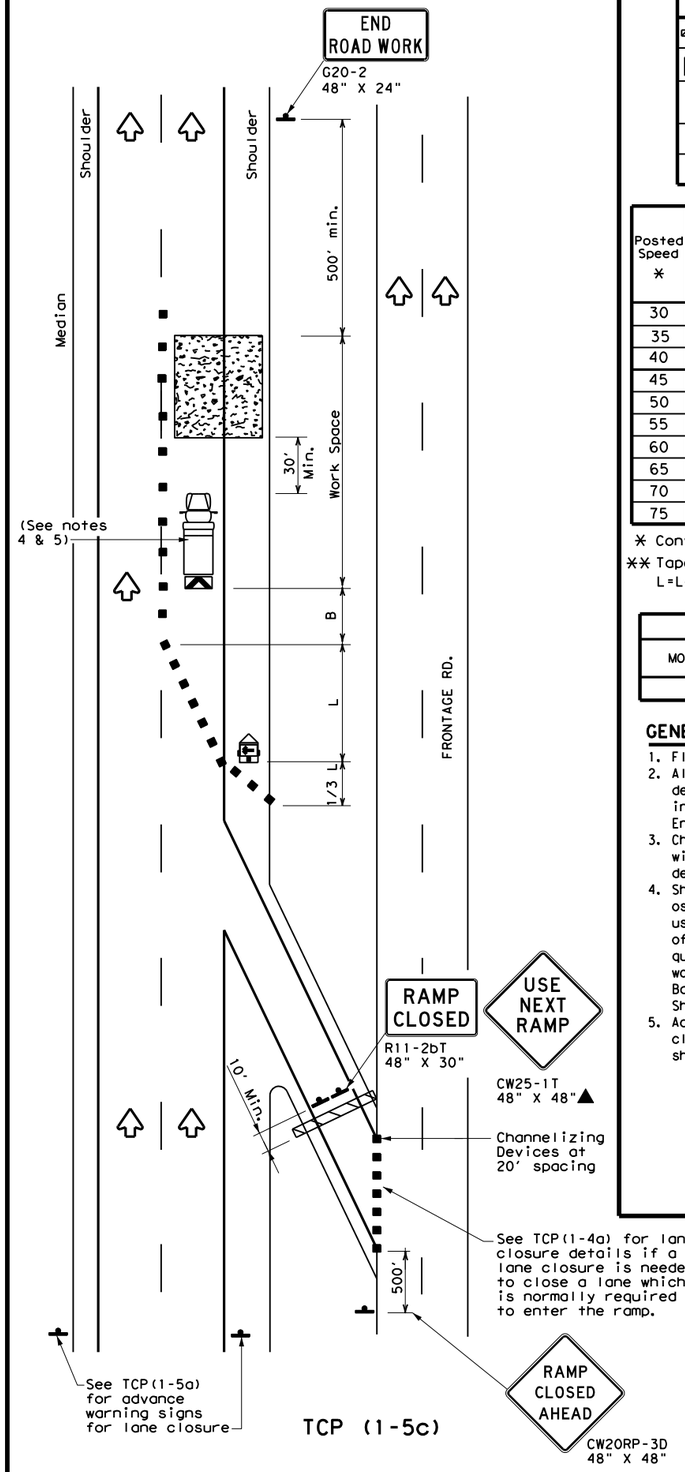
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		54

DATE: 02/26/2024 07:20 PM
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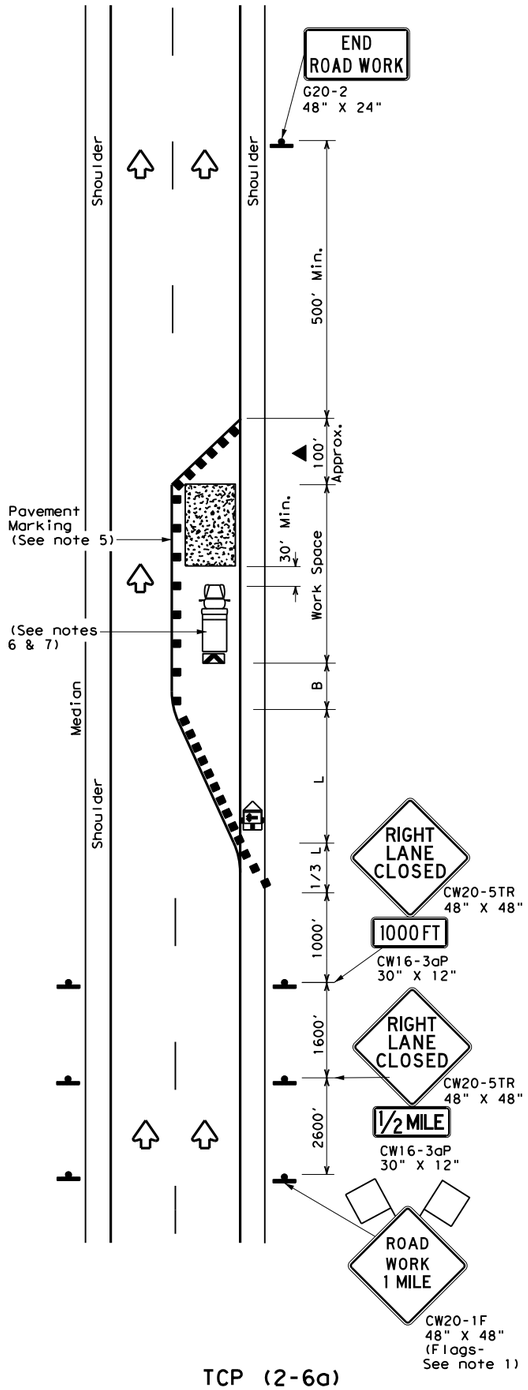
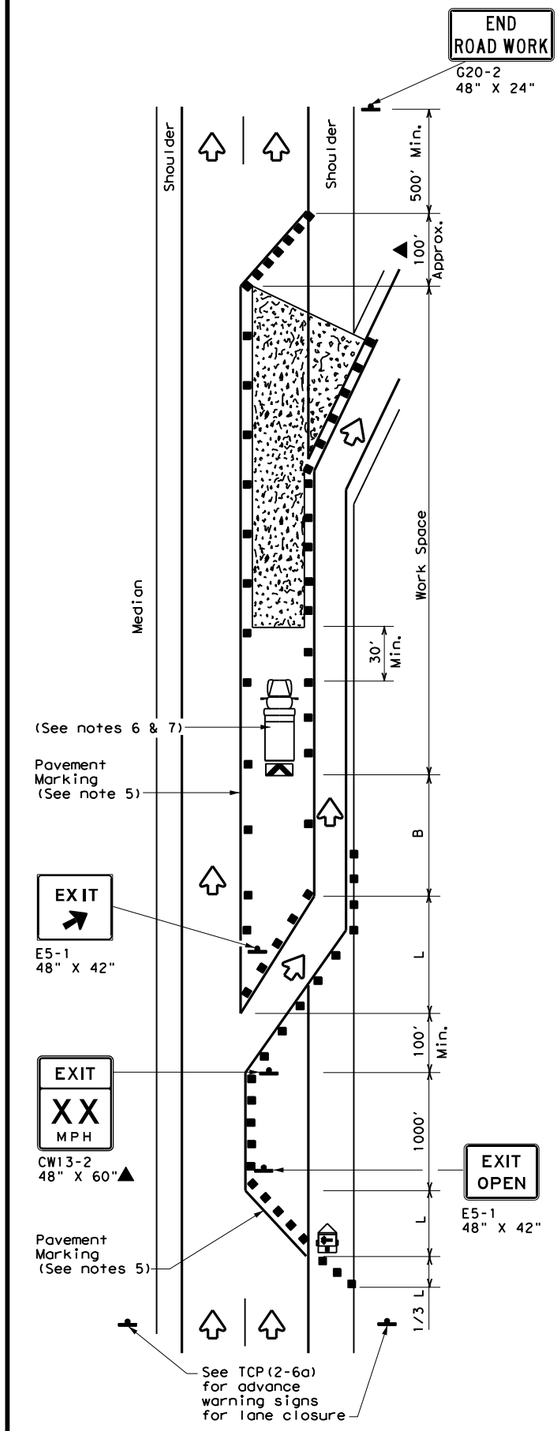


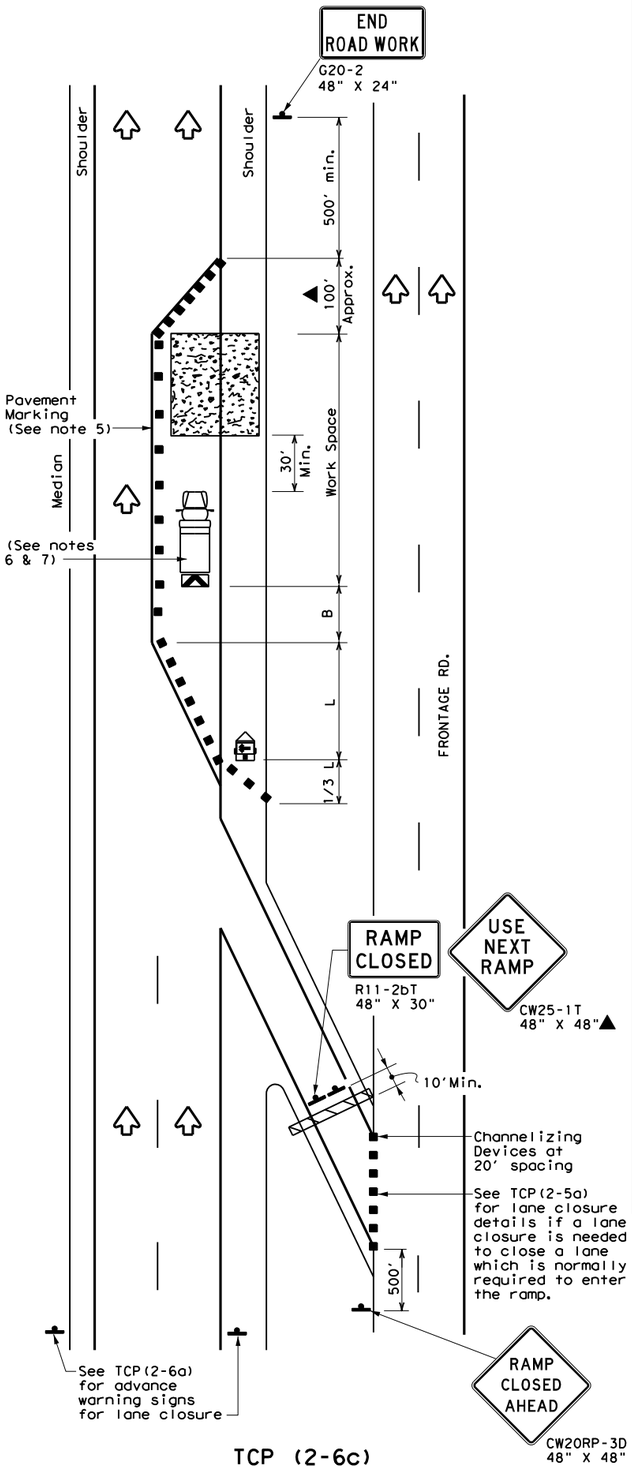
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. 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.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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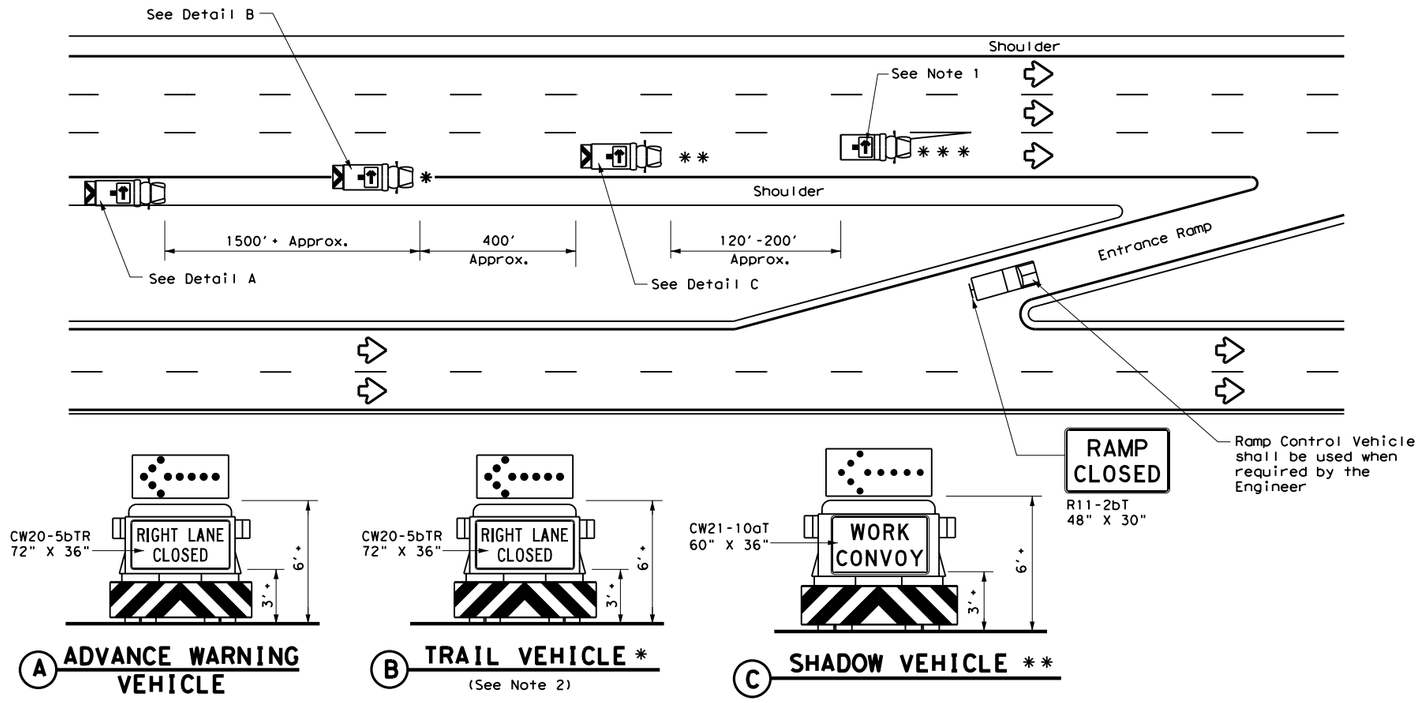
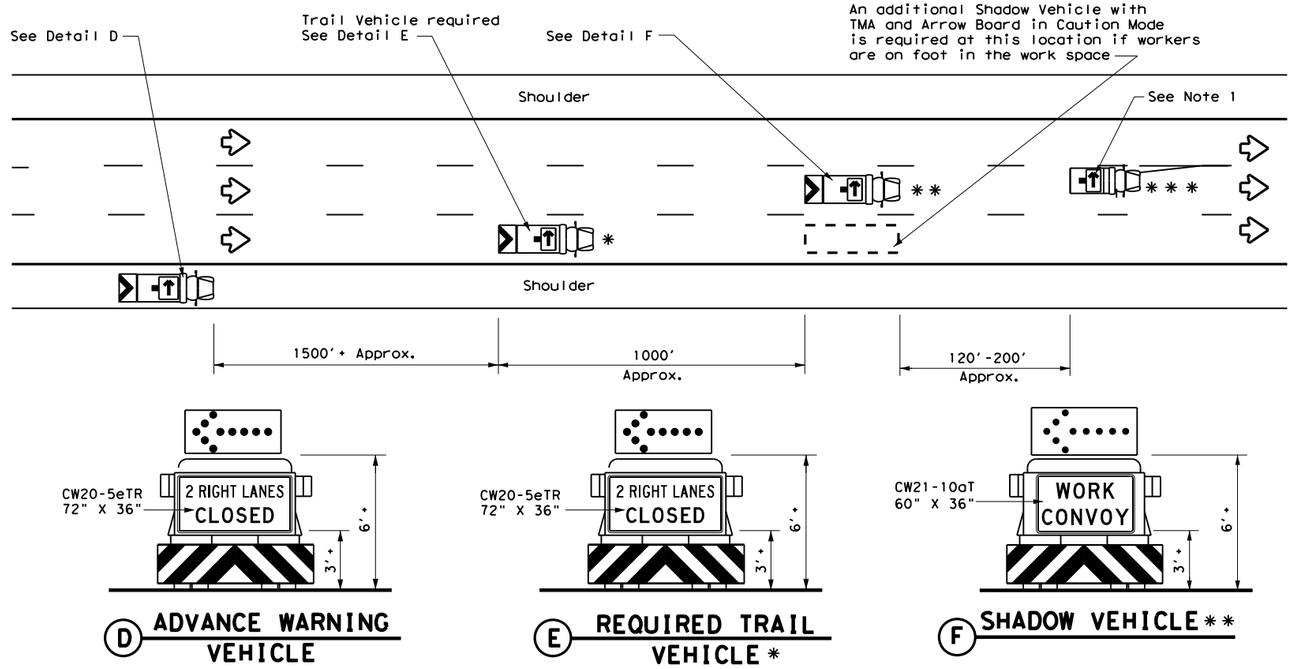
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		55



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



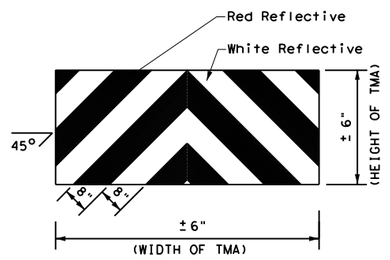
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

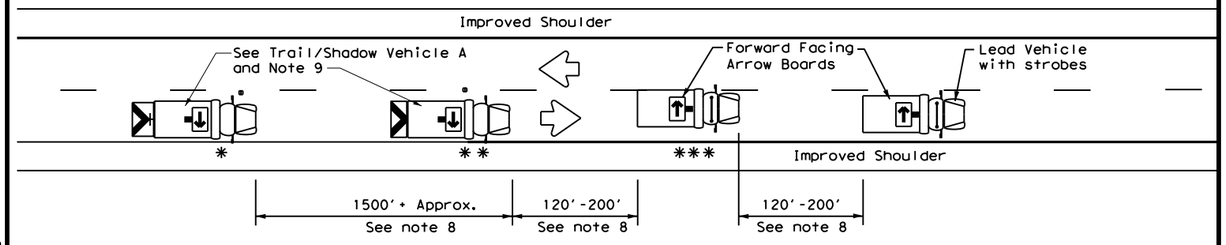
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	HOU	HARRIS		56
1-97				

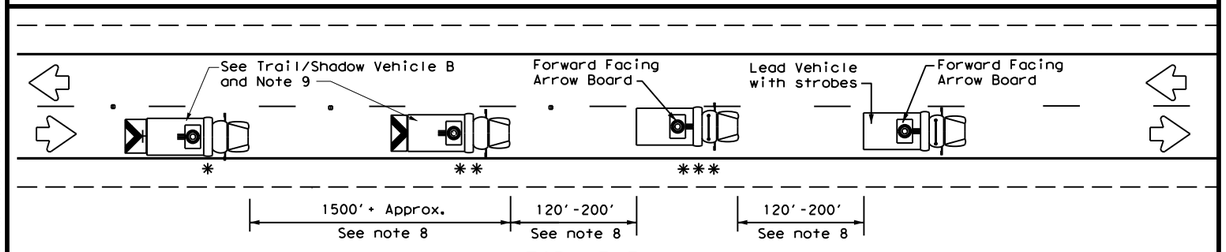
176

DATE: 02/15/2024 04:44 PM
FILE: DOCUMENT NAME



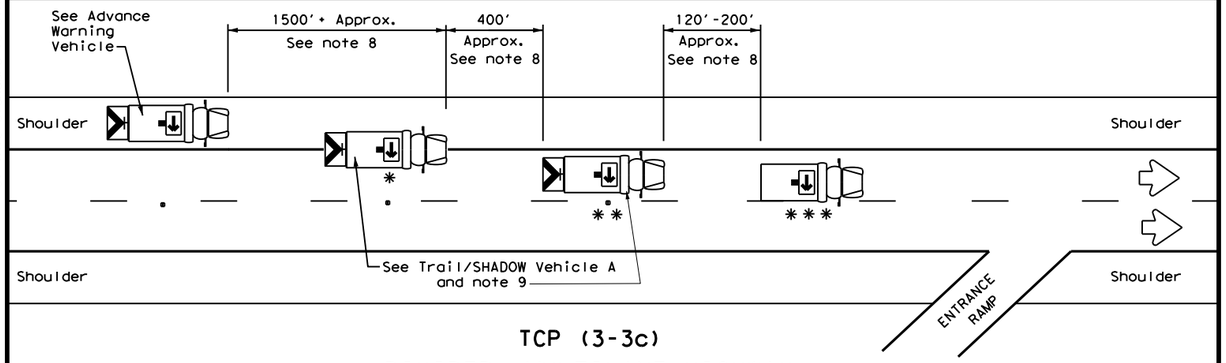
TCP (3-3a)

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



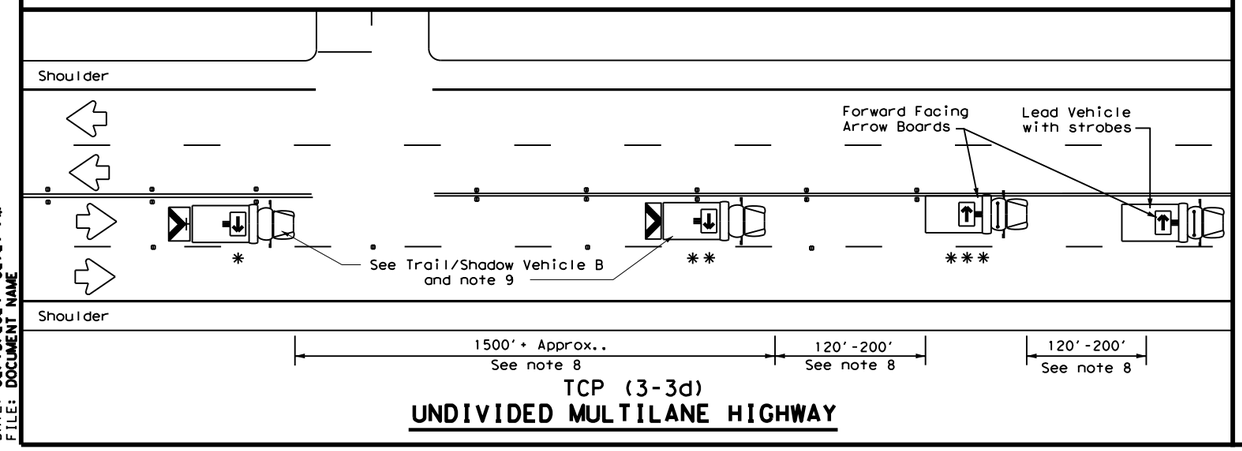
TCP (3-3b)

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



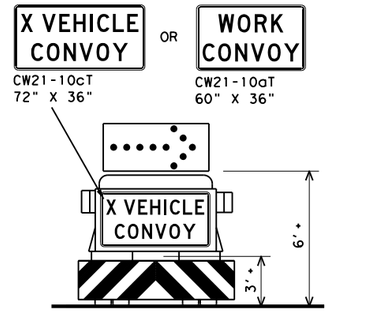
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



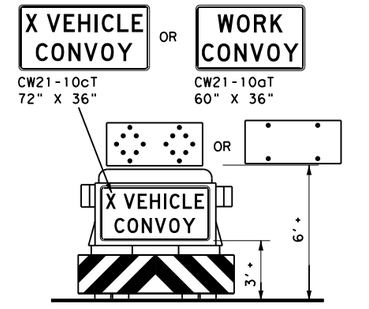
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



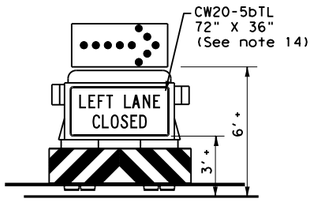
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

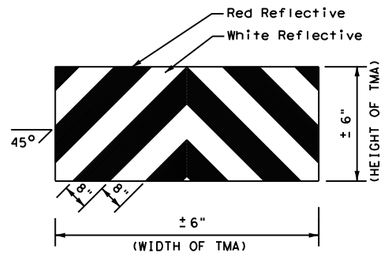


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

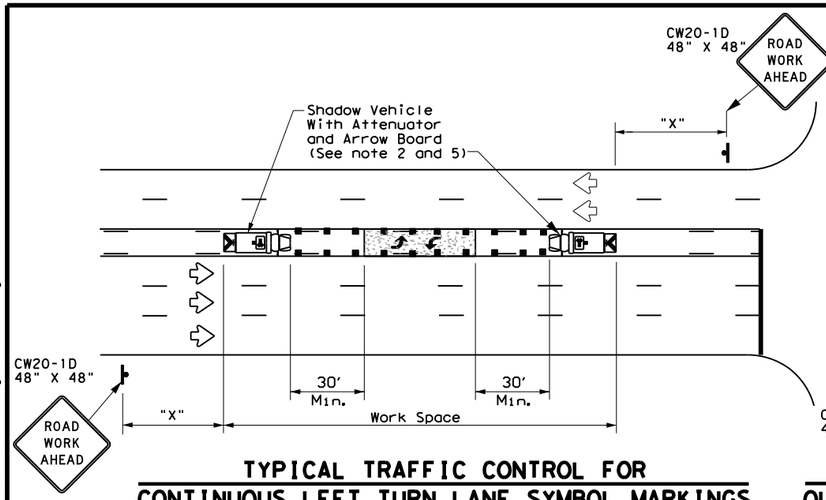
Traffic Operations Division Standard

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

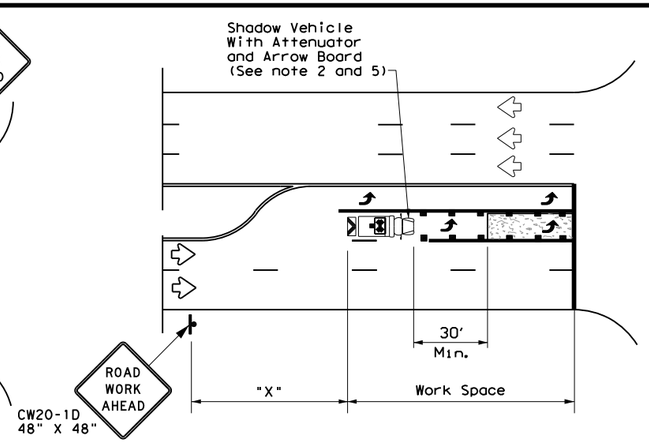
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	HOU	HARRIS		57
1-97 7-14				

177

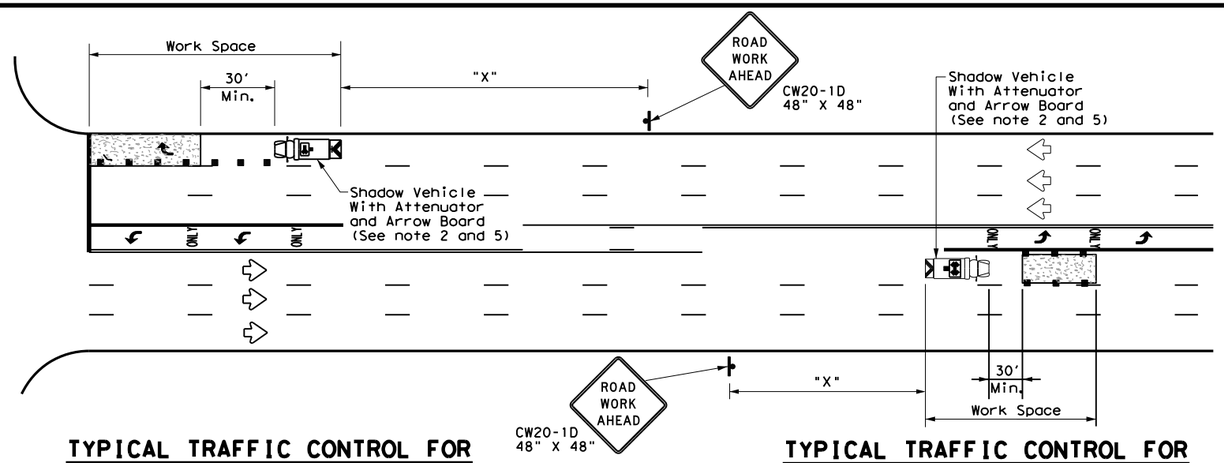
DATE: 02/15/2024 02:21 PM
FILE: DOCUMENT NAME



TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

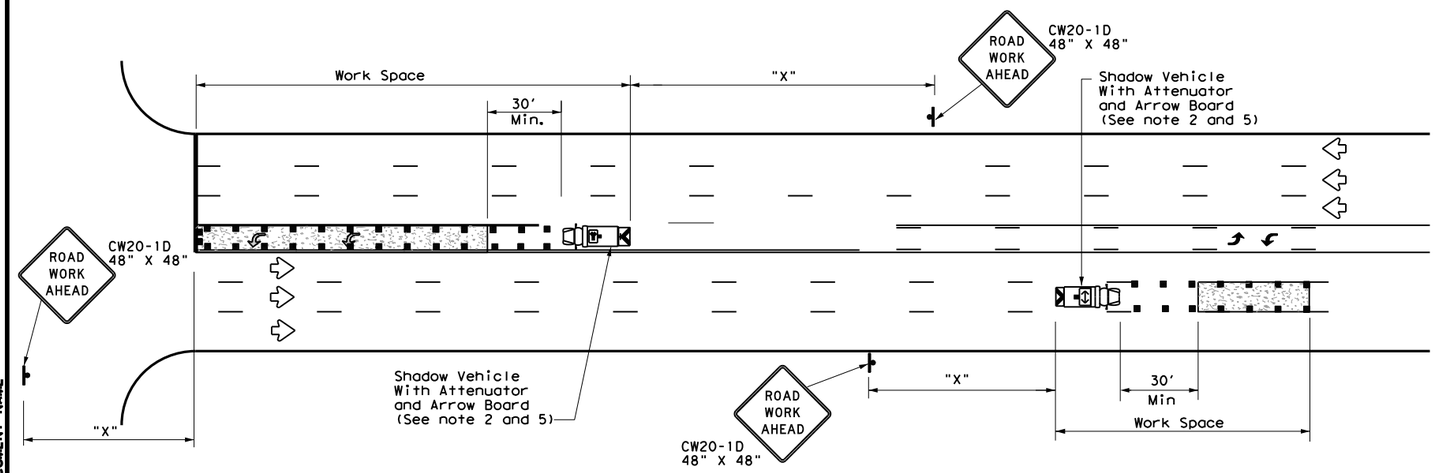


TYPICAL TRAFFIC CONTROL FOR OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR CENTER LANE MARKINGS

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

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

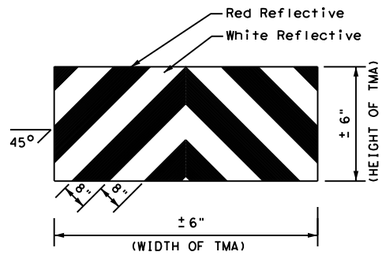
* Conventional Roads Only

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

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

GENERAL NOTES

1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		58

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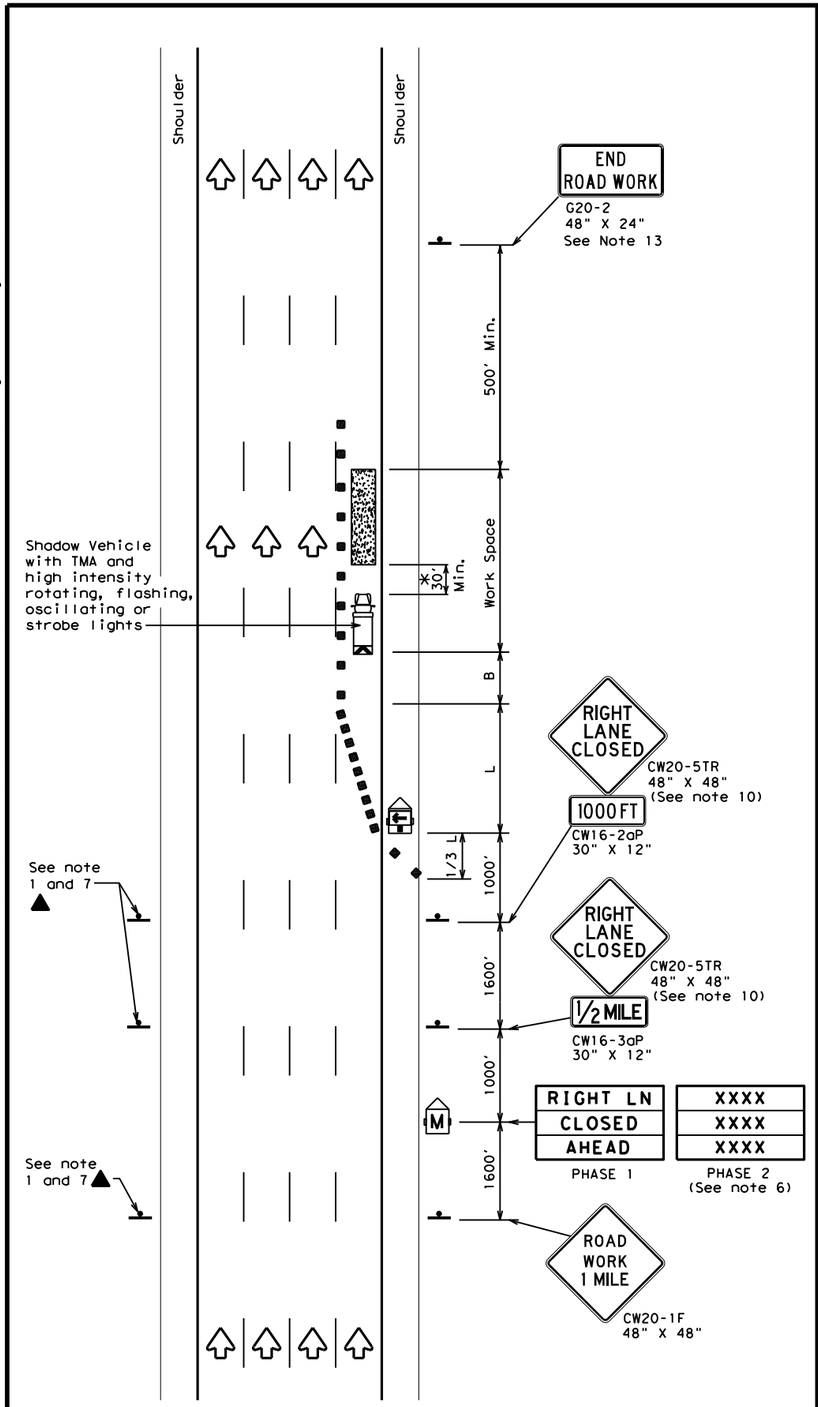
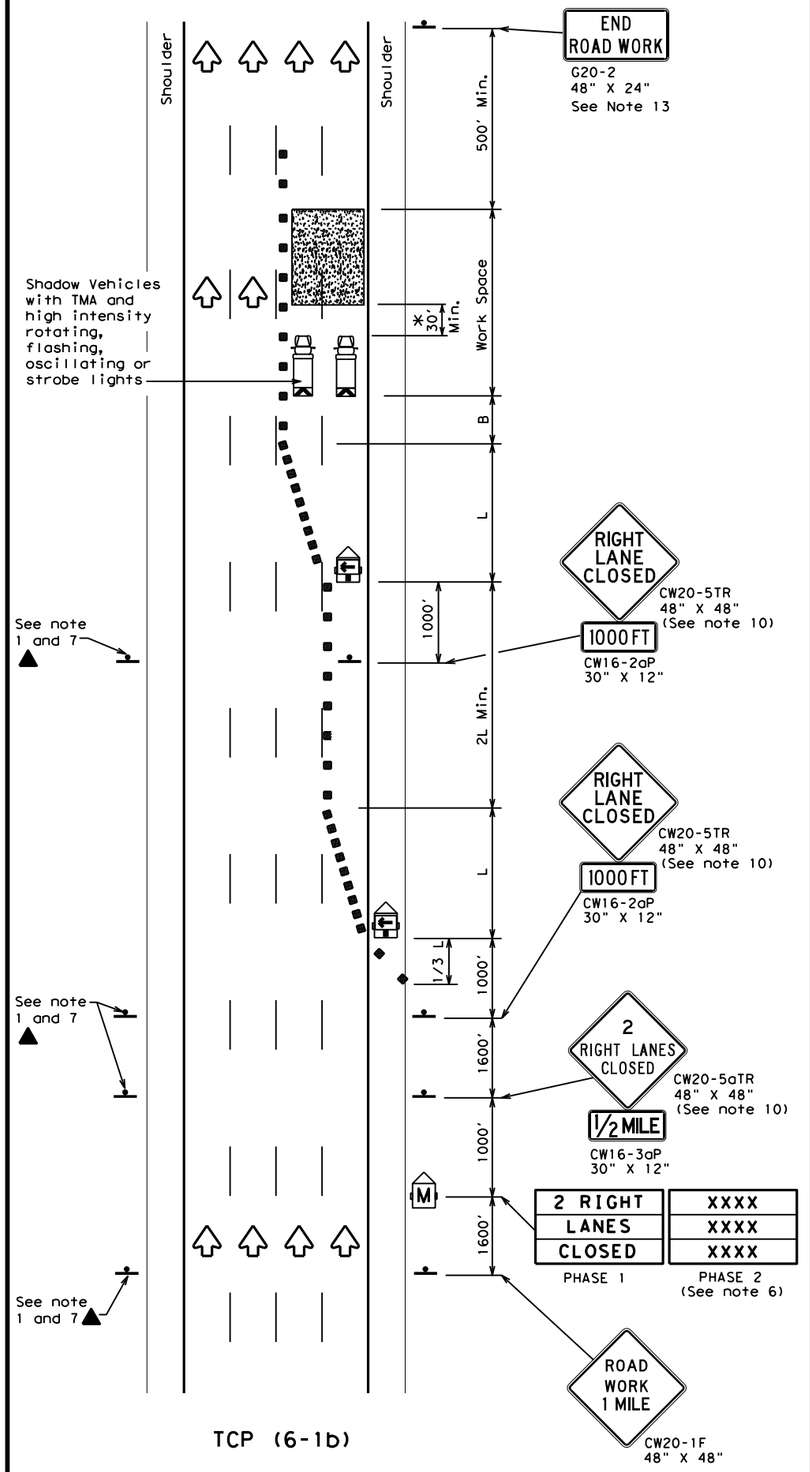


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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	HOU	HARRIS		59

201

DATE: 02/15/2024 04:45 PM
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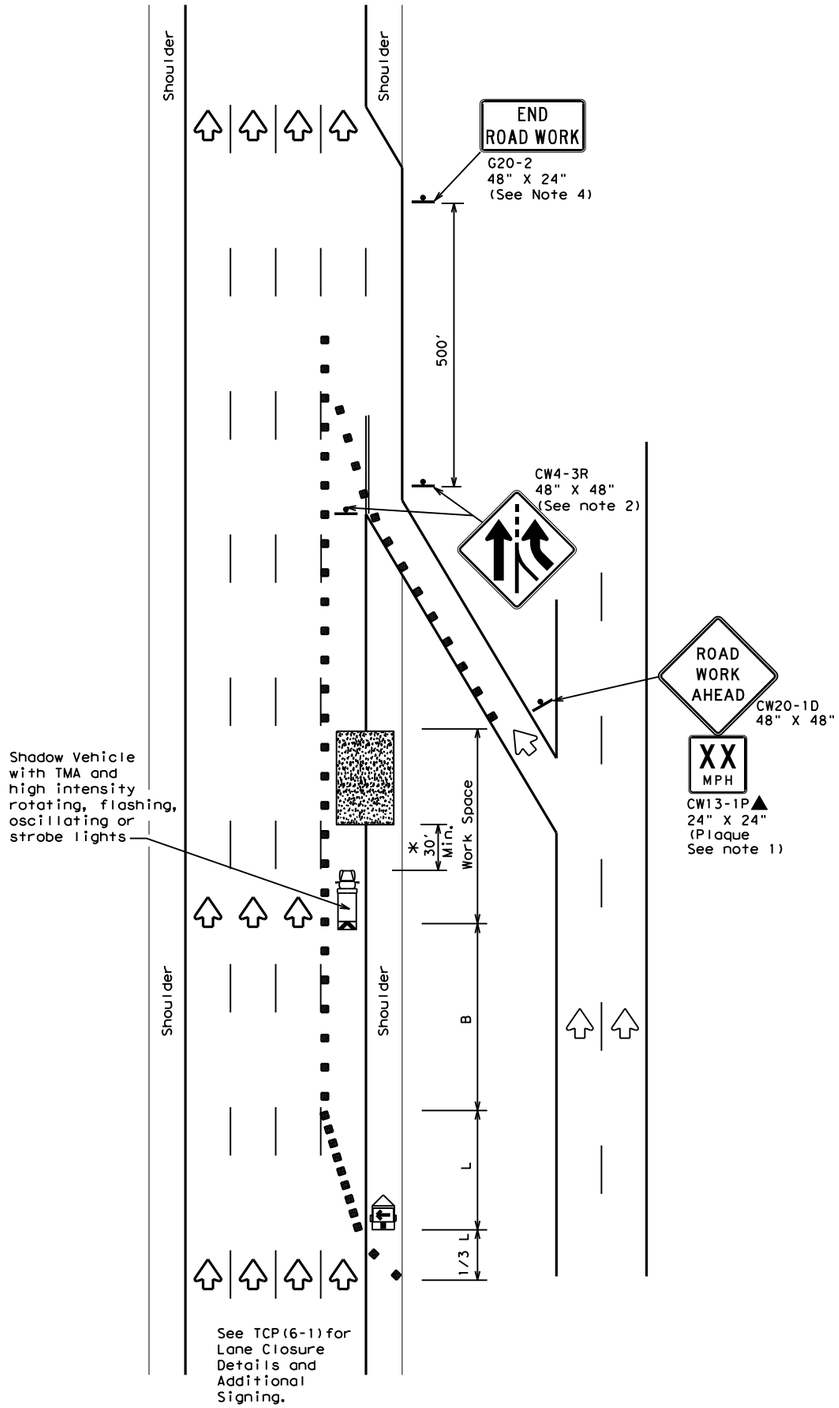
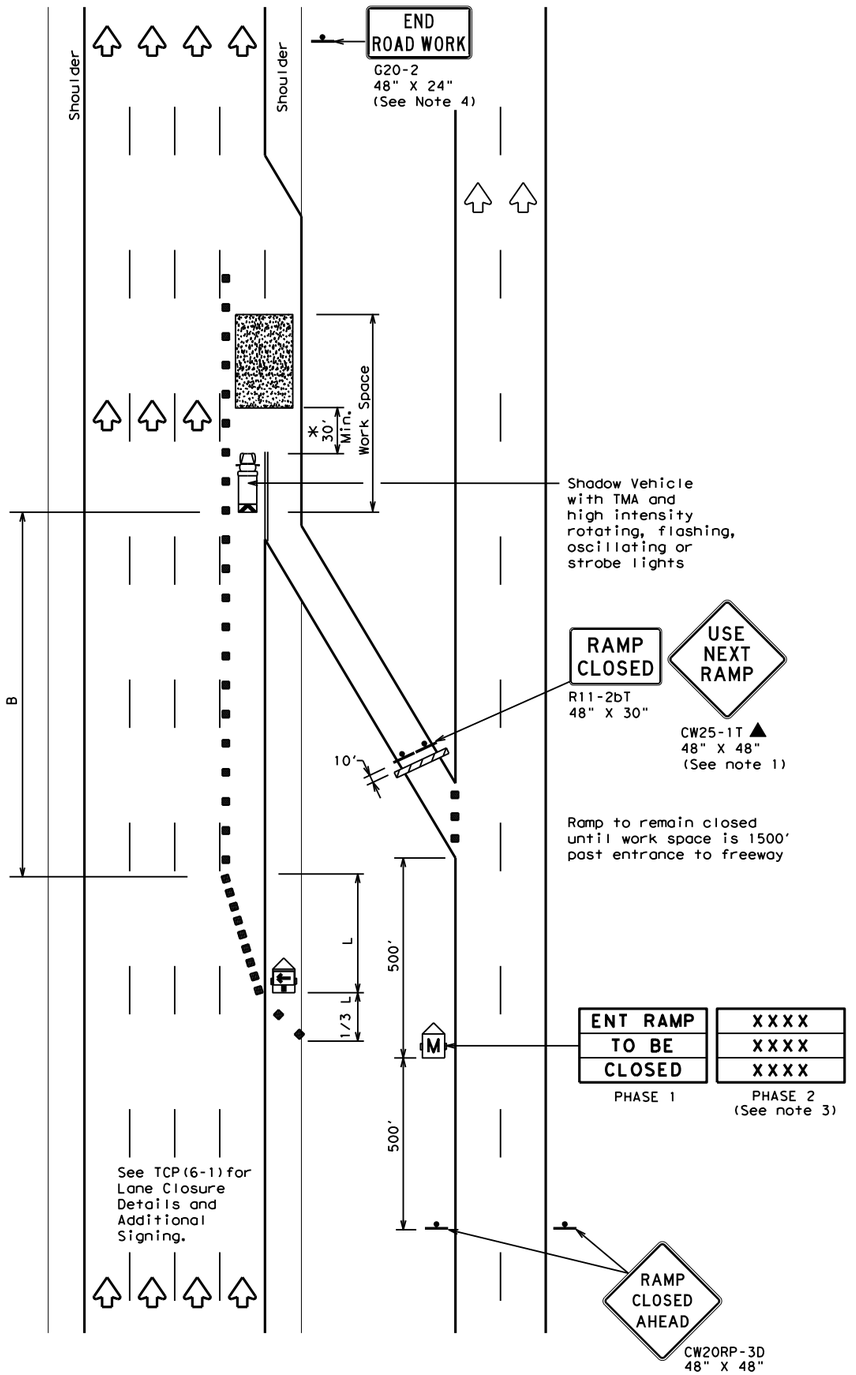


TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP 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 "L" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

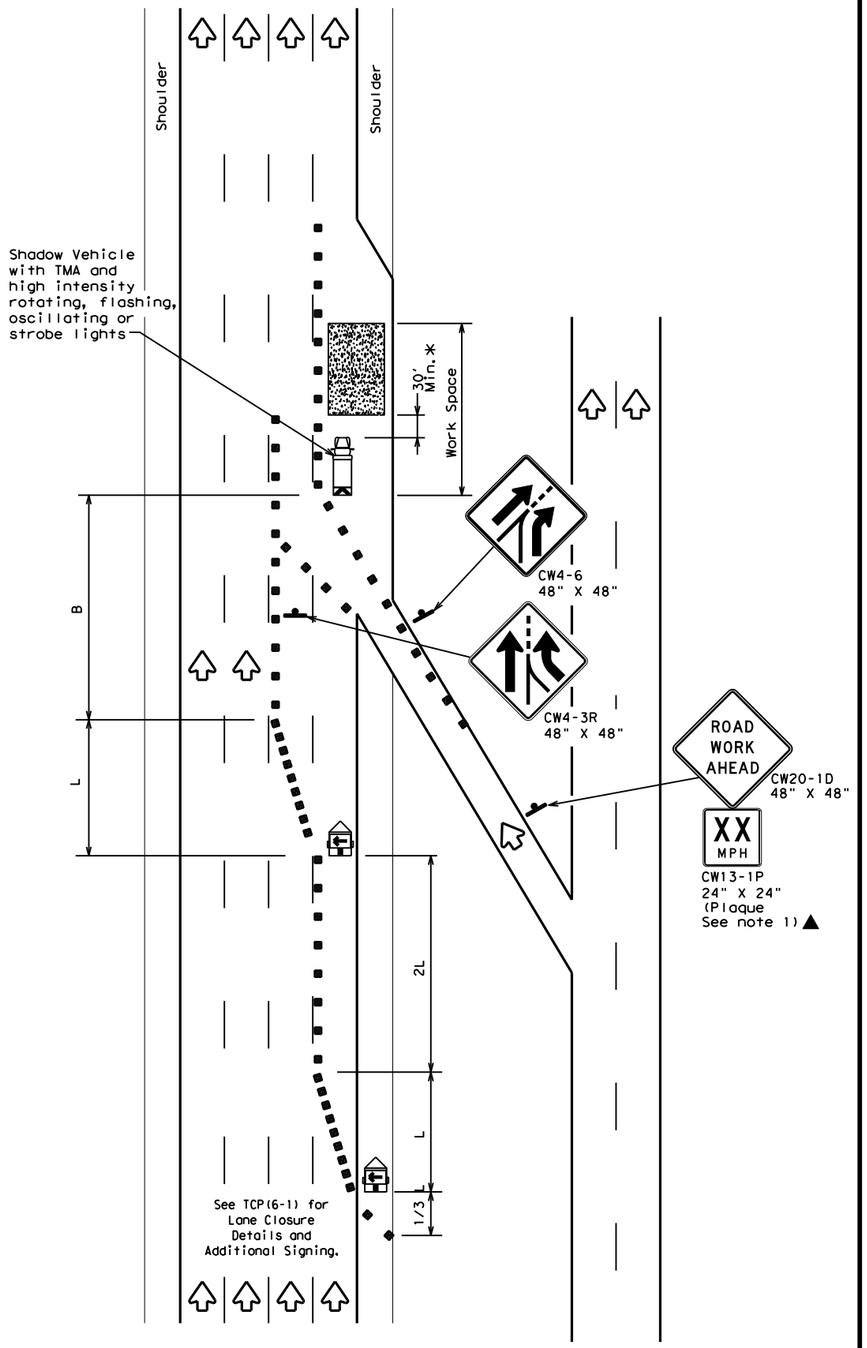
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635, ETC.	IH 45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		60

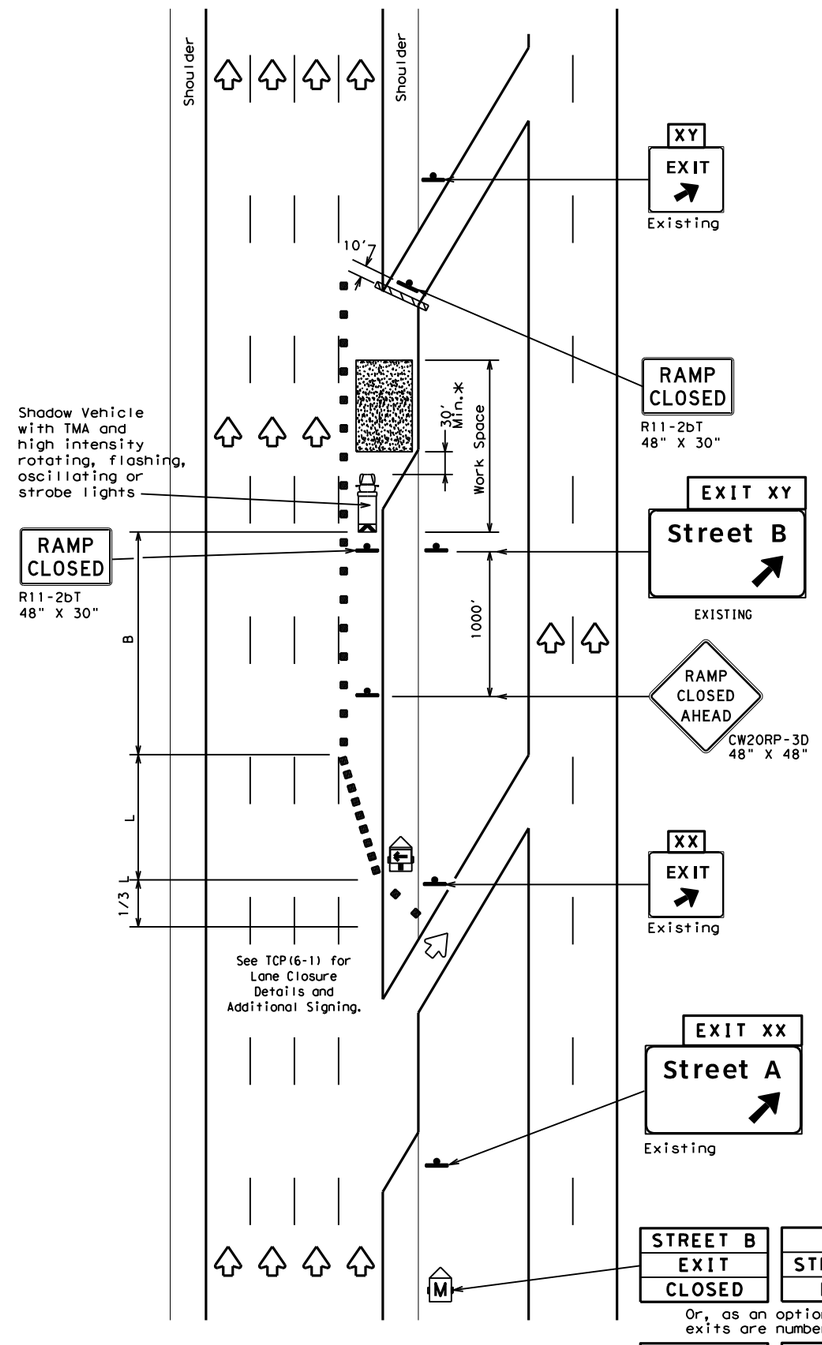
202

DATE: 02/15/2024 09:45 AM
FILE: DOCUMENT NAME



TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

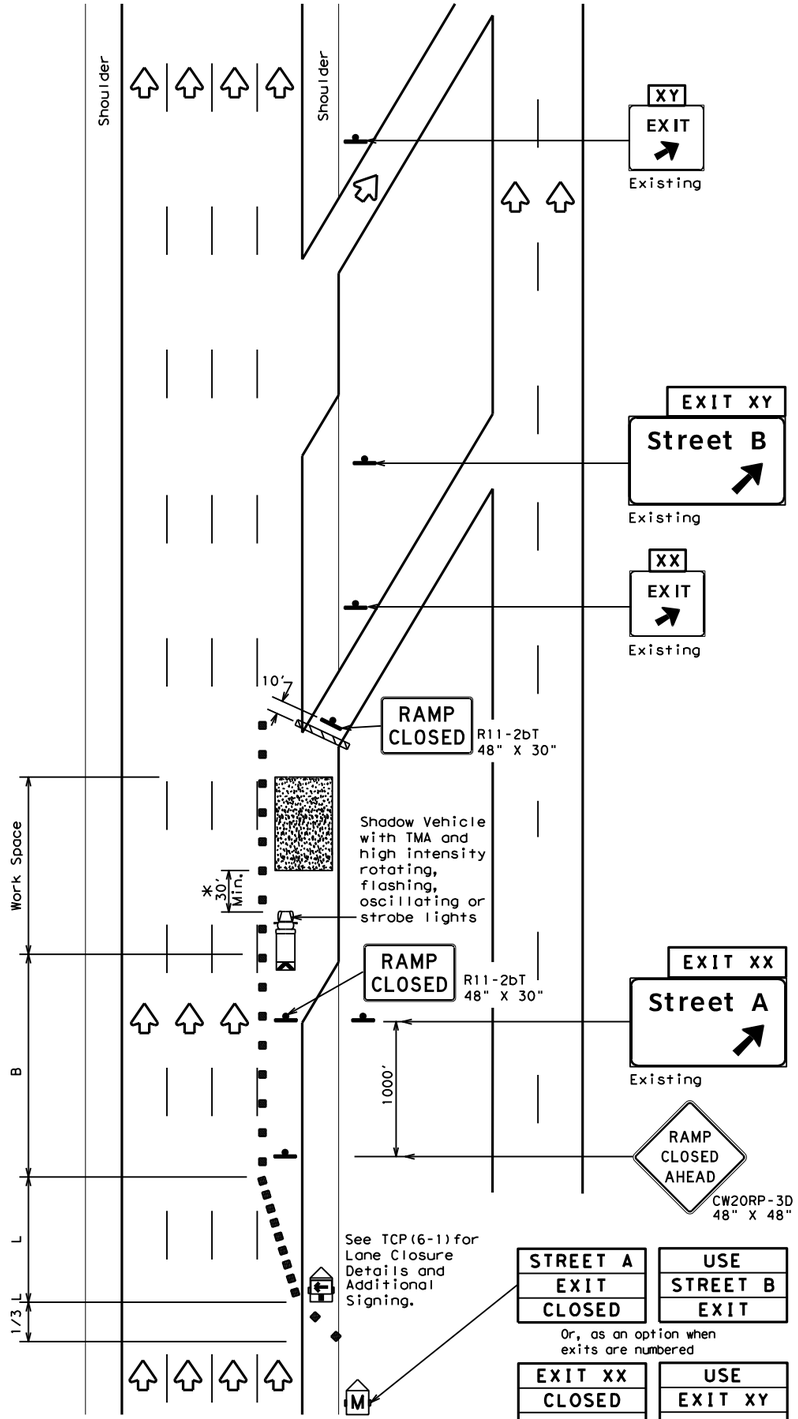
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

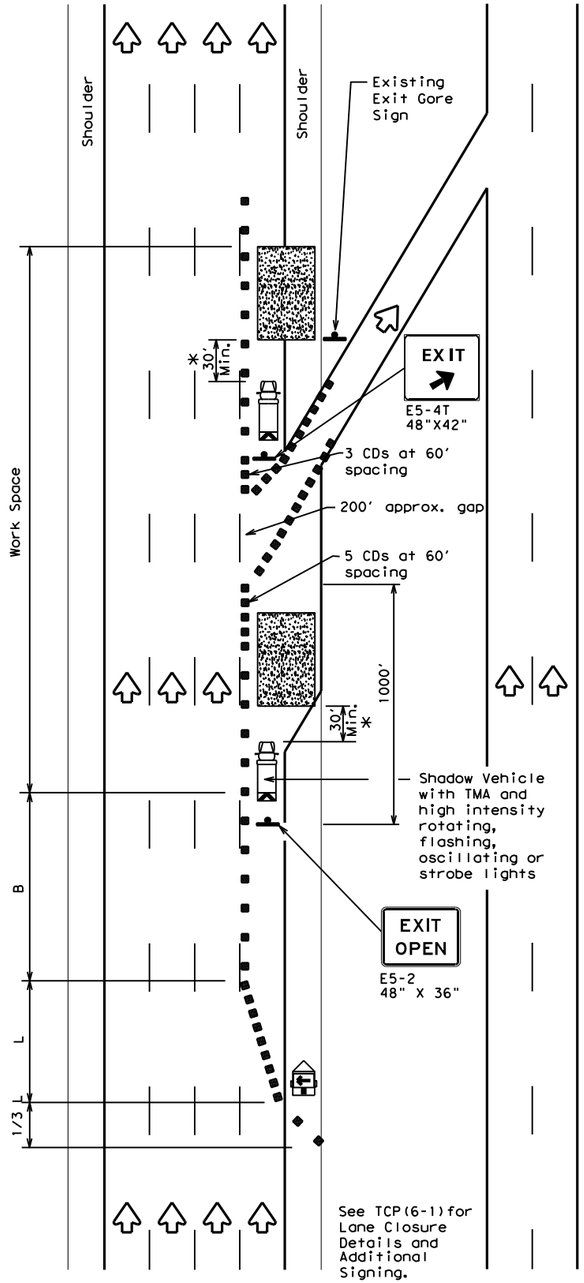
FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		61

DATE: 02/15/2024 09:40 AM
FILE: DOCUMENT NAME



TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND

	Type 3 Barricade		Channelizing Devices (CDs)
	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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

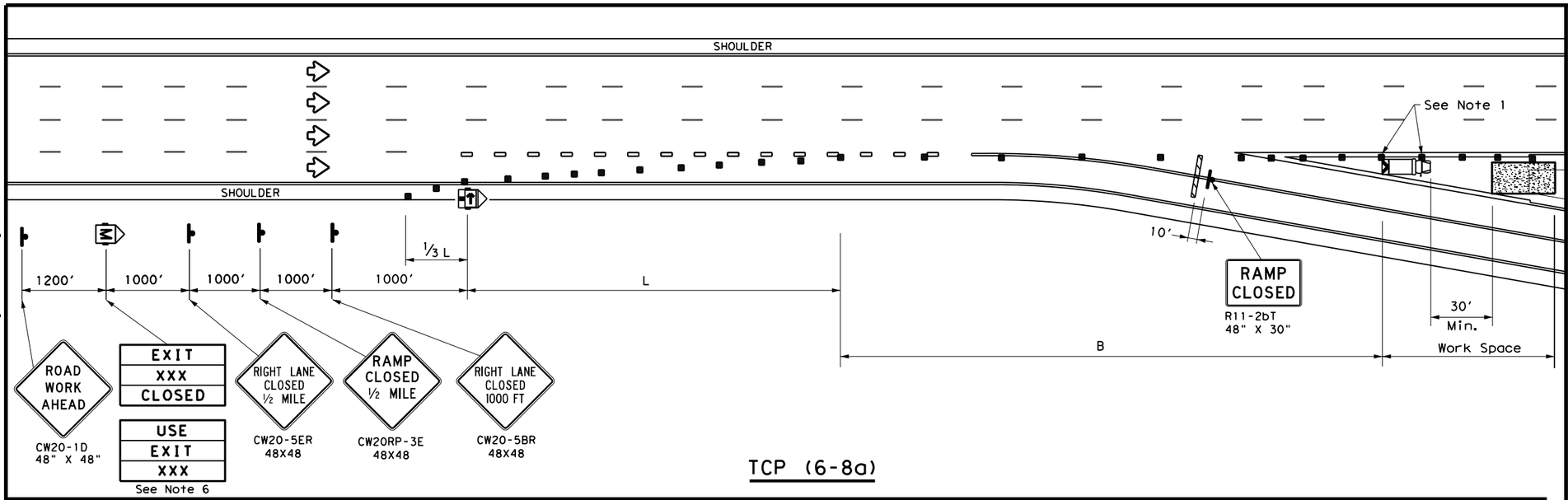
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

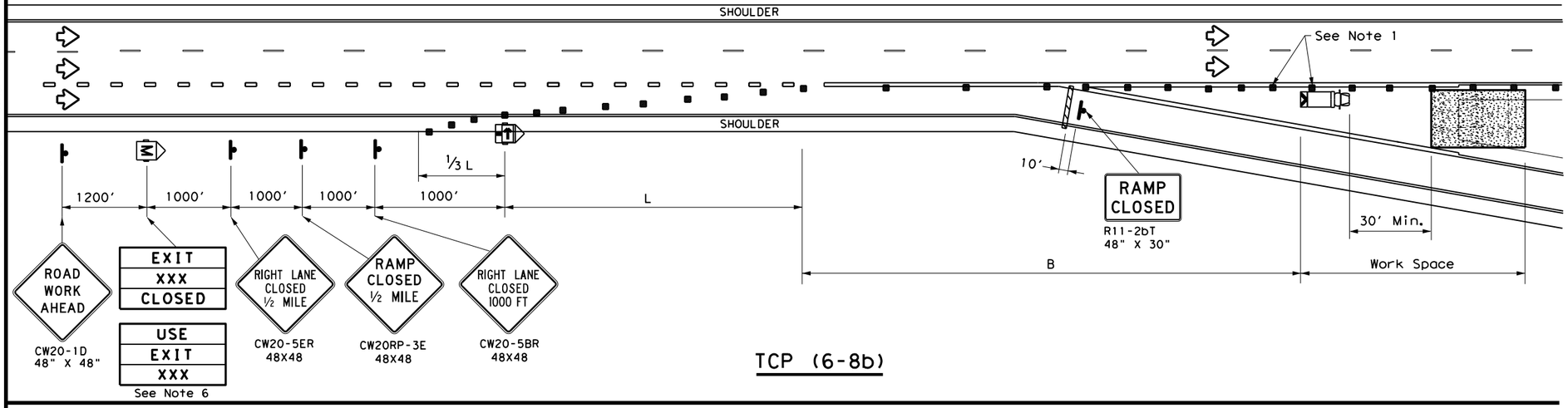
TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		62

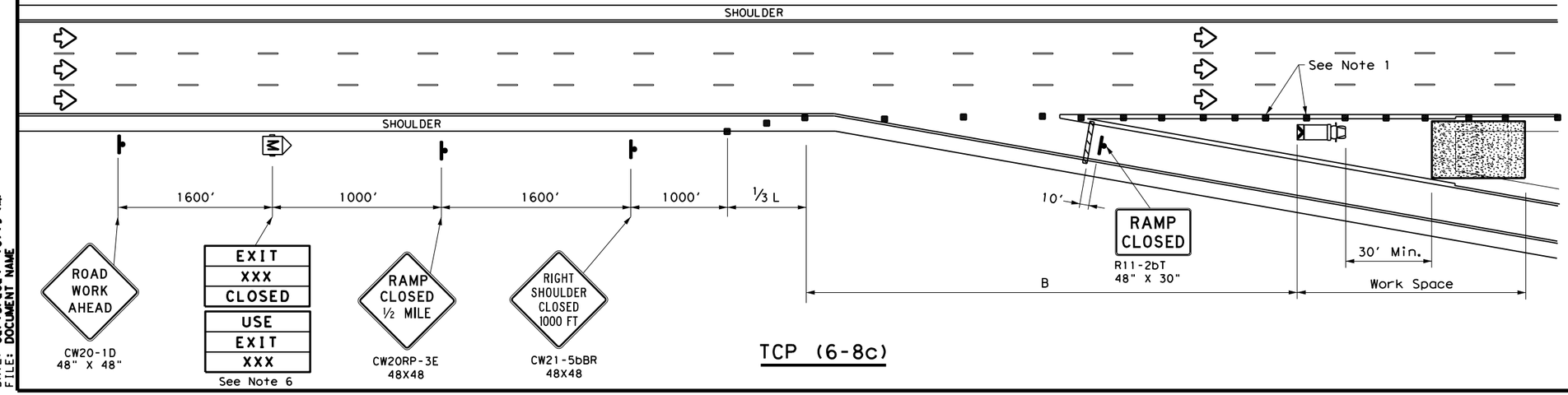
DATE: 02/15/2024 09:28 AM
FILE: DOCUMENT NAME



TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10′ Offset	11′ Offset	12′ Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450′	495′	540′	45′	90′	195′
50		500′	550′	600′	50′	100′	240′
55		550′	605′	660′	55′	110′	295′
60		600′	660′	720′	60′	120′	350′
65		650′	715′	780′	65′	130′	410′
70		700′	770′	840′	70′	140′	475′
75		750′	825′	900′	75′	150′	540′
80		800′	880′	960′	80′	160′	615′

** 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. Place channelizing devices in the gore at 20′ spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. Truck mounted attenuator is required.
6. The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW20RP-3D) Sign.
7. Roadway ADT should be greater than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP(6-8)-14

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		63

DATE: 02/15/2024 10:19 AM
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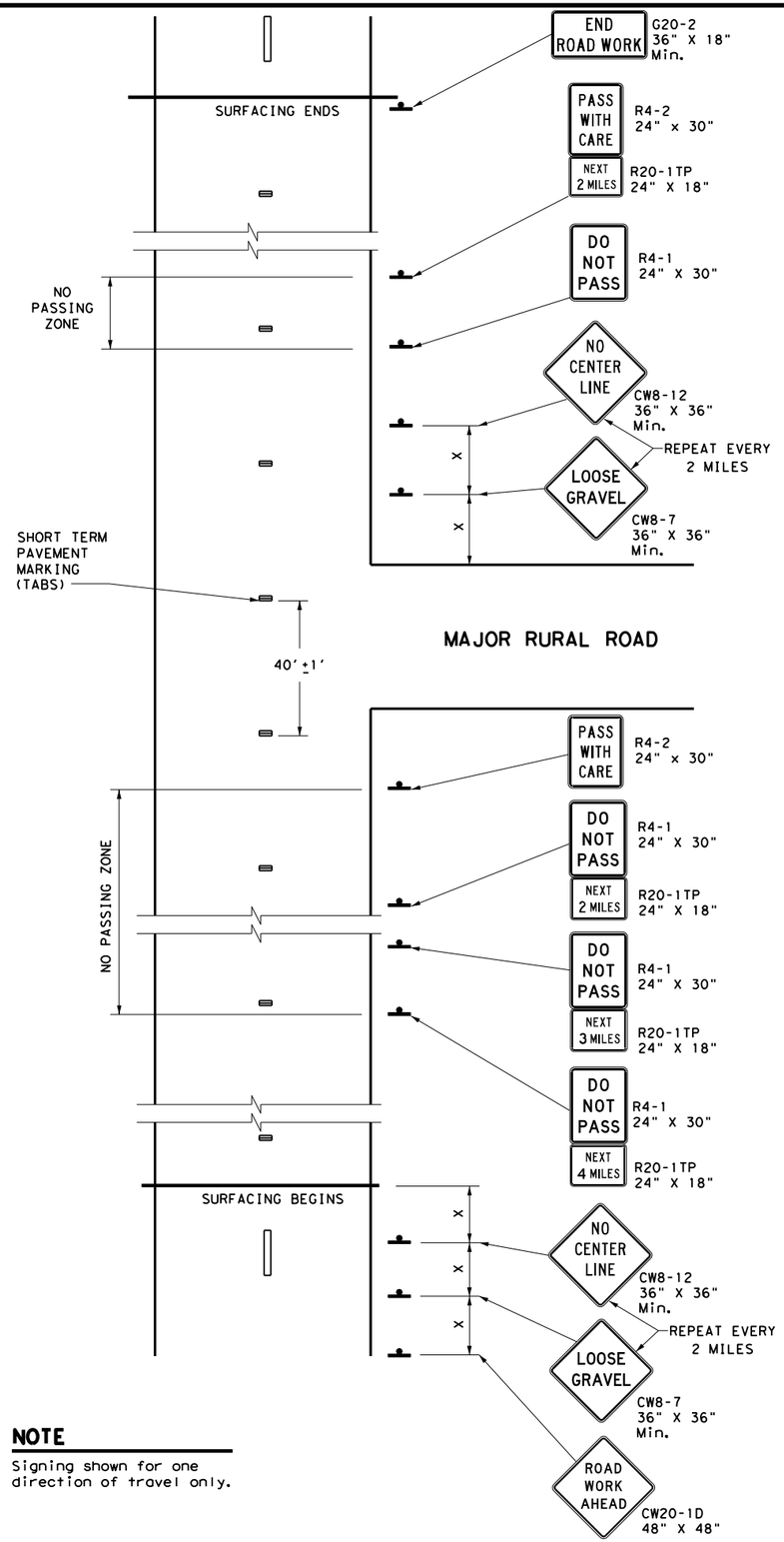
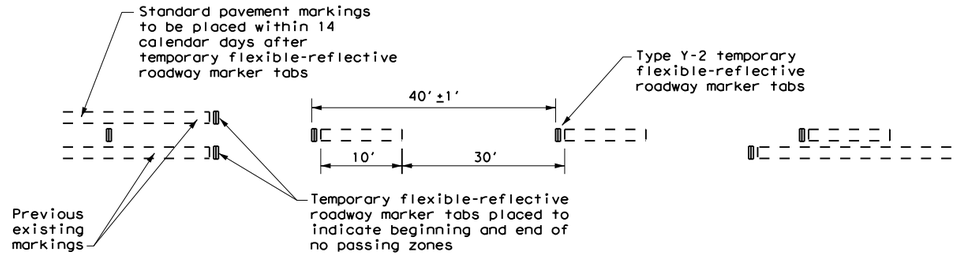
DATE: 02/15/2024 10:24 AM
FILE: DOCUMENT NAME



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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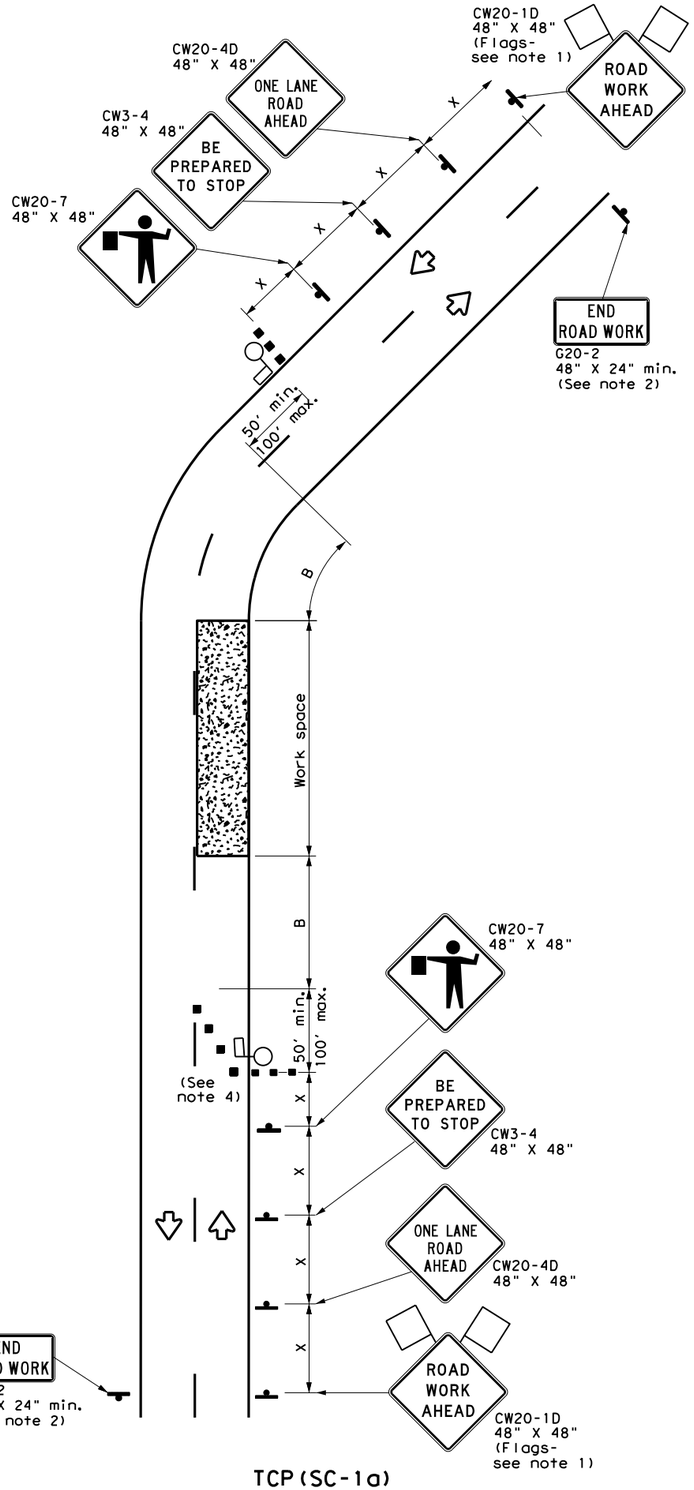
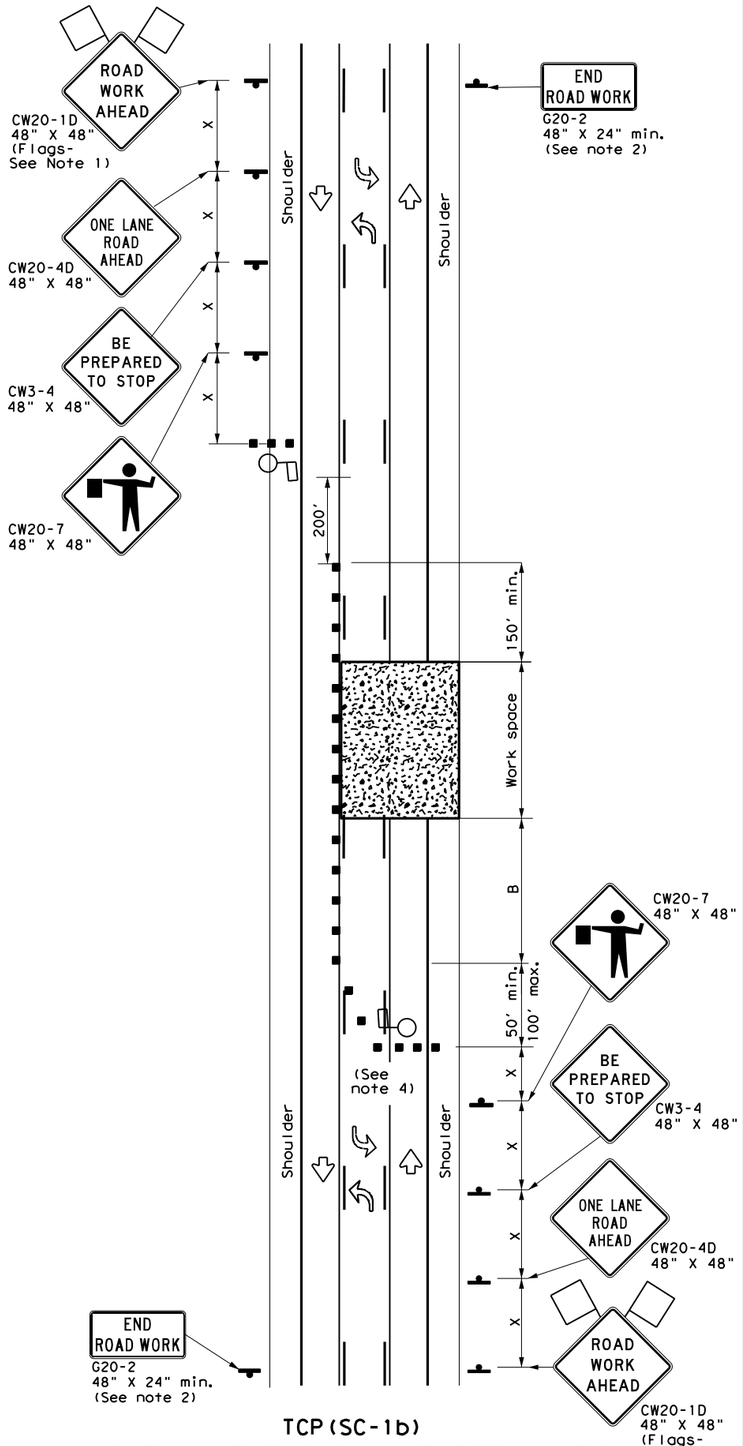
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	HOU	HARRIS		64

210



TCP(SC-1a)

ONE LANE TWO-WAY (TWO LANES) CONTROL WITH PILOT VEHICLE



TCP(SC-1b)

ONE LANE TWO-WAY (THREE LANES) CONTROL WITH PILOT VEHICLE AND CHANNELIZING DEVICES

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 Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L = Length of Taper (FT) W = Width of Offset (FT) S = Posted Speed (MPH)

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Sign spacing may be increased or an additional ROAD WORK AHEAD (CW20-1D) sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
4. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
5. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
6. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
7. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
8. Temporary rumble strips are not required on seal coat operations.
9. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

1. Channelizing devices on the centerline are not required when a pilot car is leading traffic, unless directed by the Engineer.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS ONE-LANE TWO-WAY

TCP(SC-1)-22

FILE: tcpsc-1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		65

217

DATE: 02/26/2024 08:19 PM
FILE: DOCUMENT NAME

DATE: 02/26/2024 08:19 PM
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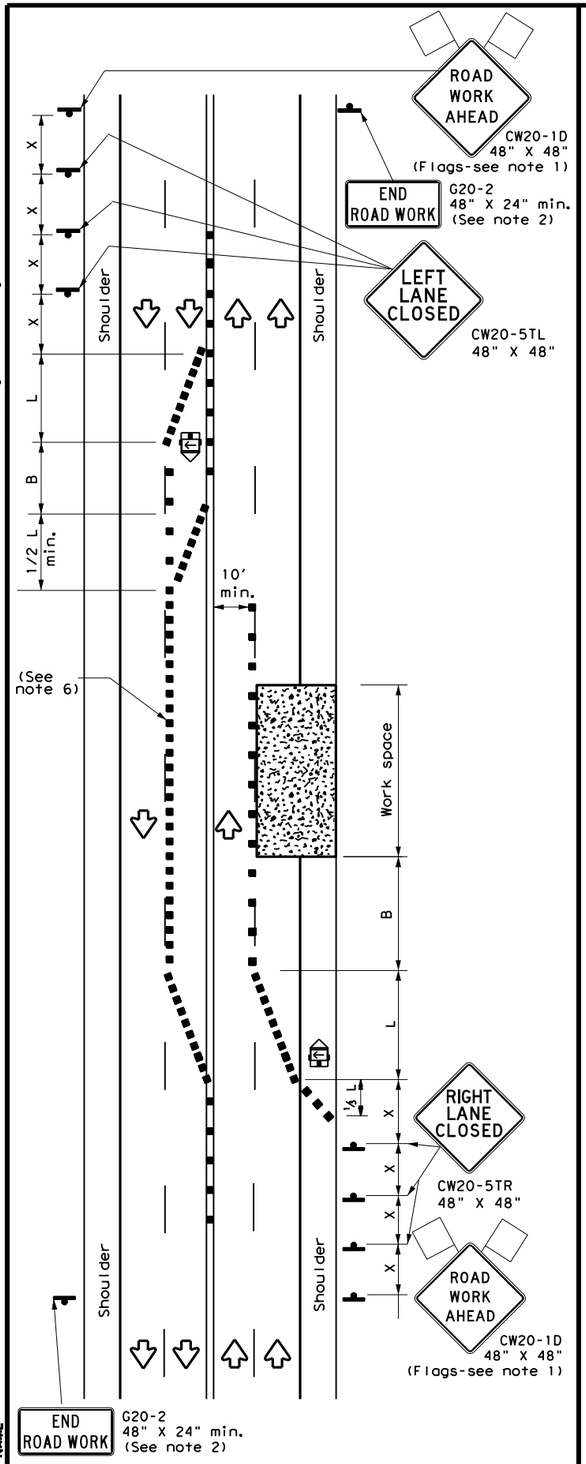
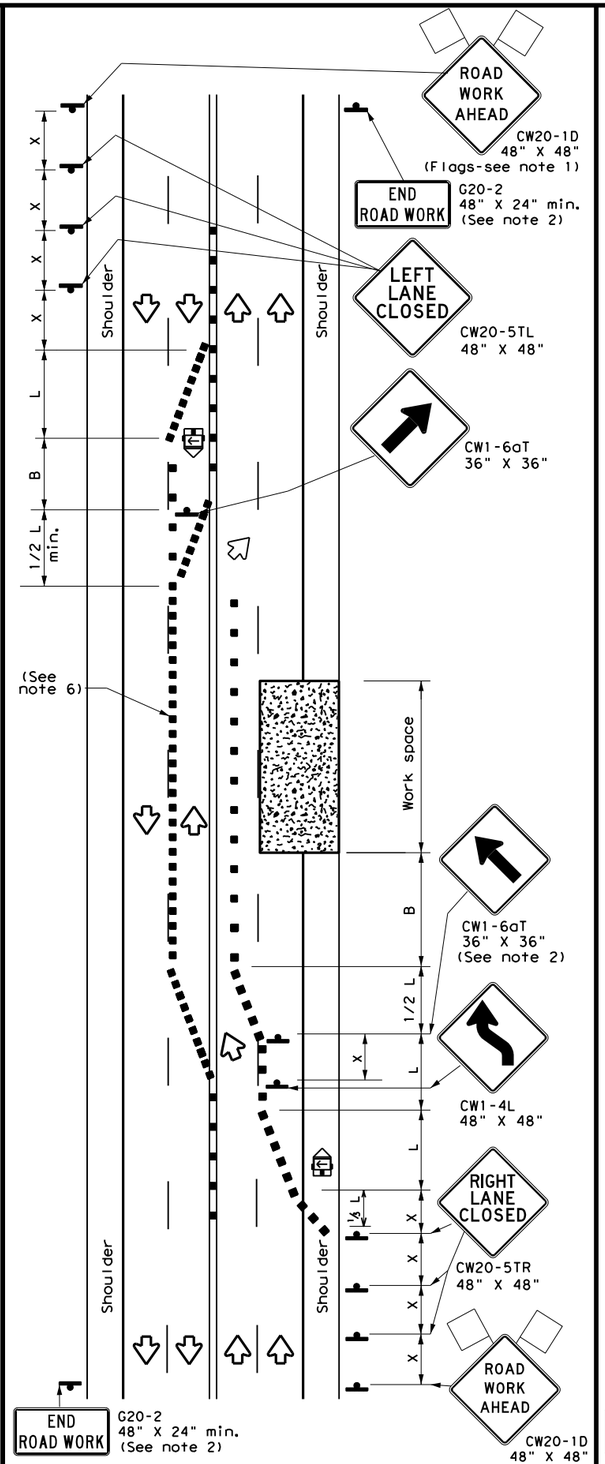


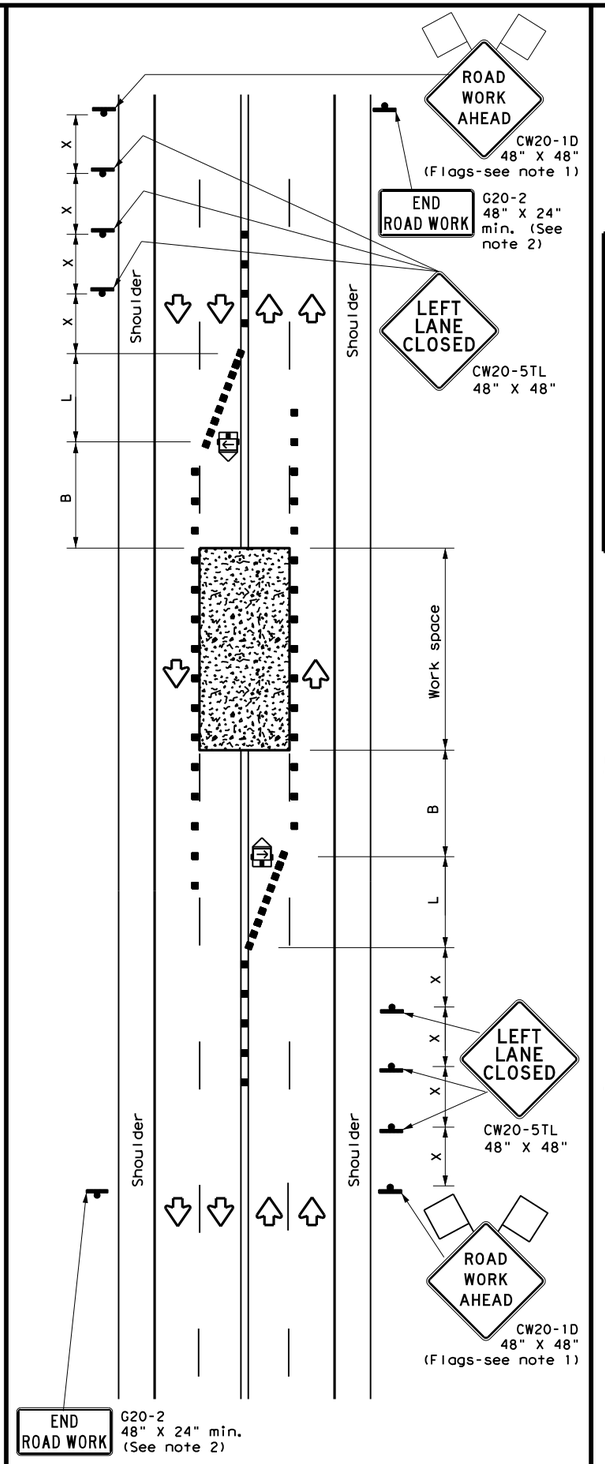
TCP (SC-2a)

ONE LANE CLOSED EACH DIRECTION
CONTROL W/ CHANNELIZING DEVICES



TCP (SC-2b)

ONE LANE CLOSED EACH DIRECTION
CONTROL W/ CHANNELIZING DEVICES



TCP (SC-2c)

CENTER LANES CLOSED
CONTROL W/ CHANNELIZING DEVICES

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 Distance "X"	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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. The ROAD WORK AHEAD (CW20-1D) sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
5. Temporary rumble strips are not required on seal coat operations.

TCP (SC-2a) and (SC-2b)

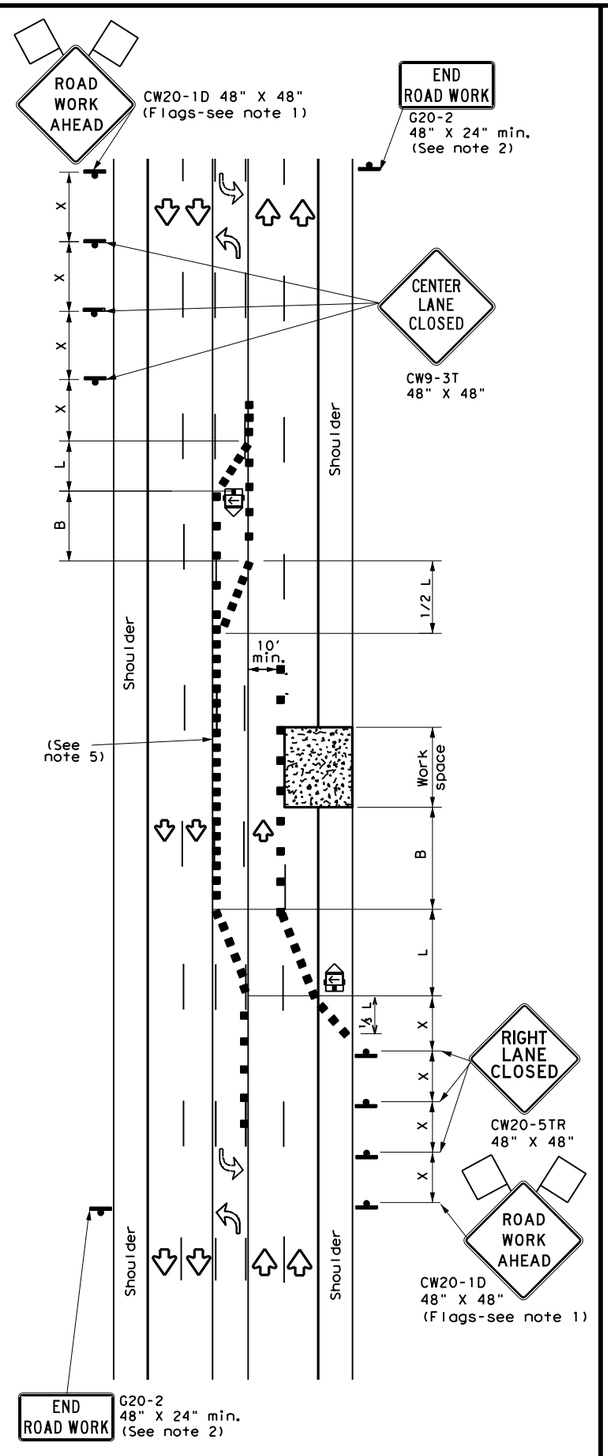
6. Channelizing devices which separate two-way traffic shall be spaced on tapers at:
   a.) 20 feet;
   b.) 15 feet when posted speeds are 35 mph or slower; or
   c.) at 1/2(S) for tangent sections.
   This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEALCOAT OPERATIONS MULTILANE ROADS (UNDIVIDED)
TCP(SC-2)-22

FILE: tcpsc-2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		66

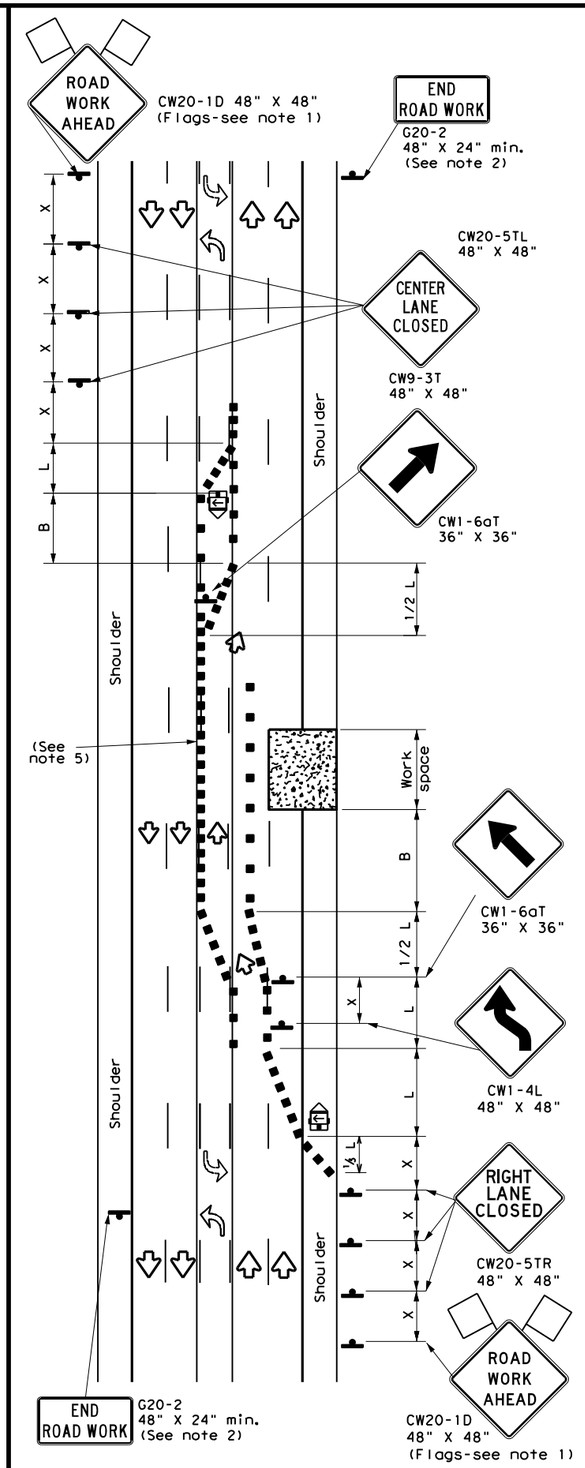
DATE: 02/26/2024 08:19 PM
FILE: DOCUMENT NAME



TCP(SC-3a)

ONE LANE CLOSED

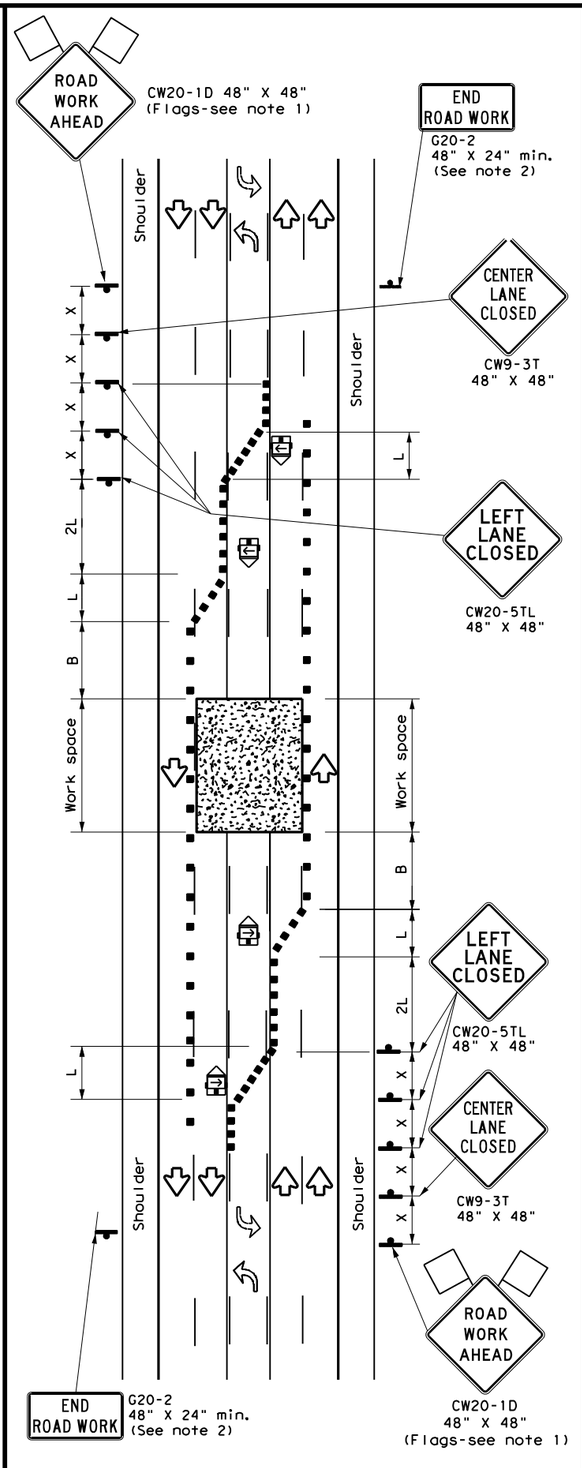
CONTROL W/ CHANNELIZING DEVICES



TCP(SC-3b)

TWO LANES CLOSED

CONTROL W/ CHANNELIZING DEVICES



TCP(SC-3c)

CENTER LANES CLOSED

CONTROL W/ CHANNELIZING DEVICES

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 Distance "X"	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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personal (flaggers) at the intersection.
4. Temporary rumble strips are not required on seal coat operations.

TCP (SC-3a) and (SC-3b)

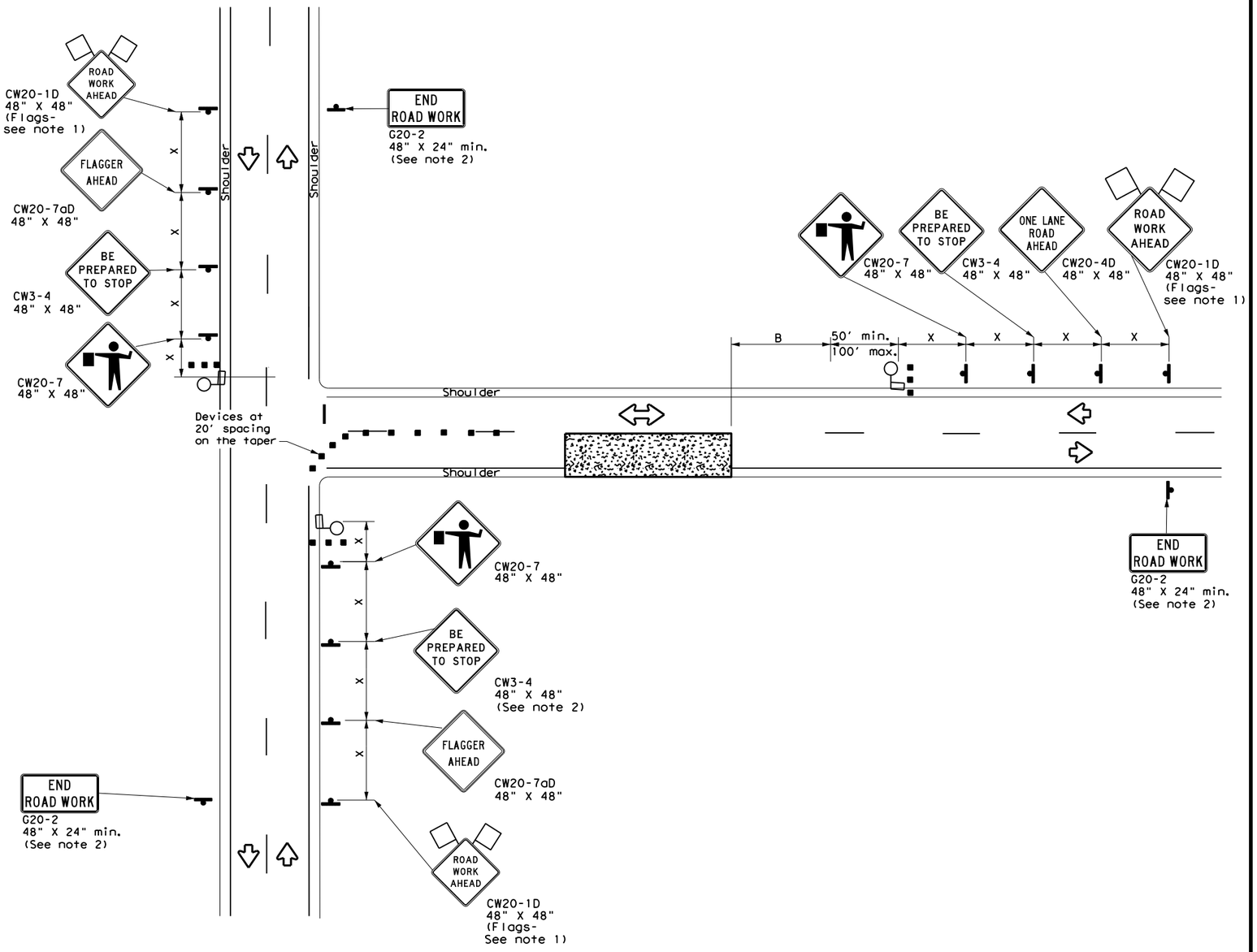
5. Channelizing devices which separate two-way traffic shall be spaced on tapers at:
   a.) 20 feet;
   b.) 15 feet when posted speeds are 35 mph or slower; or
   c.) at 1/2(S) for tangent sections.
   This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS MULTILANE ROADS (W/ CENTER LEFT TURN LANE)

TCP(SC-3)-22

FILE: tcpsc-3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
4-21	DIST	COUNTY		SHEET NO.
10-22	HOU	HARRIS		67



ONE LANE TWO-WAY (T-INTERSECTION) CONTROL WITH PILOT VEHICLE

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 Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L = Length of Taper (FT) W = Width of Offset (FT) S = Posted Speed (MPH)

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
4. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
5. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
6. Temporary rumble strips are not required on seal coat operations.
7. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

Texas Department of Transportation | Traffic Safety Division Standard

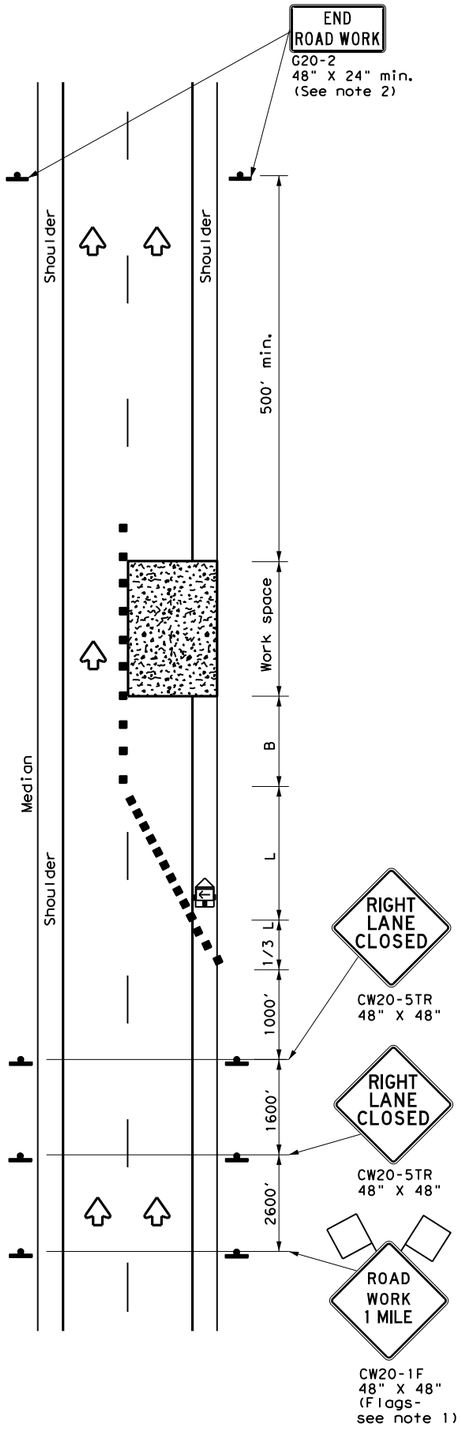
TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS NEAR INTERSECTION

TCP(SC-4)-22

FILE: tcpsc-4-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		68

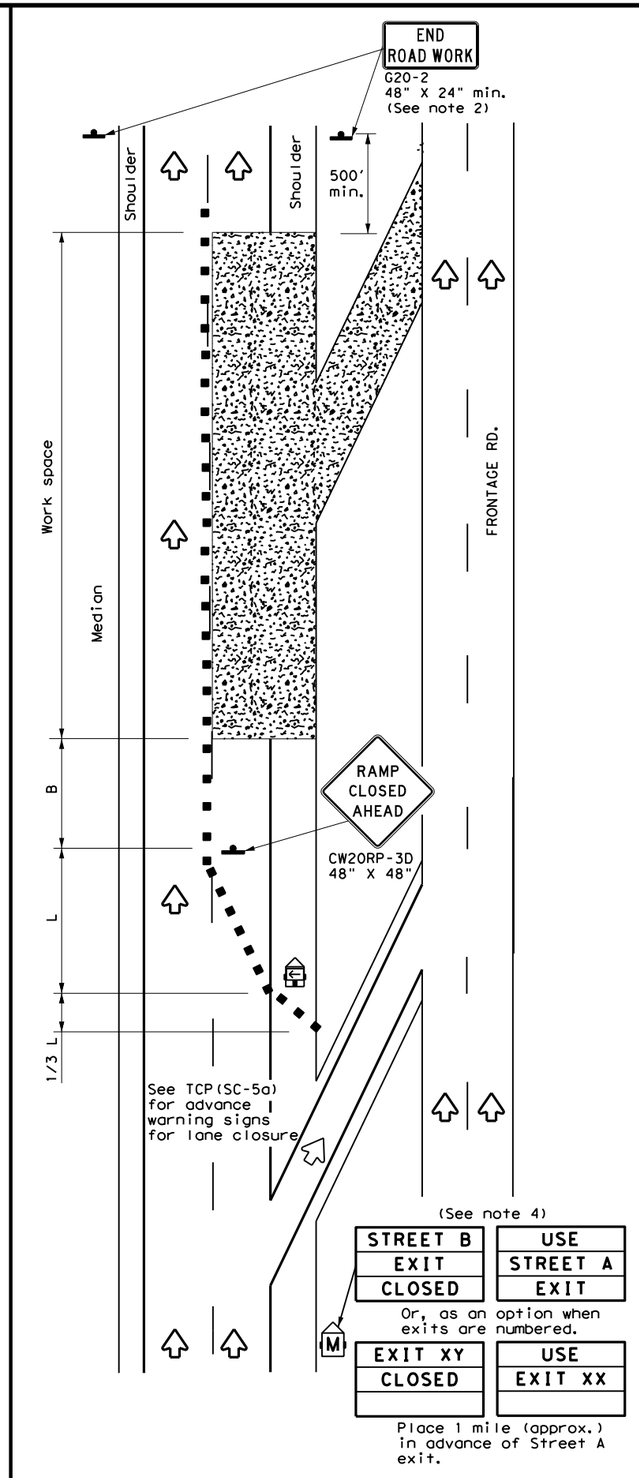
220

DATE: 02/15/2024 10:29 AM
FILE: DOCUMENT NAME



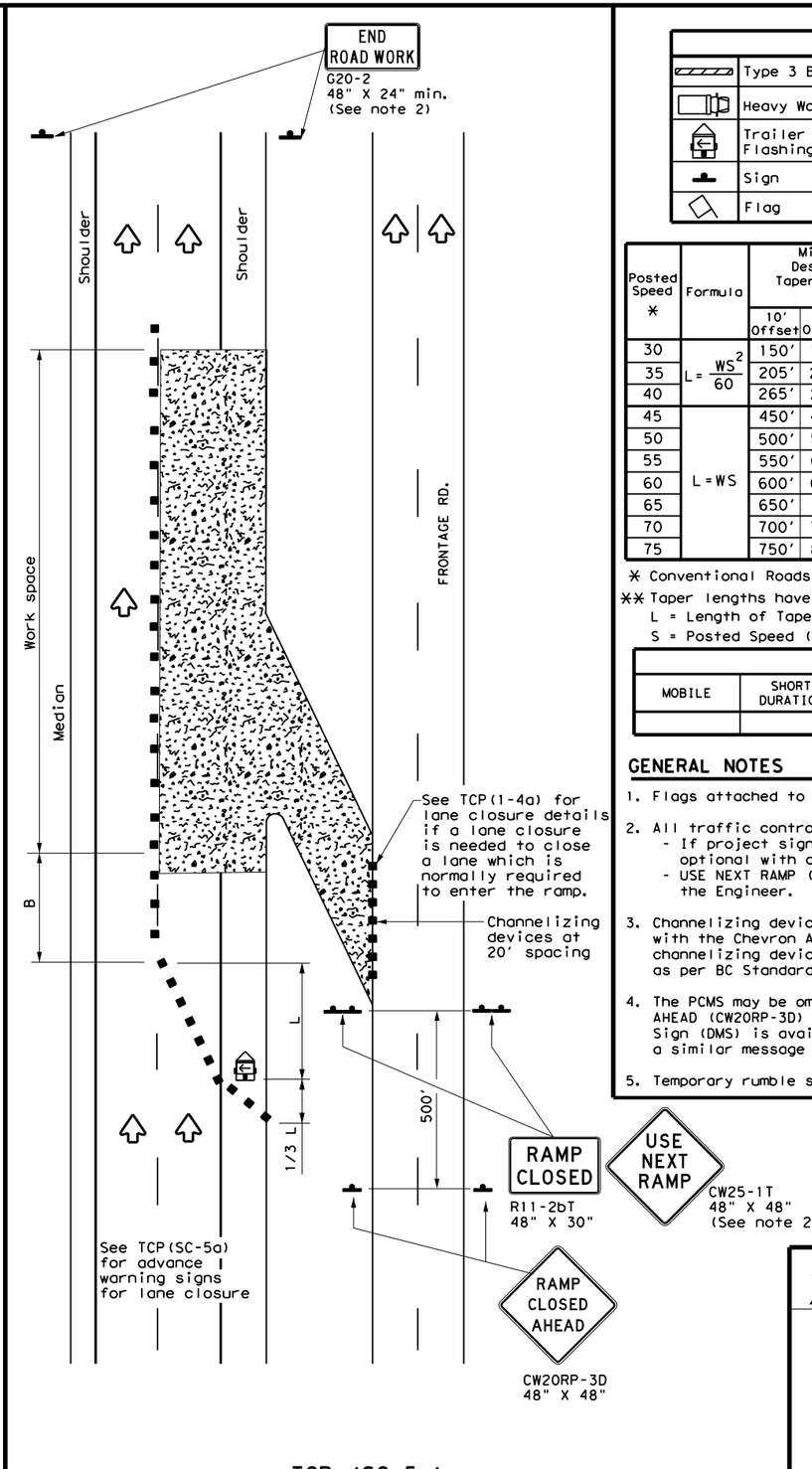
TCP (SC-5a)

ONE LANE CLOSURE



TCP (SC-5b)

LANE AND RAMP CLOSURE AT EXIT RAMPS



TCP (SC-5c)

LANE AND RAMP CLOSURE AT ENTRANCE RAMPS

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 Distance "X"	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:
   - If project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
   - USE NEXT RAMP (CW25-1T) sign is optional with approval by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. The PCMS may be omitted if: it is replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in the appropriate location to display a similar message as called for on the PCMS.
5. Temporary rumble strips are not required on seal coat operations.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS DIVIDED HIGHWAYS

TCP(SC-5)-22

FILE: tcpsc-5-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		69

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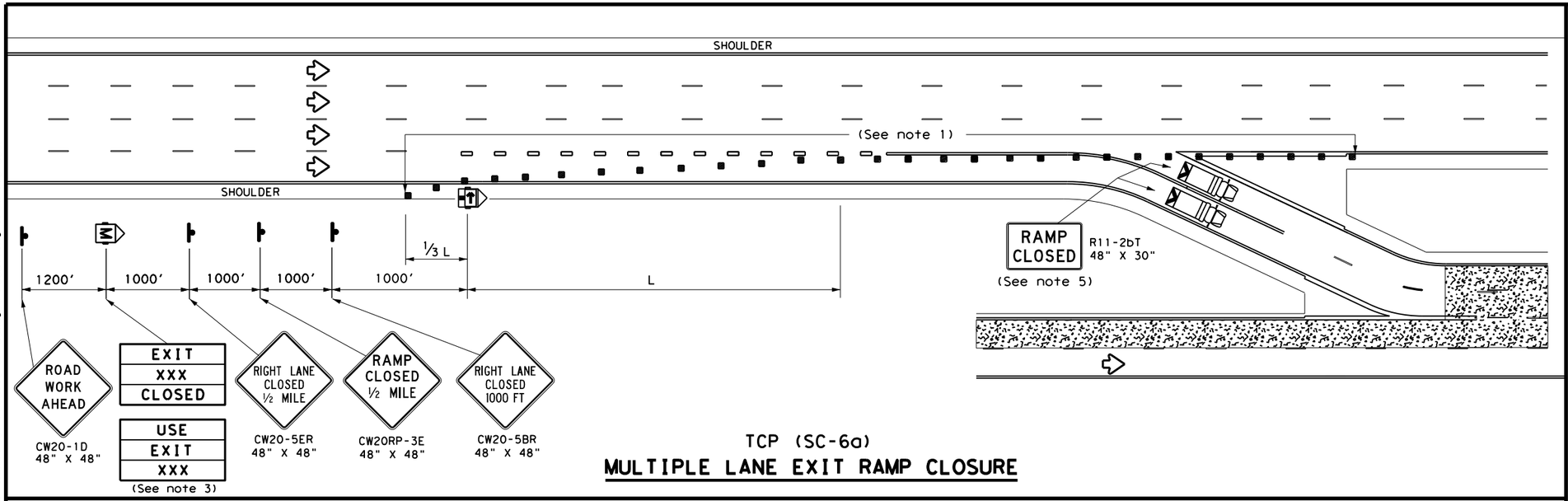
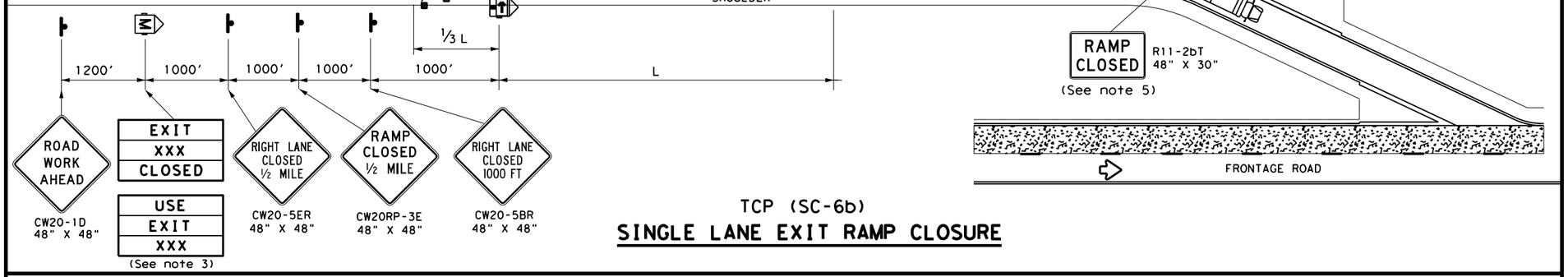
FILE: DOCUMENT NAME



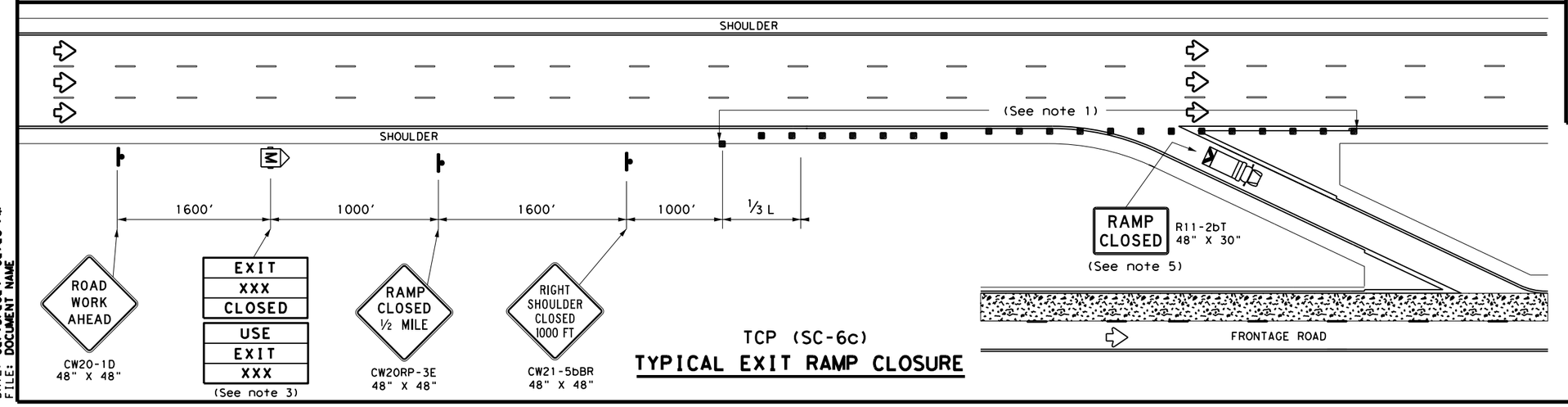
TCP (SC-6a)

MULTIPLE LANE EXIT RAMP CLOSURE



TCP (SC-6b)

SINGLE LANE EXIT RAMP CLOSURE



TCP (SC-6c)

TYPICAL EXIT RAMP CLOSURE

DATE: 02/15/2024 02:26 PM
FILE: DOCUMENT NAME

LEGEND

	Type 3 Barricade		Channelizing Devices (CDs)
	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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'
85		850'	935'	1020'	85'	170'	695'

** 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. Place channelizing devices at 20' spacings. Tighter spacing allowed as necessary to address field conditions or observed driver behavior.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted if replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. A Truck Mounted Attenuator (TMA), where shown, is REQUIRED and shall have a RAMP CLOSED (R11-2bT) sign mounted on the rear of the truck.

Texas Department of Transportation — Traffic Safety Division Standard

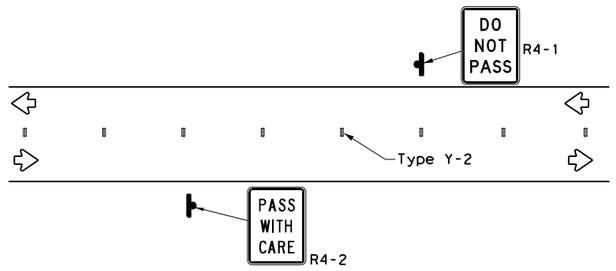
TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS DIVIDED HIGHWAYS

TCP(SC-6)-22

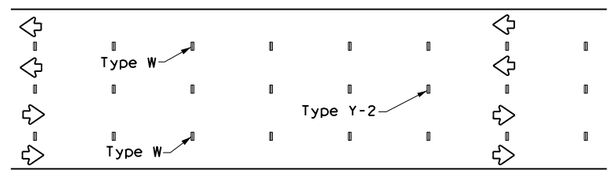
FILE: tcpsc-6-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-22	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		70

DATE: 8/26/22
FILE: tcpsc-7-22.dgn

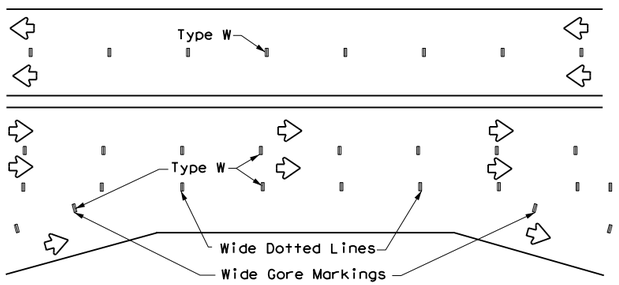
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



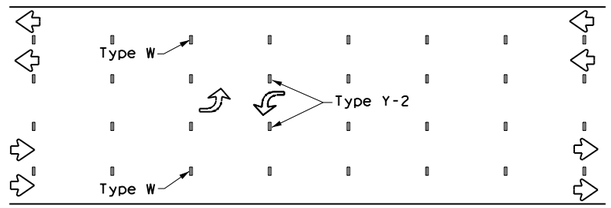
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS

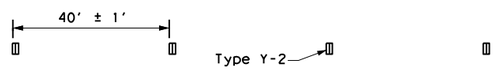
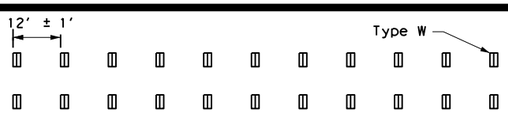


LANE LINES FOR DIVIDED HIGHWAY

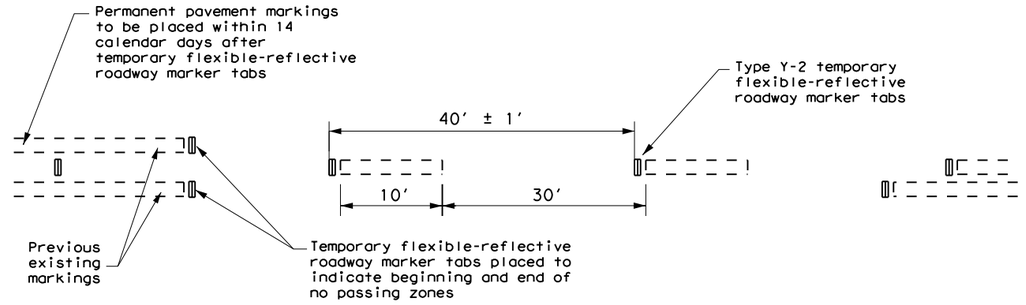


TWO-WAY LEFT TURN LANE

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)

SOLID LINES	DOUBLE NO-PASSING LINE	
	SINGLE NO-PASSING LINE or CHANNELIZATION LINE	
	8" WIDE SOLID LINE	
BROKEN LINES (FOR CENTER LINE OR LANE LINE)		
WIDE DOTTED LINES (FOR LANE DROP LINES)		
WIDE GORE MARKINGS		

TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS



TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

1. Temporary markings for surfacing projects shall be Temporary Flexible-Reflective Roadway Marker Tabs with protective cover unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two days before the surfacing is applied. After the surfacing is rolled and swept, the protective cover over the reflective strip shall be removed.
2. Temporary Flexible-Reflective Roadway Marker Tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with a 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).
3. Temporary Flexible-Reflective Roadway Marker Tabs will require normal maintenance replacement when used on roadways with an Average Daily Traffic (ADT) per lane of up to 7500 vehicles with no more than 10% truck mix. When roadway volumes exceed these values, additional maintenance replacement of these devices should be planned for.
4. 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.
5. 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 4.
6. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
7. Tabs shall NOT be used to simulate edge lines.

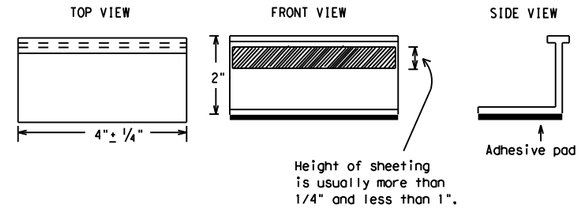
NOTES:

1. 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.
2. 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 acceptable.
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.

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

1. DMSs referenced above may be found along with embedded links to their respective MPLs at the following website: http://www.txdot.gov

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS



Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

TCP(SC-7)-22

FILE: tcpsc-7-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
4-21	DIST	COUNTY		SHEET NO.
10-22	HOU	HARRIS		71

DATE: 02/26/2024 08:19 PM
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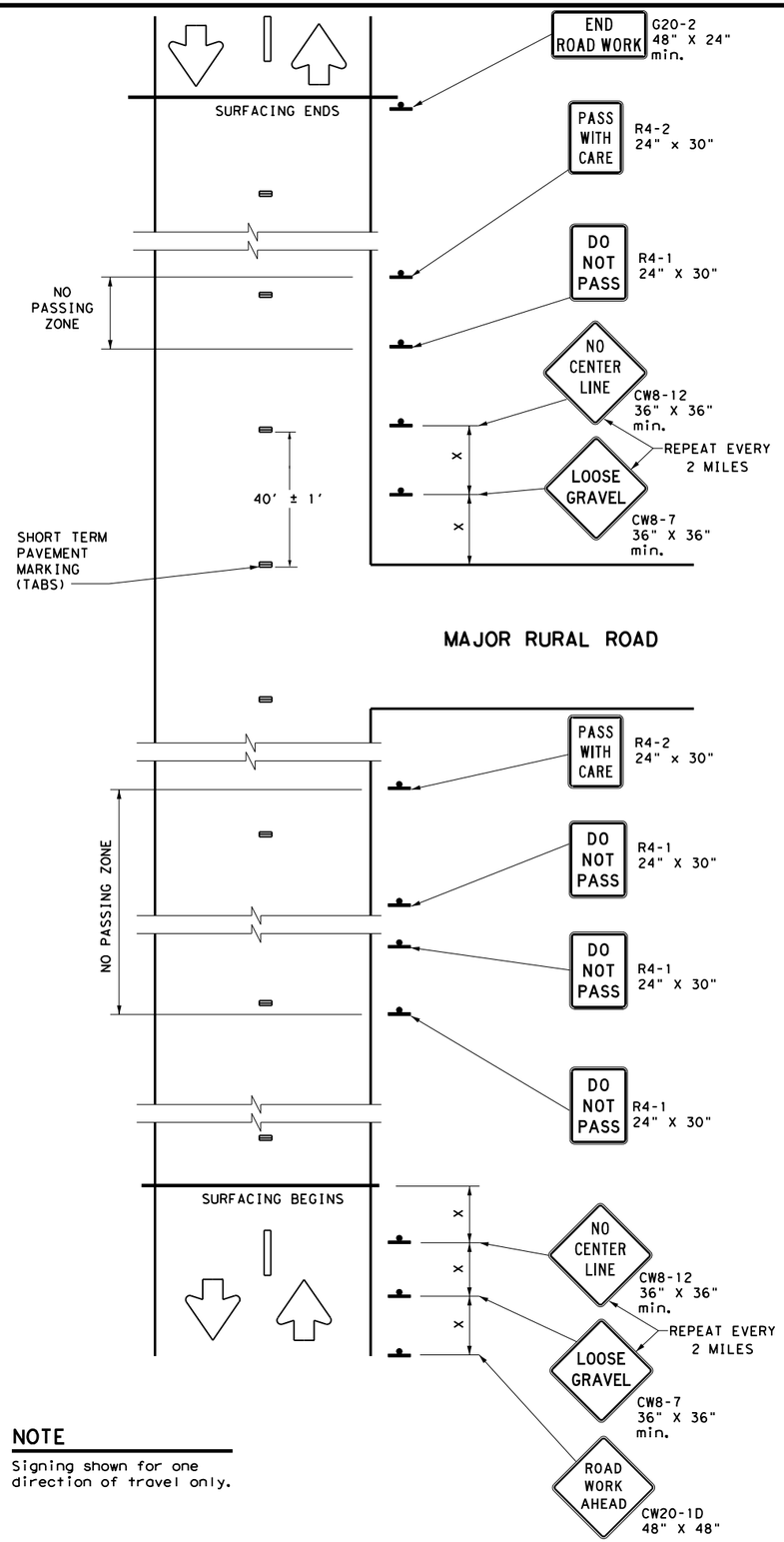


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS

DO NOT PASS (R4-1) SIGN and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel, except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibitd over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is a considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshields and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one day of operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. DO NOT PASS and PASS WITH CARE signs are to remain in place until permanent pavement markings are installed.

NO CENTER LINE (CW8-12) SIGN

A. Center line markings are yellow pavement markings that delineate the separation between lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing center line), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately two mile intervals within the work area, beyond major intersections, and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until permanent pavement markings are installed.

LOOSE GRAVEL (CW8-7) SIGN

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately two miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible, the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed:
   a.) In the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) sign and the TRAFFIC FINES DOUBLE (R20-5T) sign; and
   b.) One "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing.

LOOSE GRAVEL and NO CENTER LINE sign placements will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

1. Surfacing operations that cover or obliterate existing pavement markings must first have the passing zones clearly marked with tabs as well as having any of the traffic control devices detailed on this sheet furnished and erected as directed by the Engineer.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Short Duration / Short Term Stationary Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways should be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

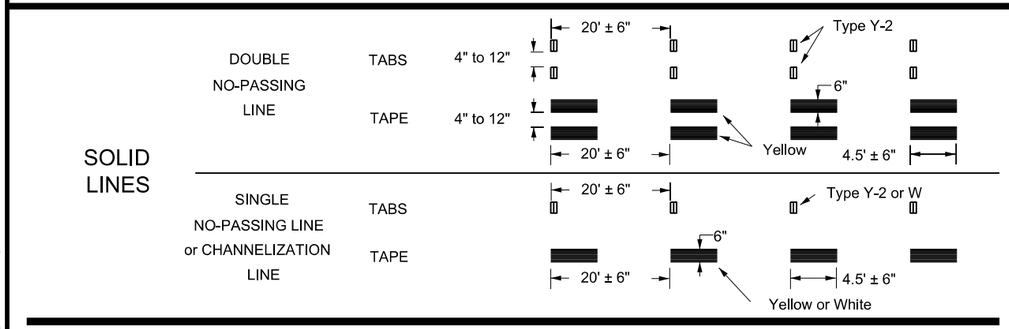
Texas Department of Transportation | Traffic Safety Division Standard

TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS

TCP(SC-8)-22

FILE: tcpsc-8-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
4-21	DIST	COUNTY		SHEET NO.
10-22	HOU	HARRIS		72

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



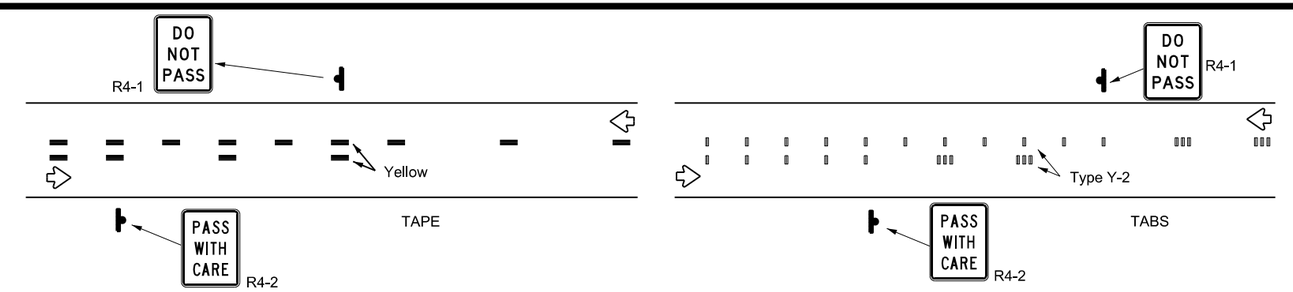
NOTES:

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.

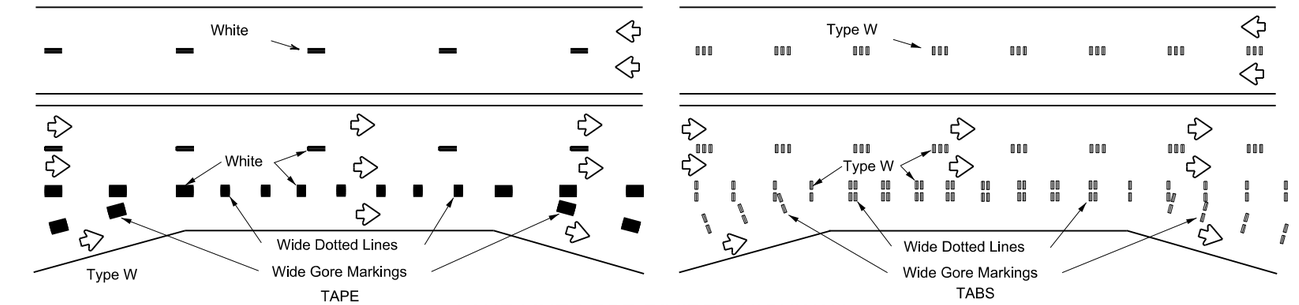
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

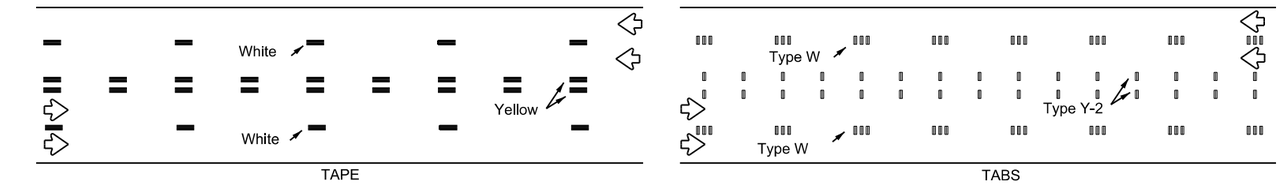
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



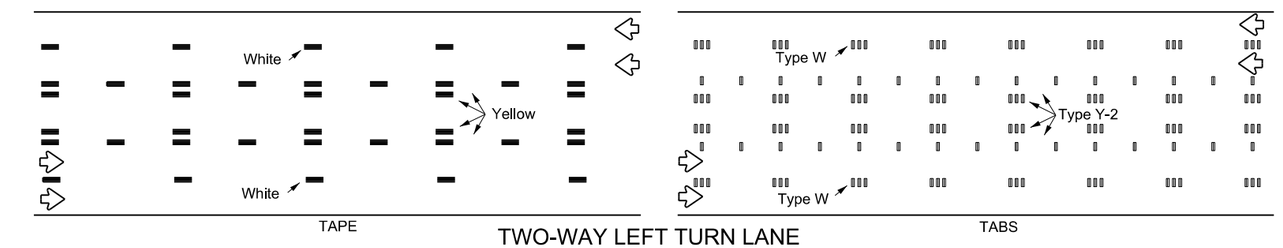
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



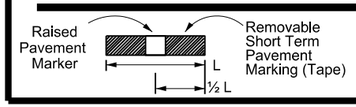
LANE LINES FOR DIVIDED HIGHWAY



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 Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		73

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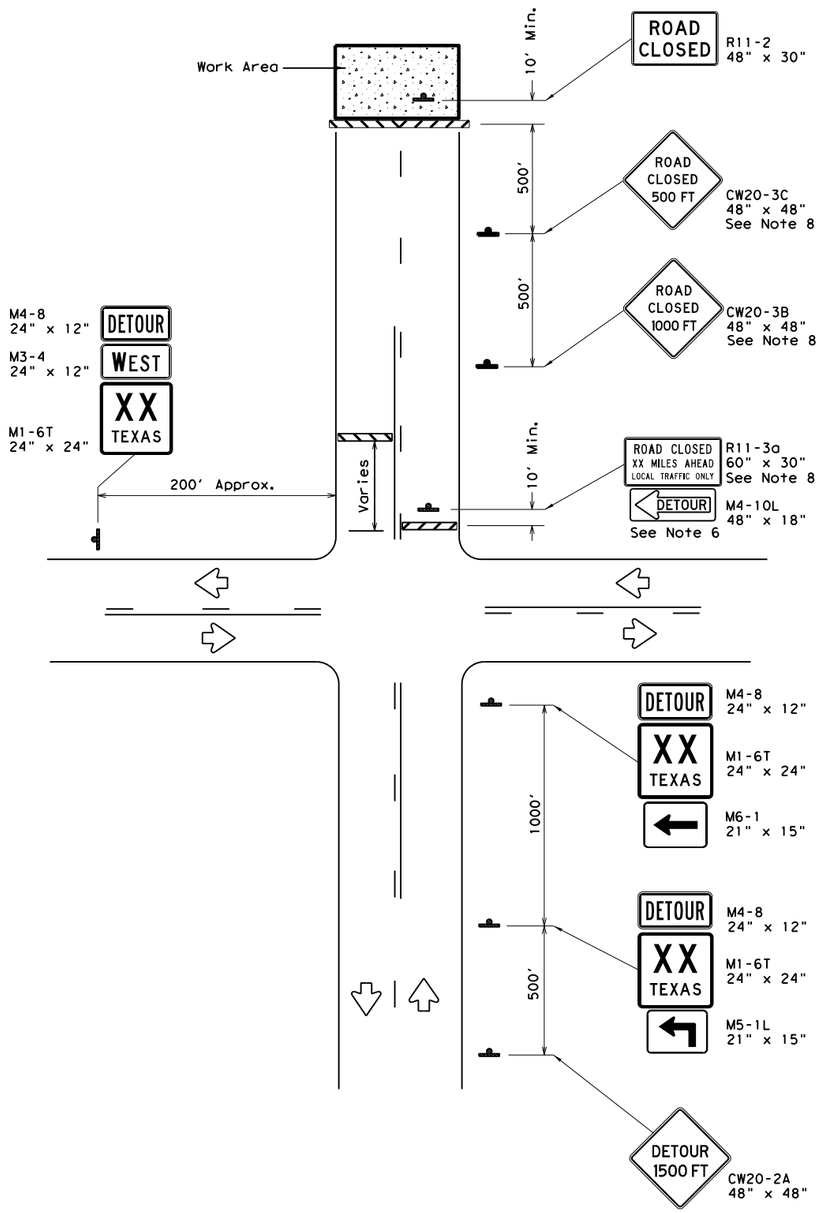
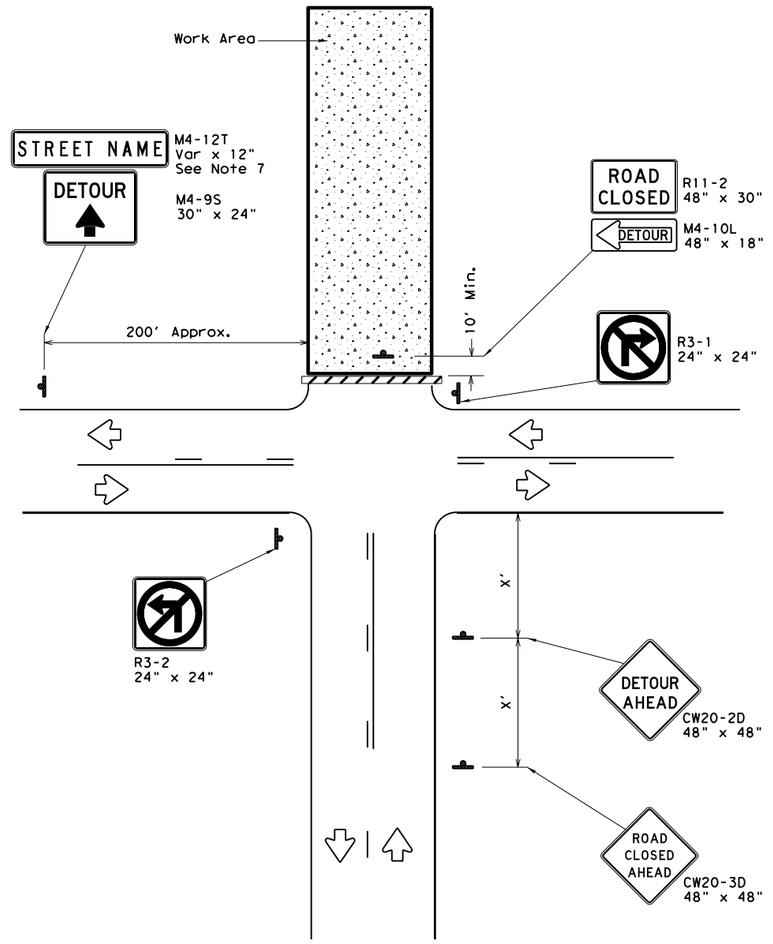


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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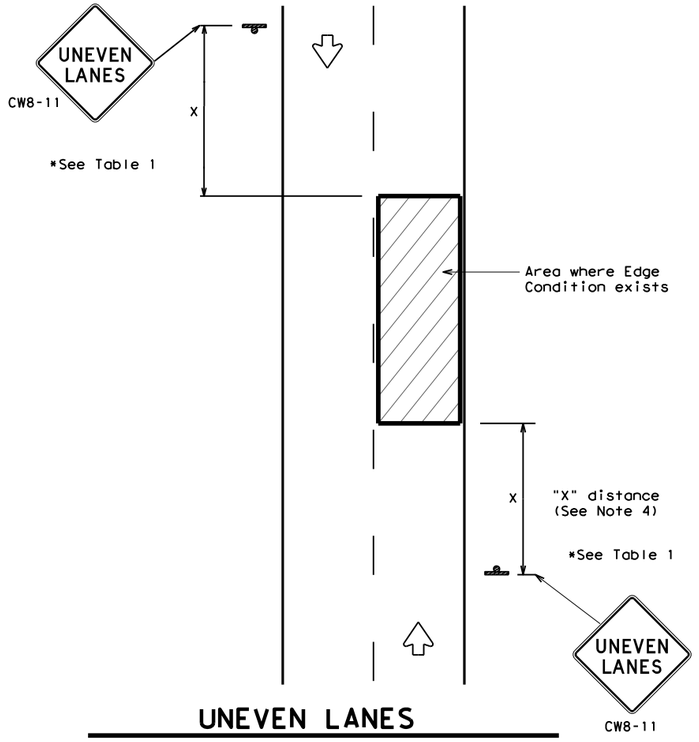
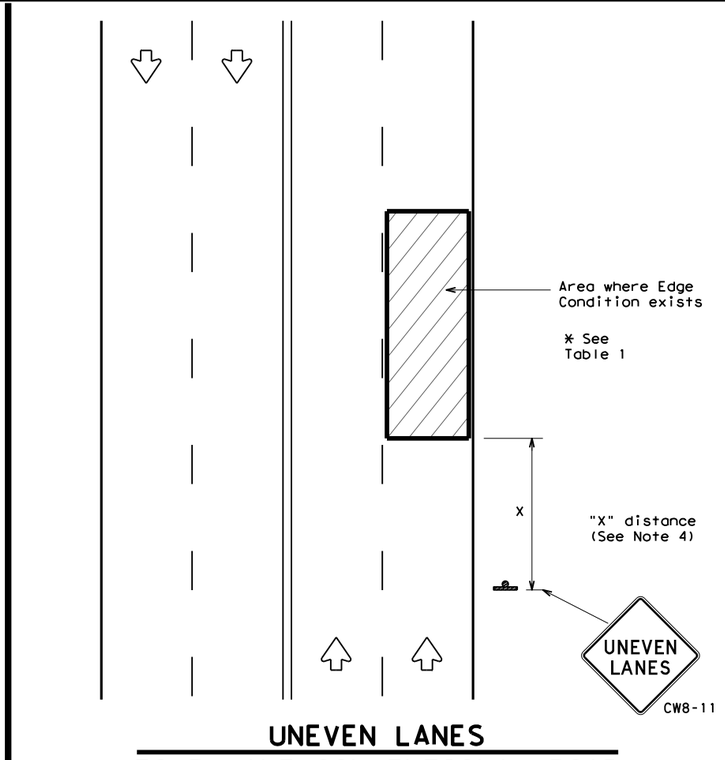
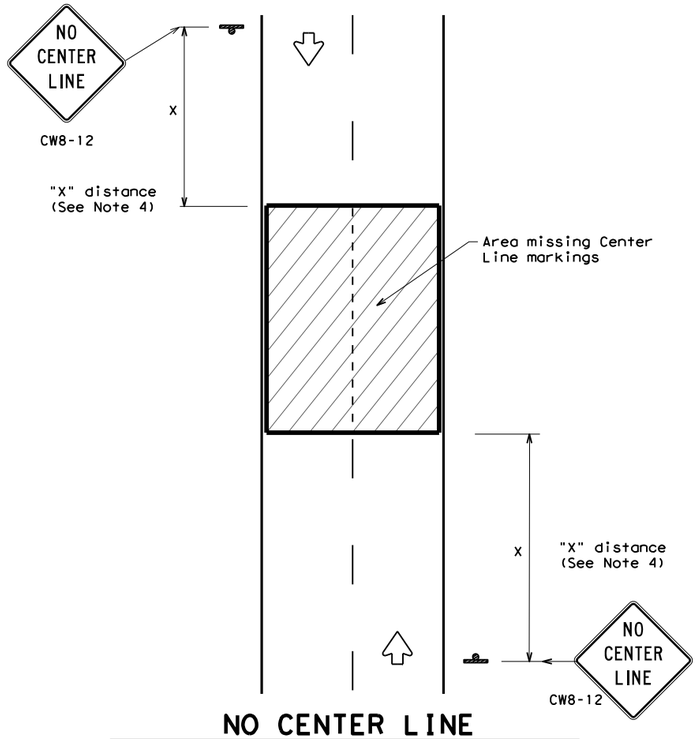
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	HOU	HARRIS		74



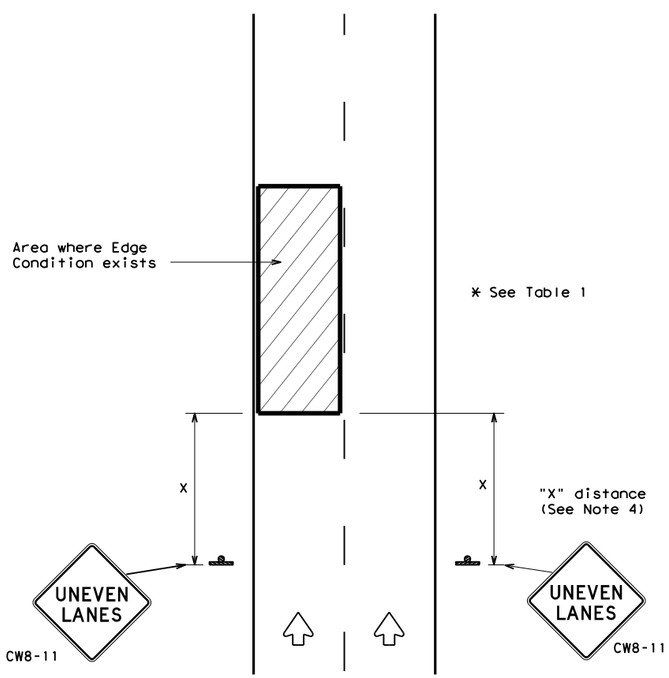
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

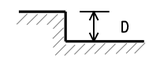
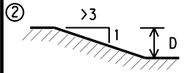
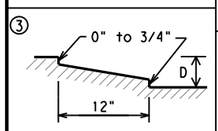
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	HOU	HARRIS		75

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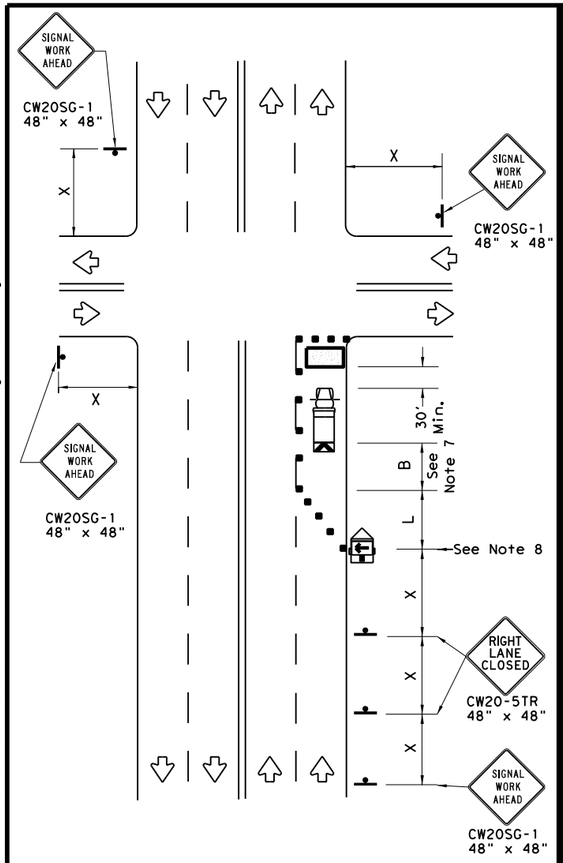
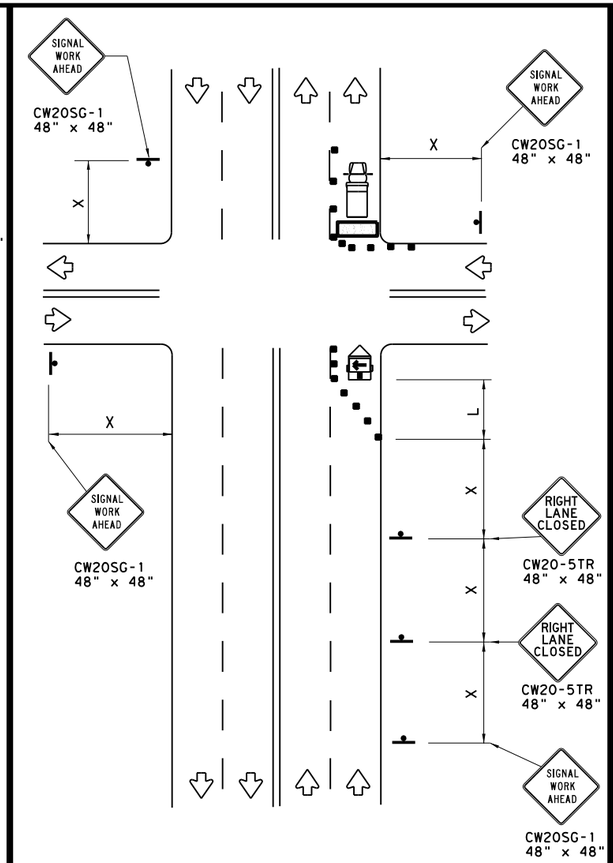


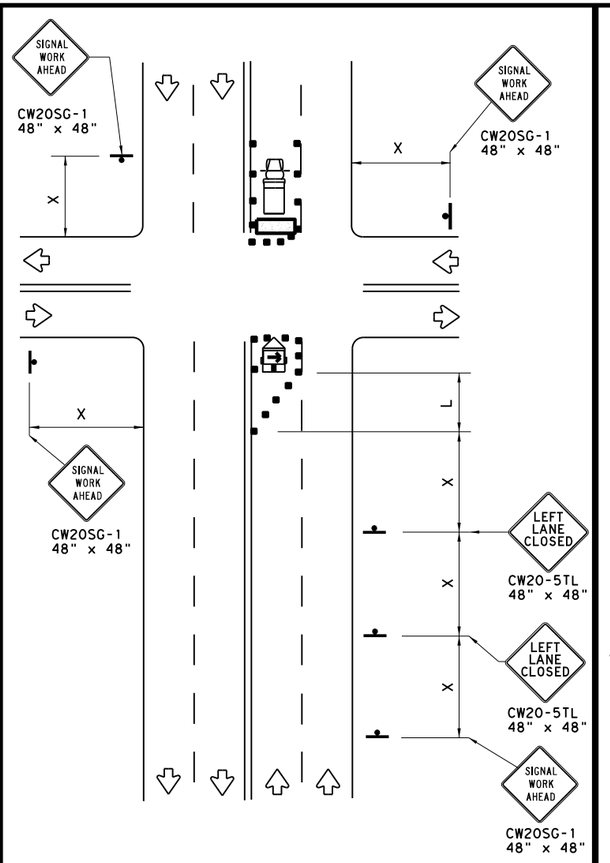
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



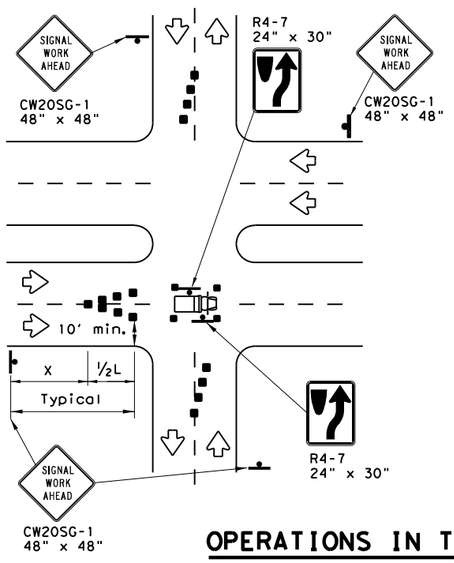
FAR SIDE RIGHT LANE CLOSURE

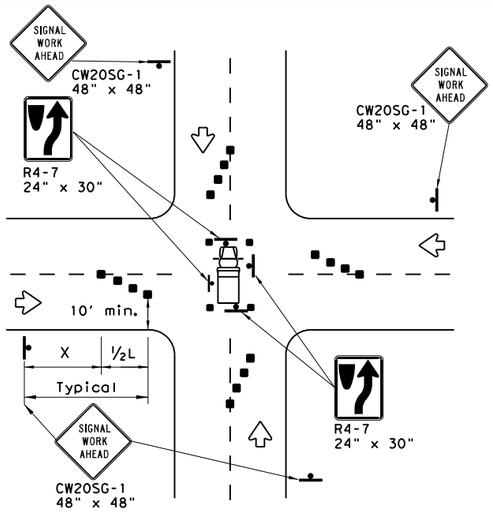
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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.

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.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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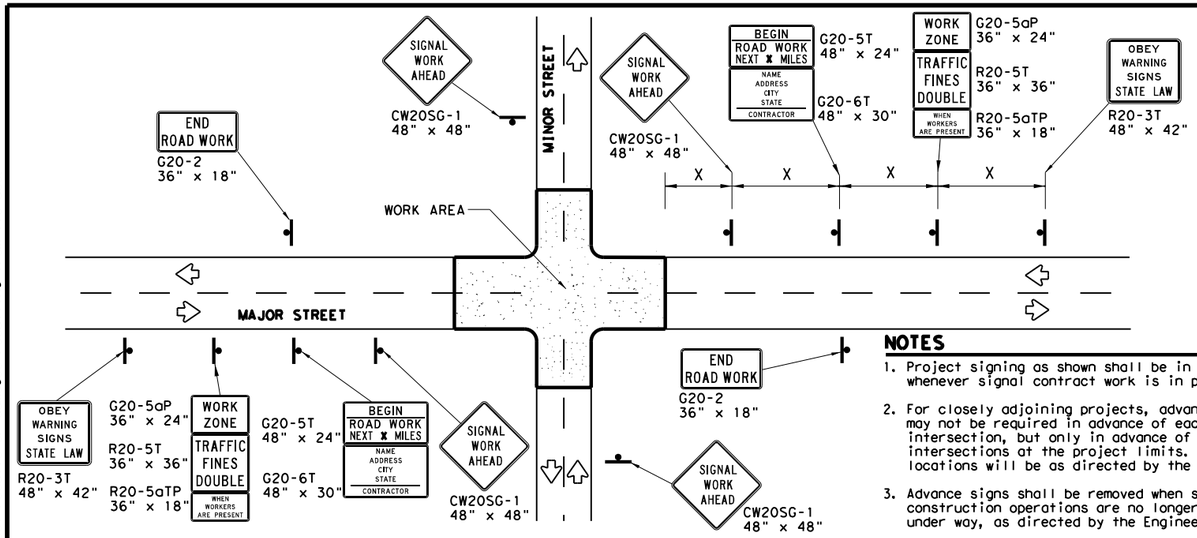
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	HARRIS		76



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

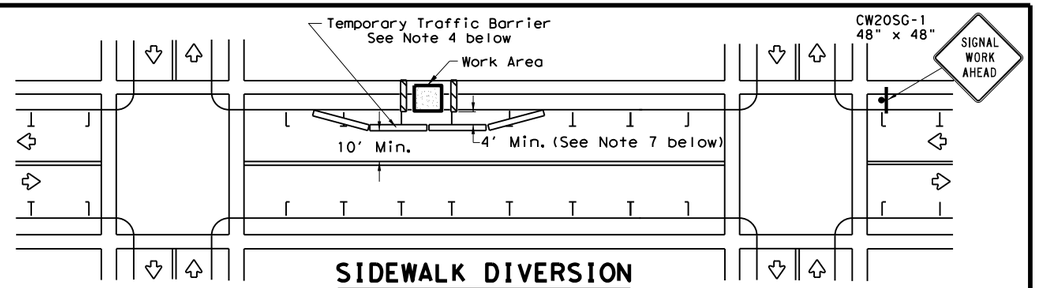
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support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

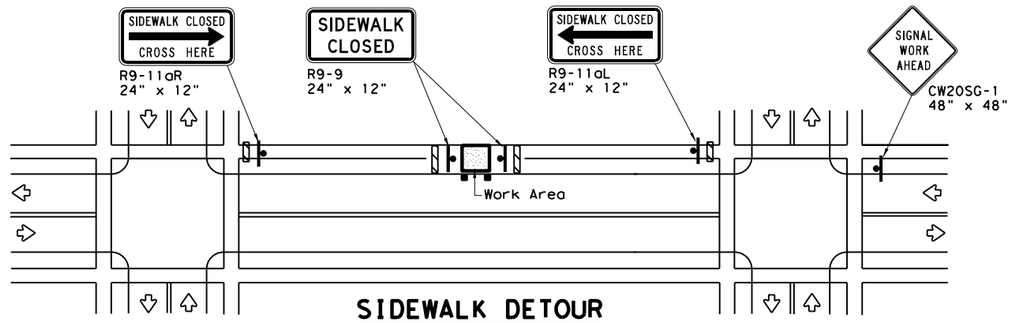
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

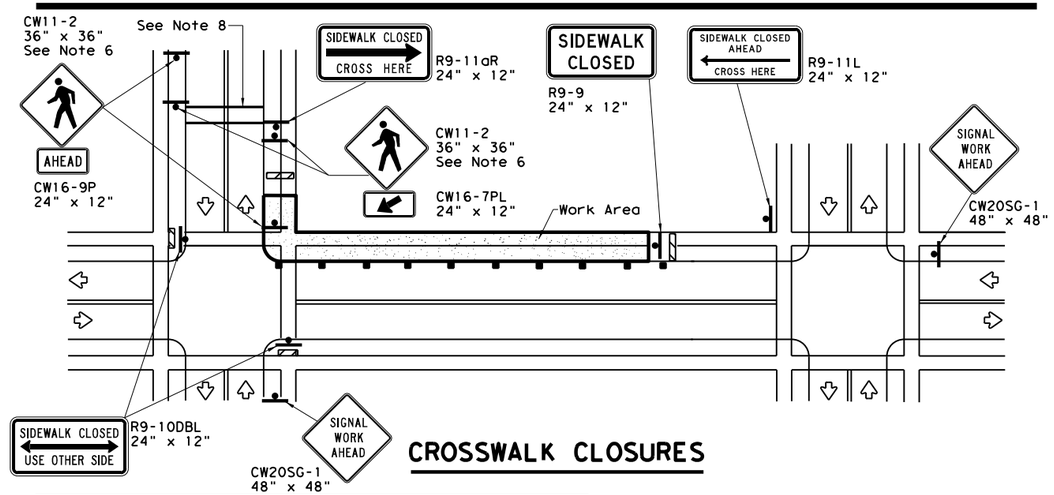
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



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

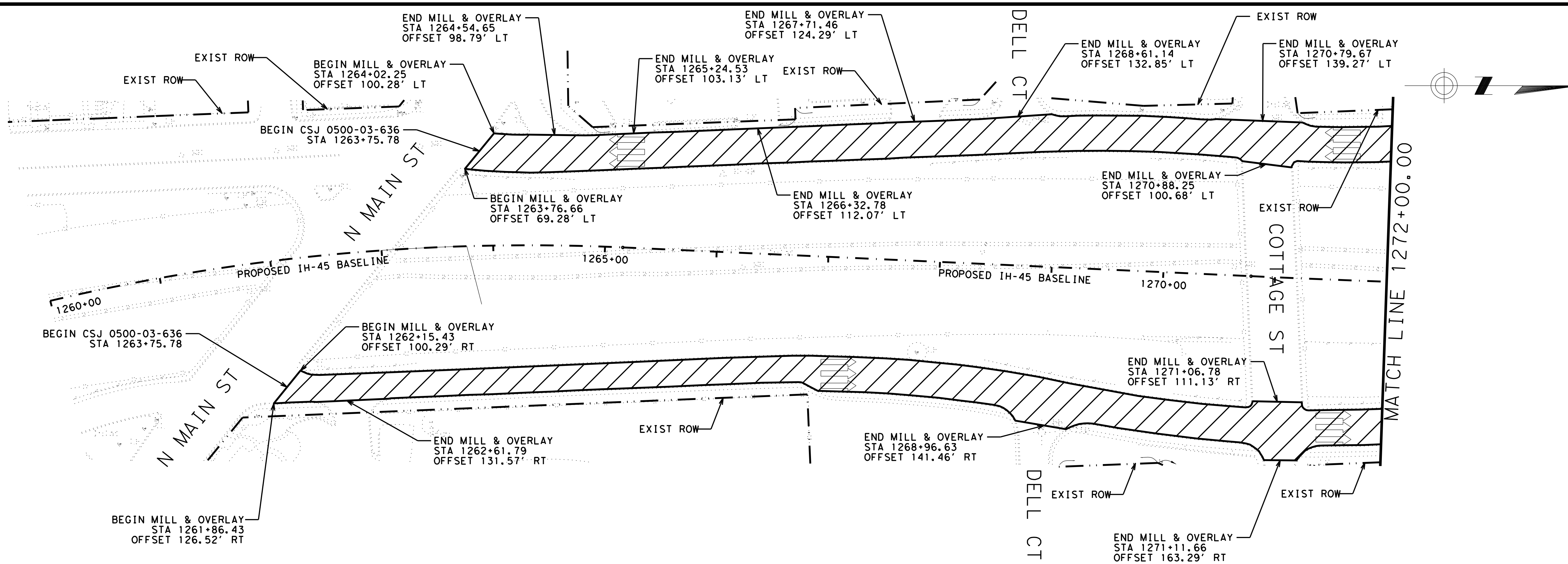
Traffic Operations Division Standard

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	0500	03	635,ETC.	IH 45
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	HOU	HARRIS		77

DATE:
FILE:



ITEM NO.	DESCRIPTION	UNIT	QUANTITY
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316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC B)	CY	61
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	506
3085-6001	UNDERSEAL COURSE	GAL	1962

LEGEND:

MILL & OVERLAY

DIRECTION OF TRAFFIC FLOW

NOTES:

1. AS NEEDED, PERFORM FULL DEPTH REPAIR (9" JRCP) AND FLEXIBLE PAVEMENT REPAIR (8"-10"). TO BE LOCATED BY THE ENGINEER IN THE FIELD.

STATE OF TEXAS MICKEY N. BONNER III 145663 LICENSED PROFESSIONAL ENGINEER

4/22/2024

0 50 100 HORIZ SCALE IN FEET

IH-45
N MAIN ST
TO LINK RD
ROADWAY
LAYOUT
SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST		COUNTY	SHEET NO.
HOU		HARRIS	78

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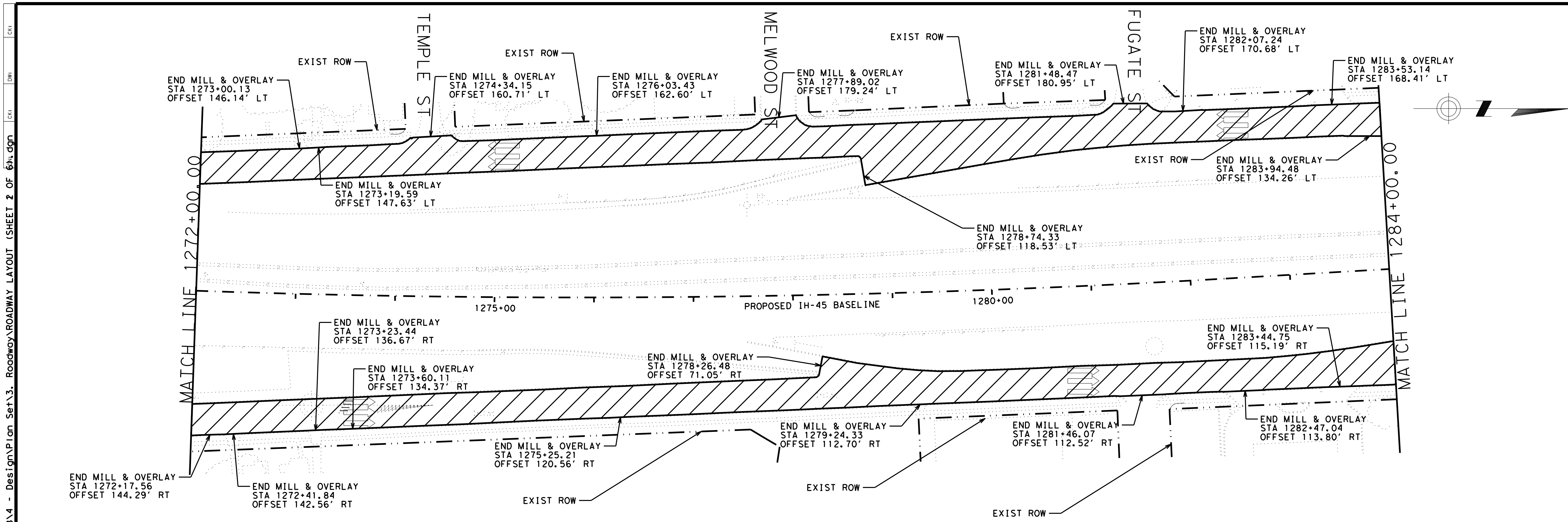

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
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3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	753
3085-6001	UNDERSEAL COURSE	GAL	2920

LEGEND:

MILL & OVERLAY

DIRECTION OF TRAFFIC FLOW

NOTES:

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0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY N. BONNER III
145663
REGISTERED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
N MAIN ST TO LINK RD
ROADWAY LAYOUT

SHEET 2 OF 6

®2024 Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST		COUNTY	SHEET NO.
HOU		HARRIS	79

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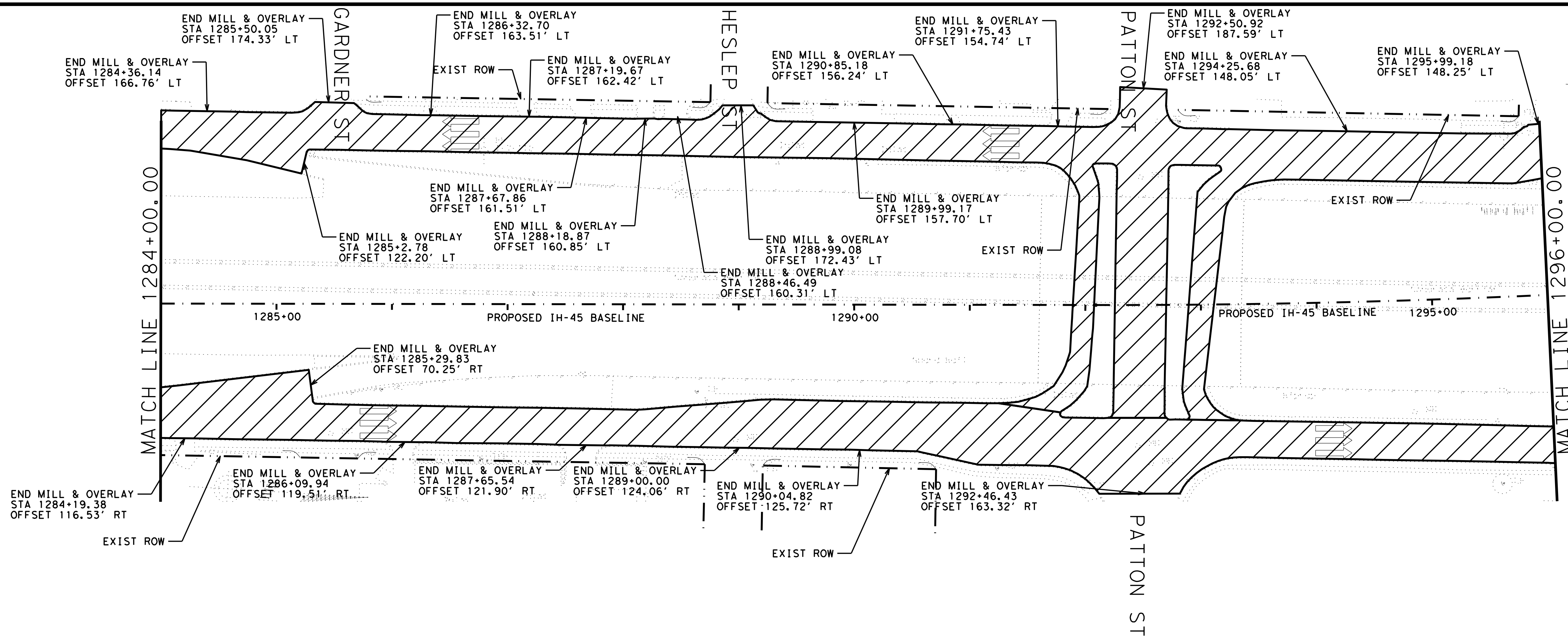

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316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC B)	CY	125
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	1031
3085-6001	UNDERSEAL COURSE	GAL	3997

LEGEND:

MILL & OVERLAY

DIRECTION OF TRAFFIC FLOW

NOTES:

1. AS NEEDED, PERFORM FULL DEPTH REPAIR (9" JRCP) AND FLEXIBLE PAVEMENT REPAIR (8"-10"). TO BE LOCATED BY THE ENGINEER IN THE FIELD.

STATE OF TEXAS
MICKEY N. BOWNER III
145663
LICENSED
PROFESSIONAL ENGINEER

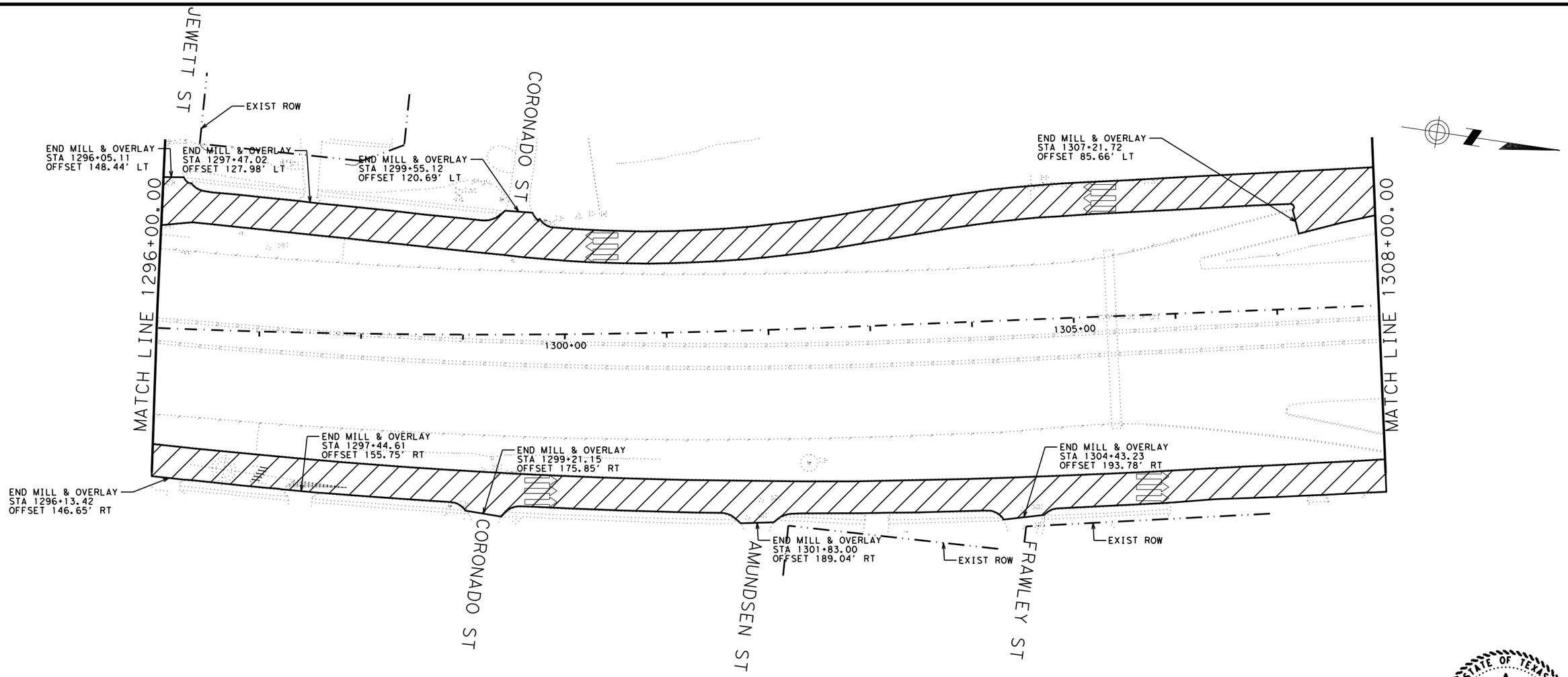
Mickey Bowner III
4/22/2024

0 50 100 HORIZ
SCALE IN FEET

IH-45
N MAIN ST
TO LINK RD
ROADWAY
LAYOUT
SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST		COUNTY	SHEET NO.
HOU		HARRIS	80



ITEM NO.	DESCRIPTION	UNIT	QUANTITY
305-6015	SALV HAUL & STKPL RCL APH PV (1 1/2")	SY	8867
316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC B)	CY	89
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	731
3085-6001	UNDERSEAL COURSE	GAL	2837

LEGEND:

MILL & OVERLAY

DIRECTION OF TRAFFIC FLOW

NOTES:

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0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER
4/22/2024

IH-45
N MAIN ST
TO LINK RD
ROADWAY
LAYOUT

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		81

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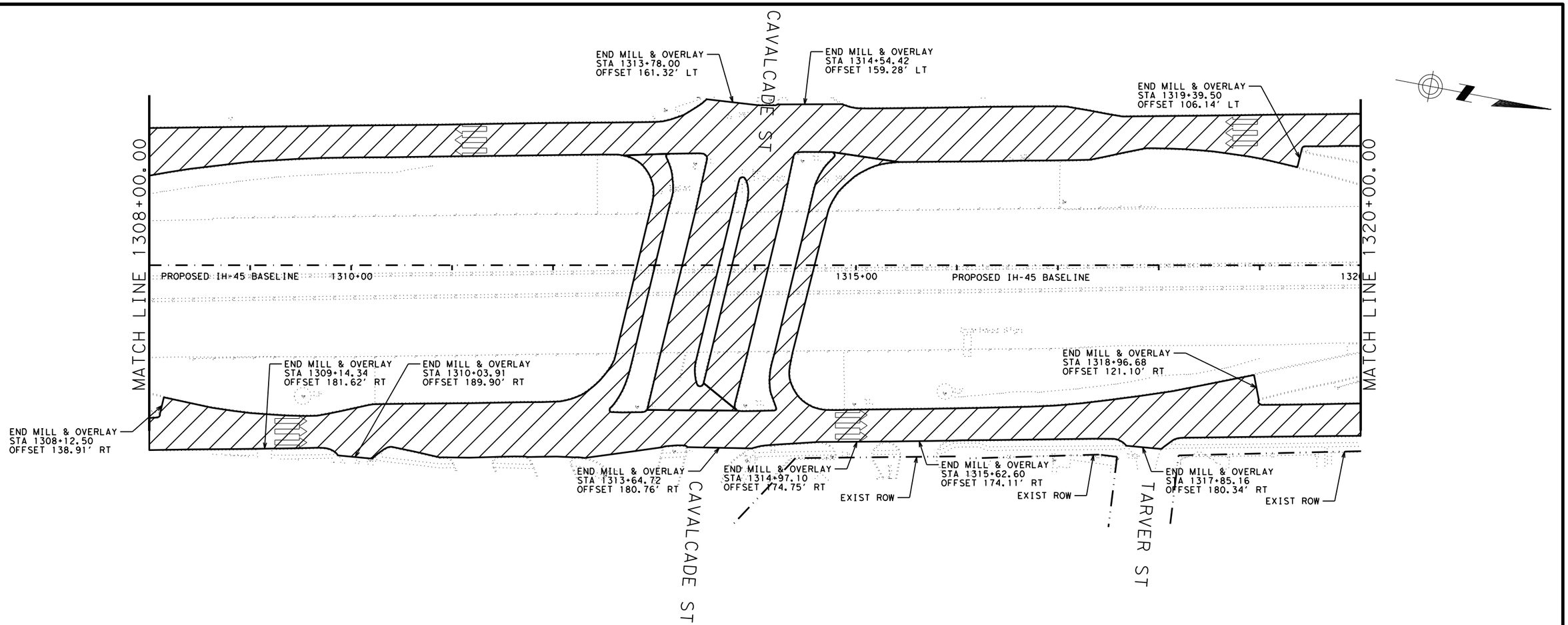

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3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	1165
3085-6001	UNDERSEAL COURSE	GAL	4517

LEGEND:

MILL & OVERLAY

DIRECTION OF TRAFFIC FLOW

NOTES:

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0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

4/22/2024

IH-45
N MAIN ST
TO LINK RD
ROADWAY
LAYOUT

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		82

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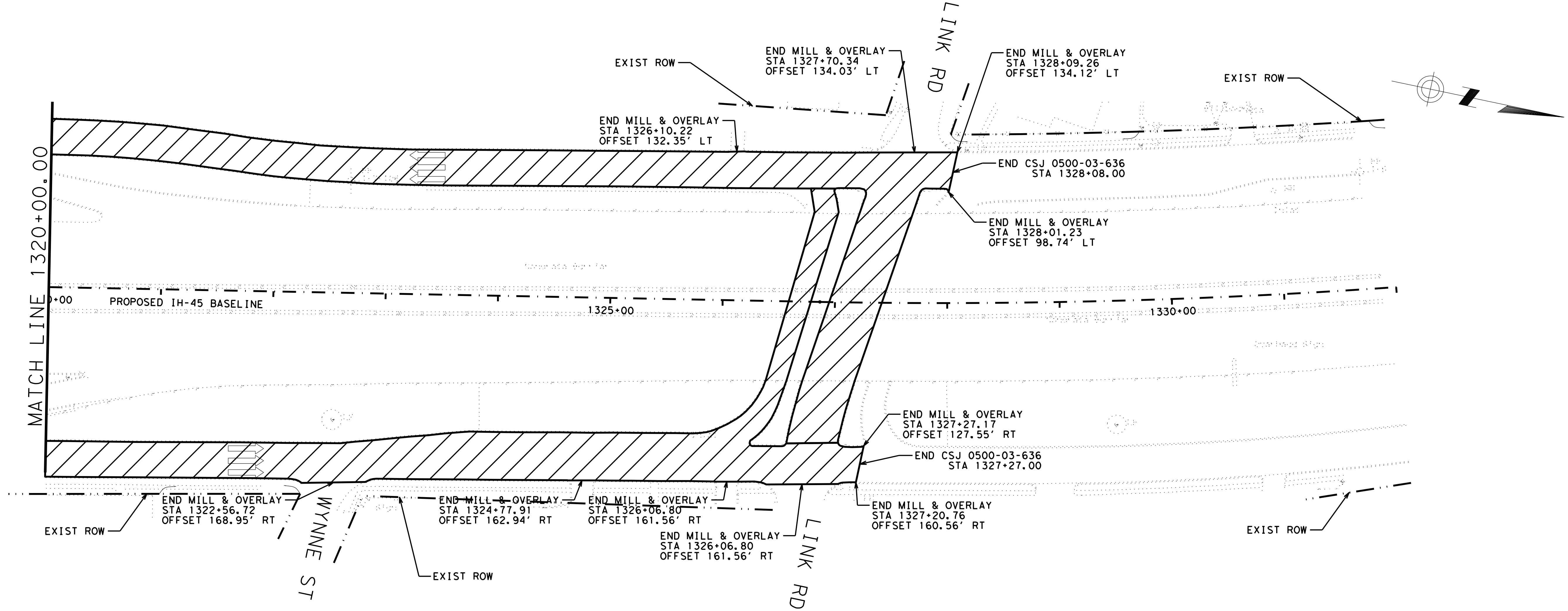

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316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC B)	CY	75
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	621
3085-6001	UNDERSEAL COURSE	GAL	2410

LEGEND:

MILL & OVERLAY

DIRECTION OF TRAFFIC FLOW

NOTES:

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0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY N. BONNER III
145663
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4/22/2024

IH-45
N MAIN ST TO LINK RD ROADWAY LAYOUT

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST		COUNTY	SHEET NO.
HOU		HARRIS	83

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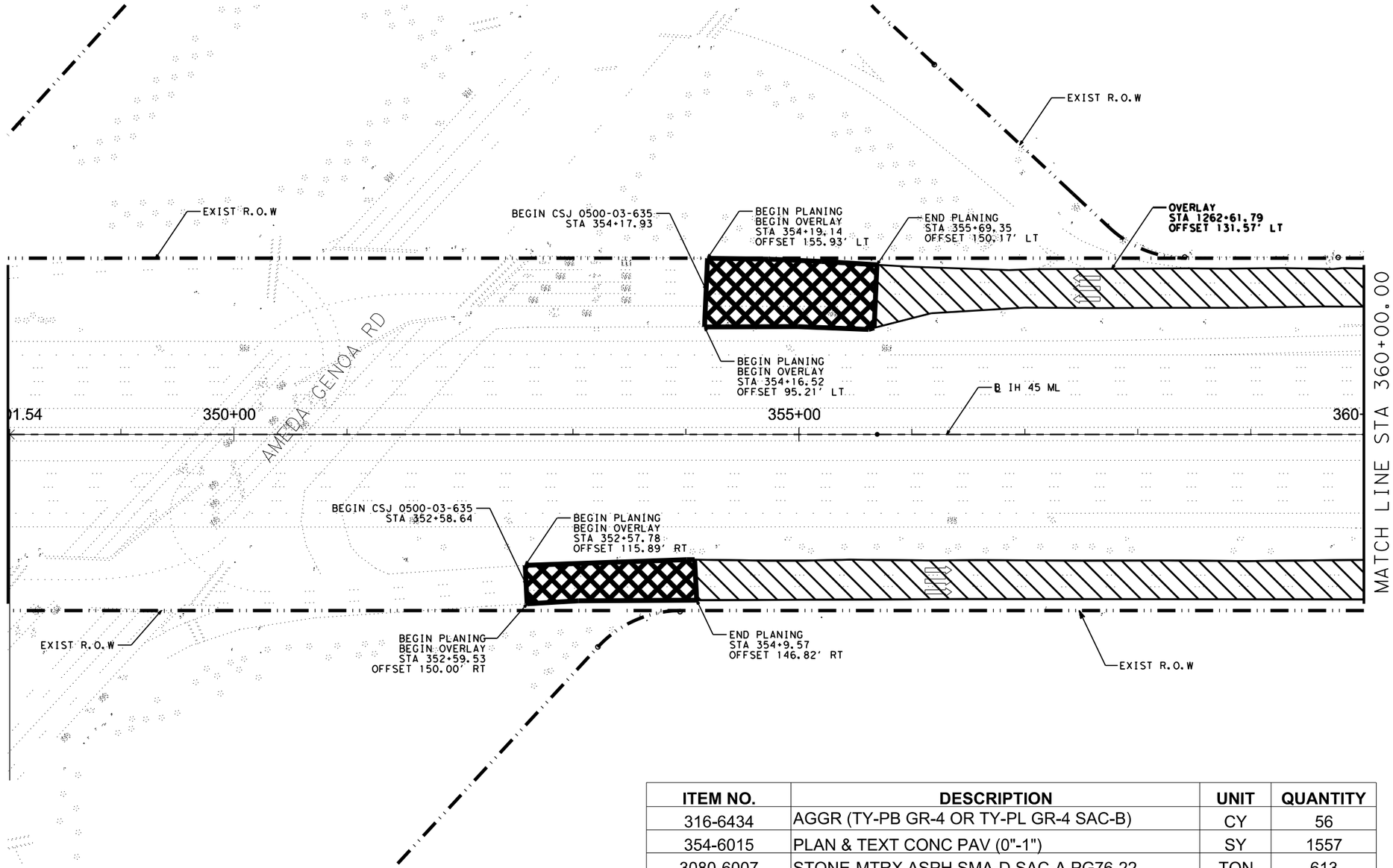

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC-B)	CY	56
354-6015	PLAN & TEXT CONC PAV (0"-1")	SY	1557
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	613
3085-6001	UNDERSEAL COURSE	GAL	1784
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	861

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 1 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		84

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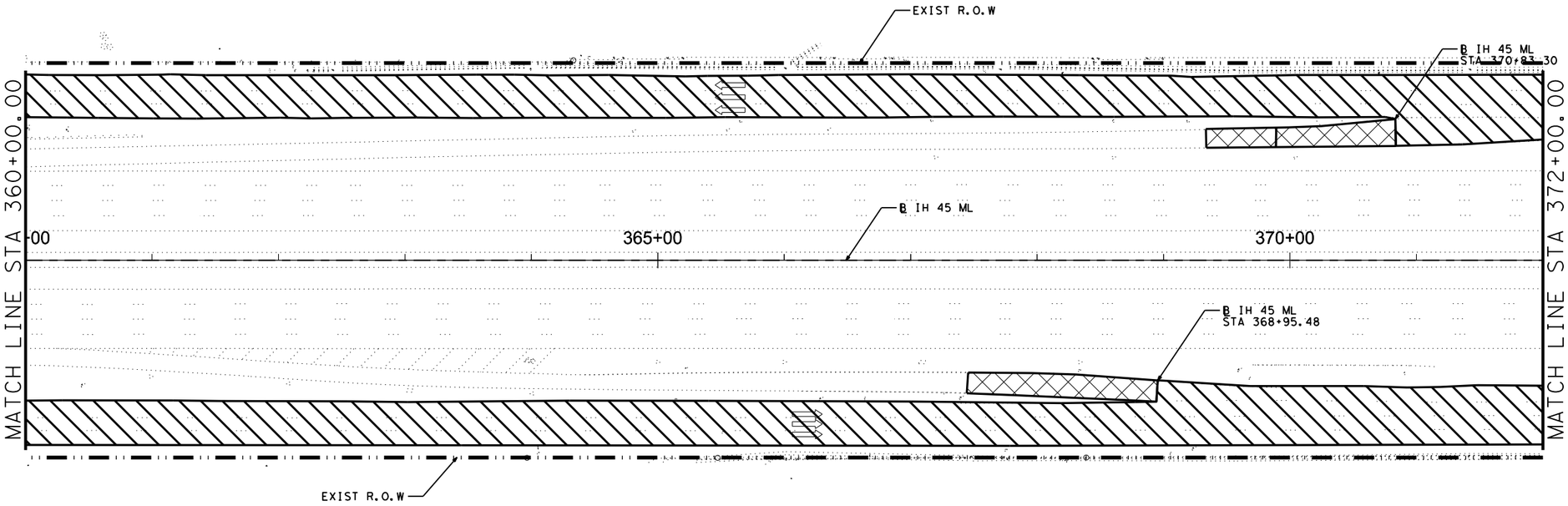

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354-6015	PLAN & TEXT CONC PAV (0-1")	SY	573
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	1139
3085-6001	UNDERSEAL COURSE	GAL	3314
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1591

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY M. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 2 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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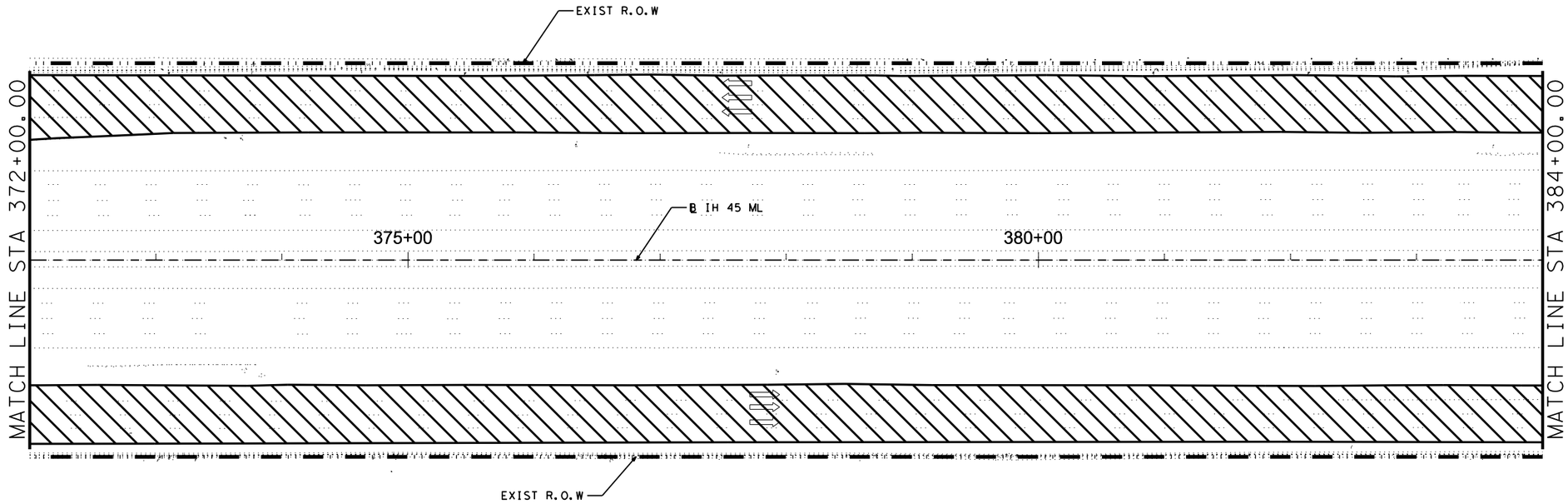

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3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	1334
3085-6001	UNDERSEAL COURSE	GAL	3882
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1983

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY M. BONNER III
145663
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PROFESSIONAL ENGINEER
4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 3 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		86

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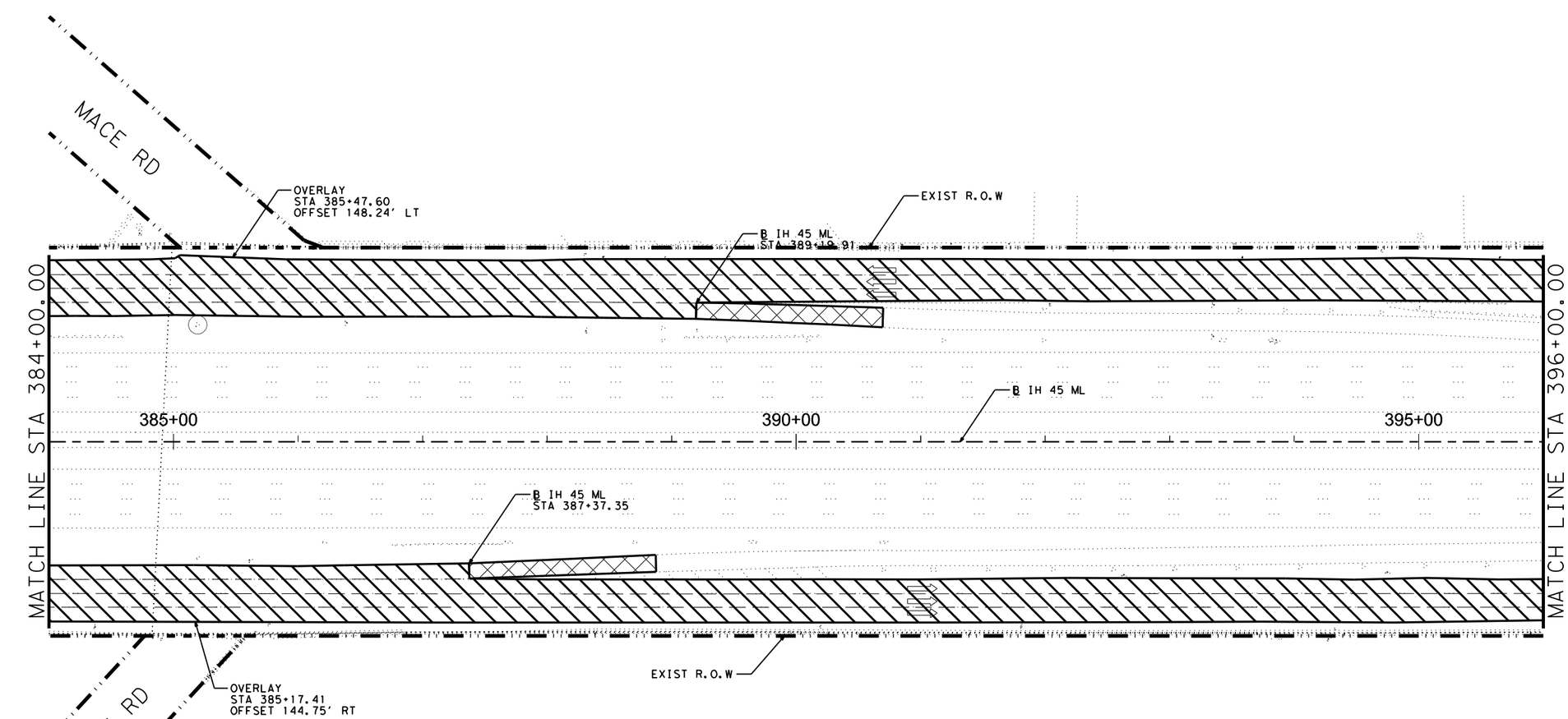

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
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354-6015	PLAN & TEXT CONC PAV (0-1")	SY	454
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	1177
3085-6001	UNDERSEAL COURSE	GAL	3424
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1678

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH
HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY M. BONNER III
145663
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Mickey Bonner III
4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 4 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
HOU	HARRIS		87

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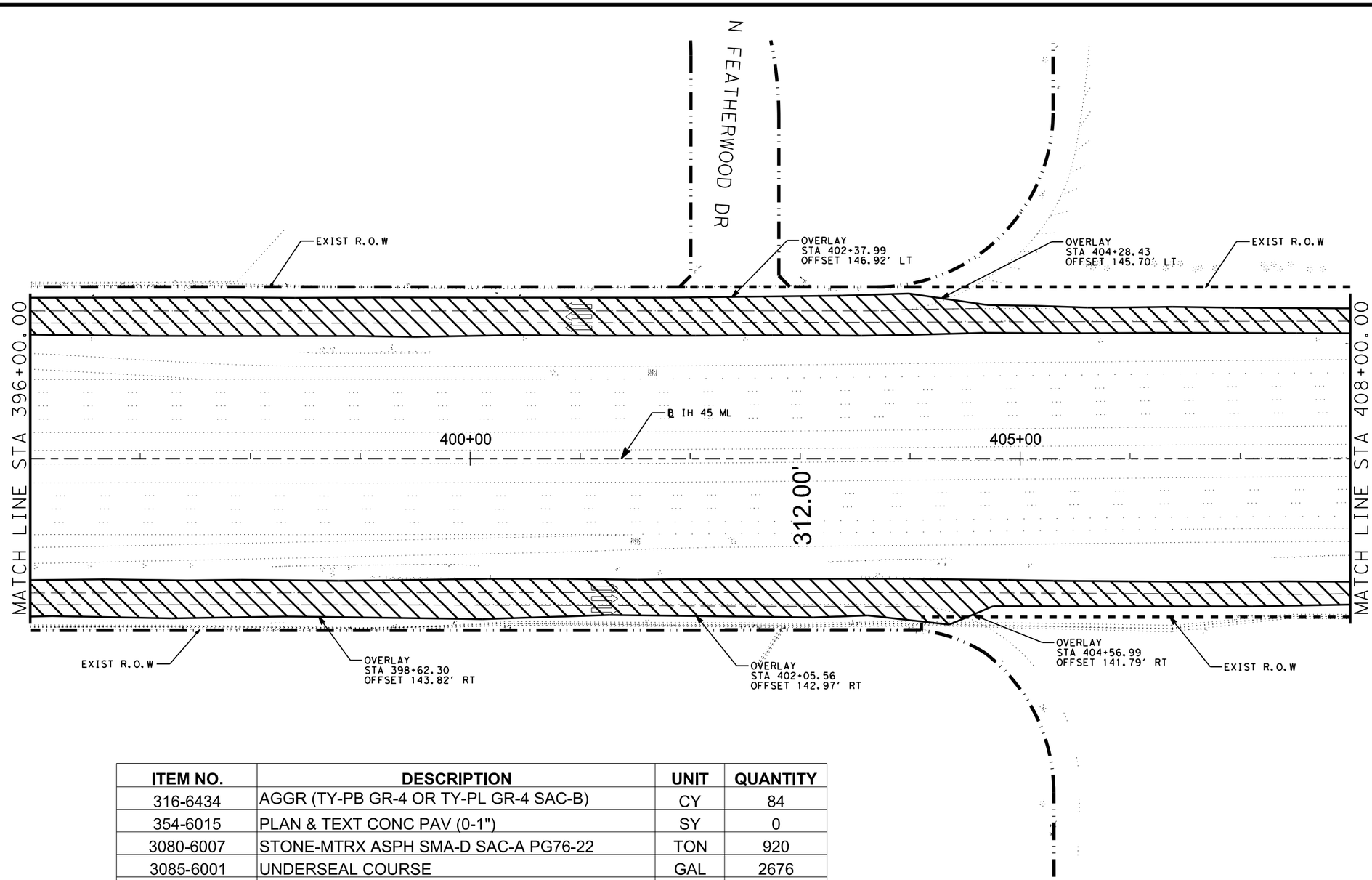

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
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3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	920
3085-6001	UNDERSEAL COURSE	GAL	2676
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1356

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

STATE OF TEXAS
MICKEY N. BONNER III
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LICENSED
PROFESSIONAL ENGINEER

4/22/2024

IH-45
ALMEDA-GENOA TO SL8 ROADWAY LAYOUT

SHEET 5 OF 9

0 50 100 HORIZ
SCALE IN FEET

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		88

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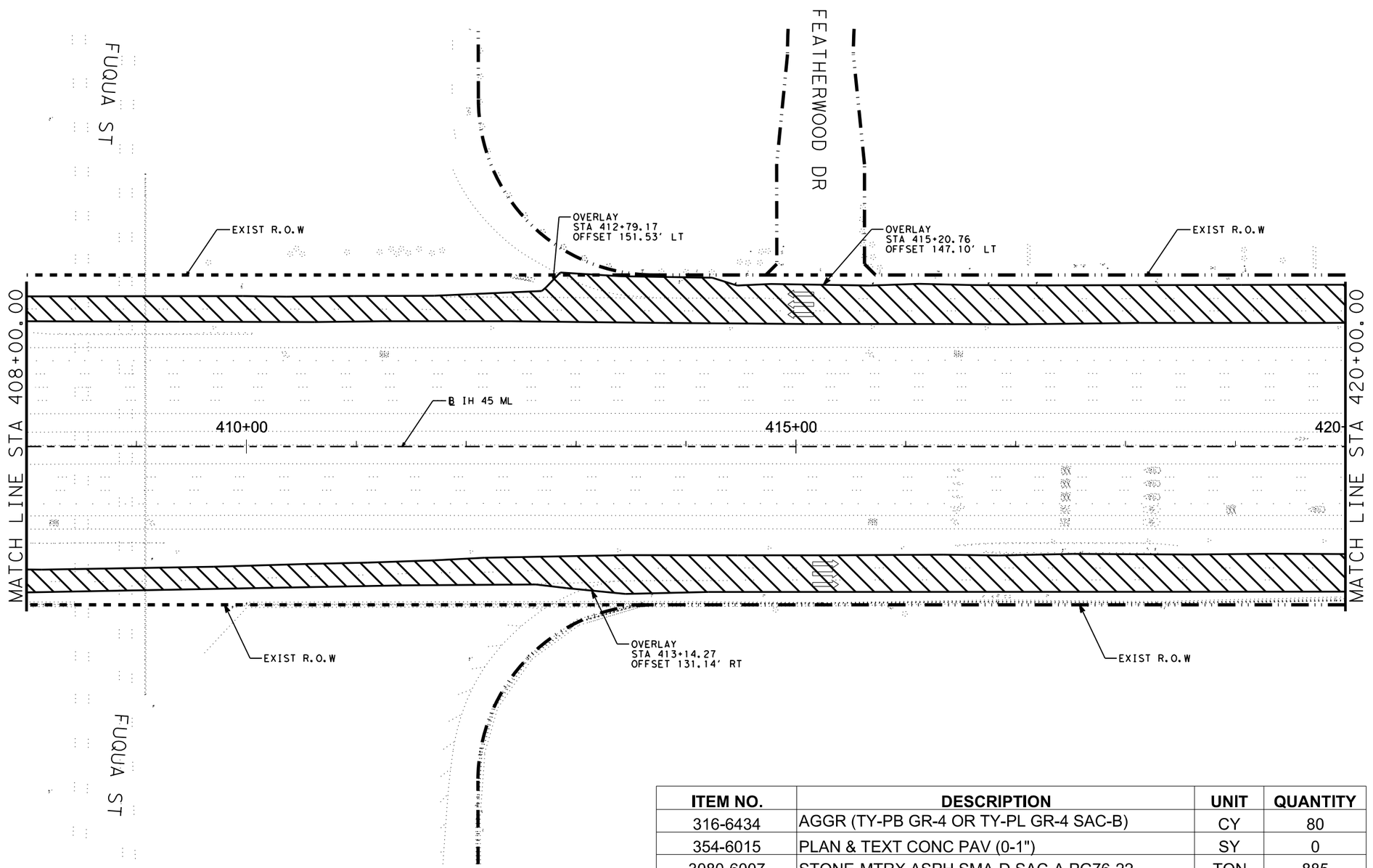

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC-B)	CY	80
354-6015	PLAN & TEXT CONC PAV (0-1")	SY	0
3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	885
3085-6001	UNDERSEAL COURSE	GAL	2575
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1306

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
NICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Nickey Bonner III
4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 6 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		89

DATE: 04/17/2024 10:03 AM
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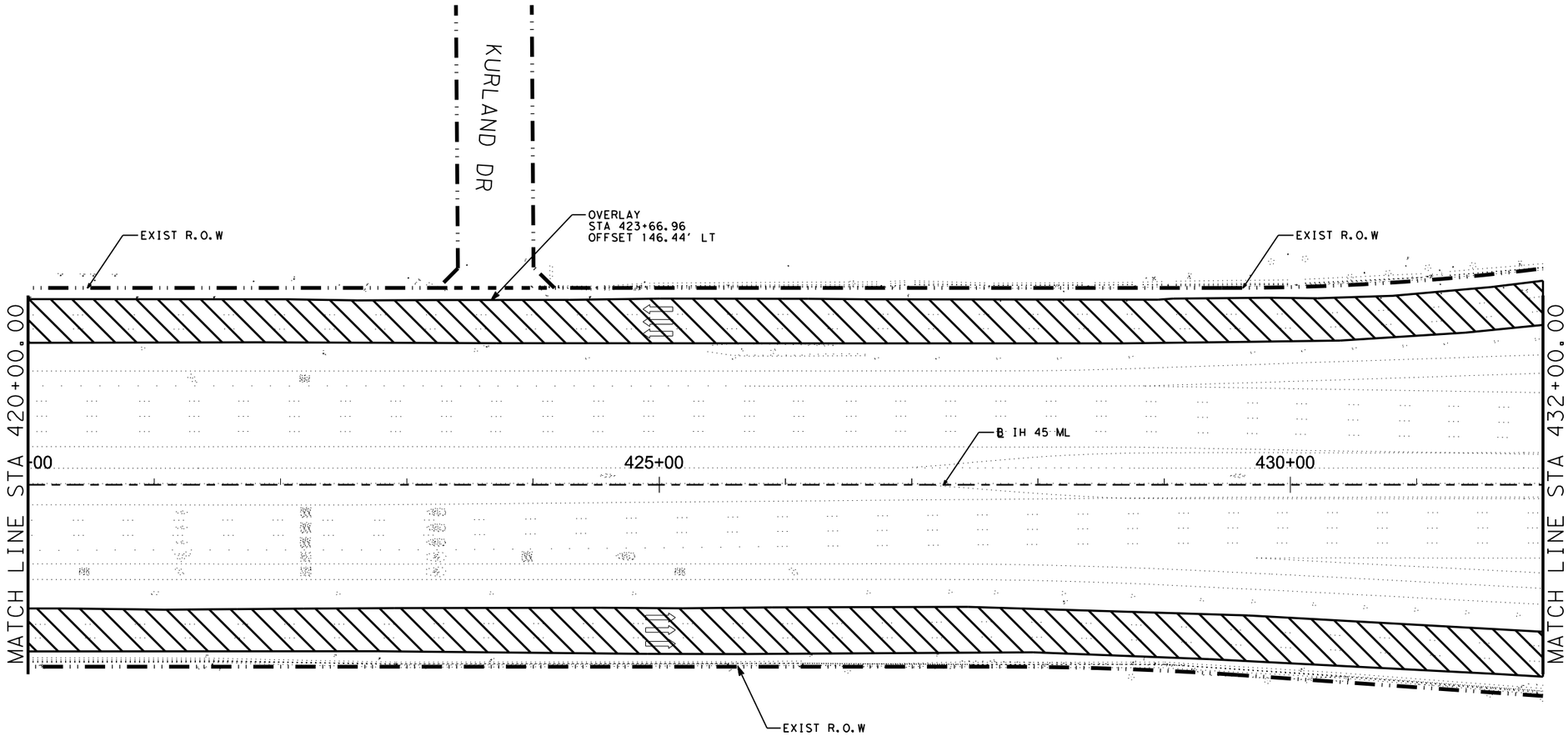

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC-B)	CY	93
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3085-6001	UNDERSEAL COURSE	GAL	2974
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1507

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY N. BONNER III
145663
LICENSED
PROFESSIONAL ENGINEER

Mickey Bonner III
4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 7 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		90

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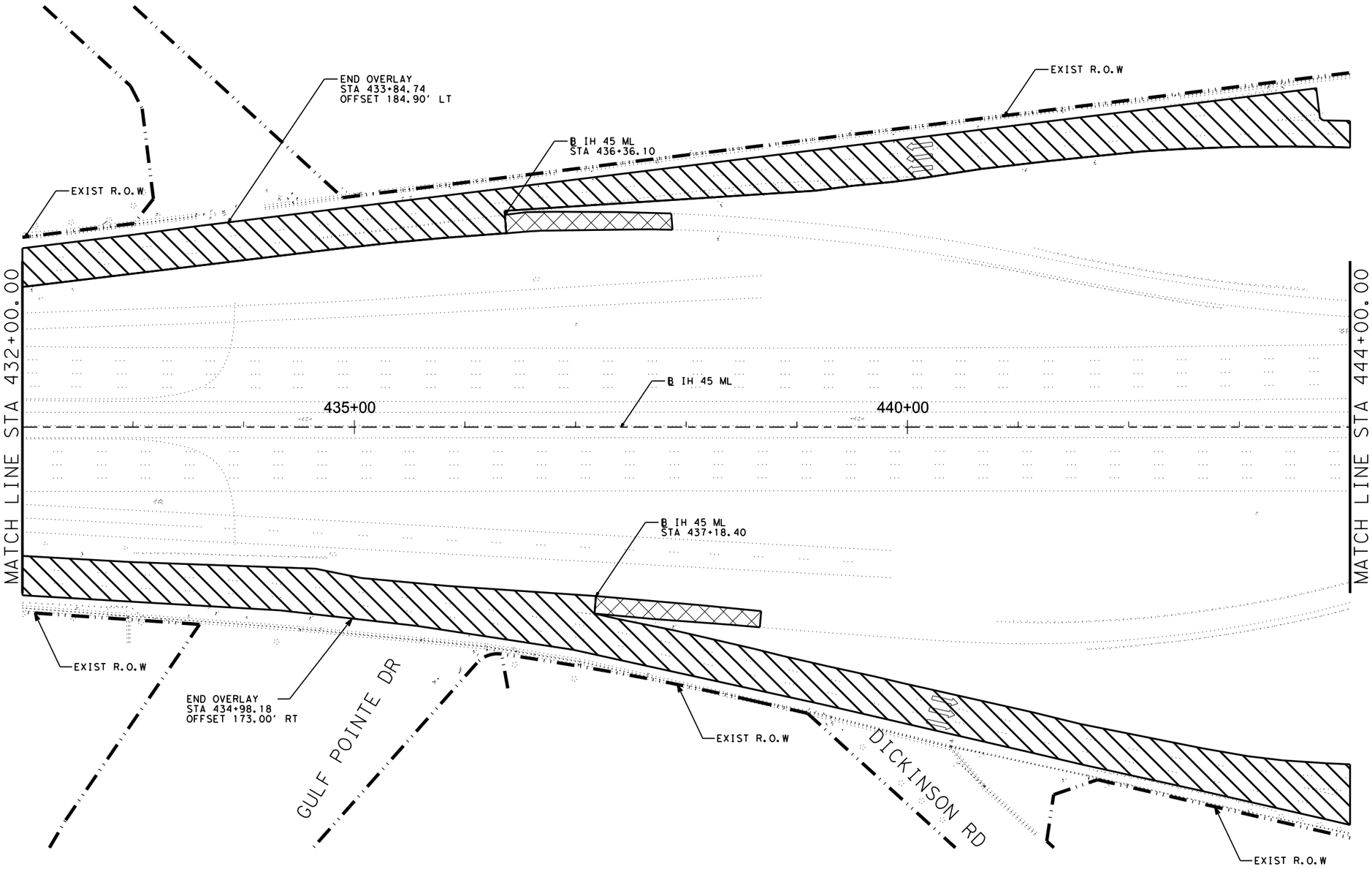

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
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3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	1148
3085-6001	UNDERSEAL COURSE	GAL	3339
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	1524

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
MICKEY N. BOMMER III
145663
LICENSED
PROFESSIONAL ENGINEER

4/22/2024

IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 8 OF 9

®2024
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		91

DATE: 04/17/2024 09:50 AM
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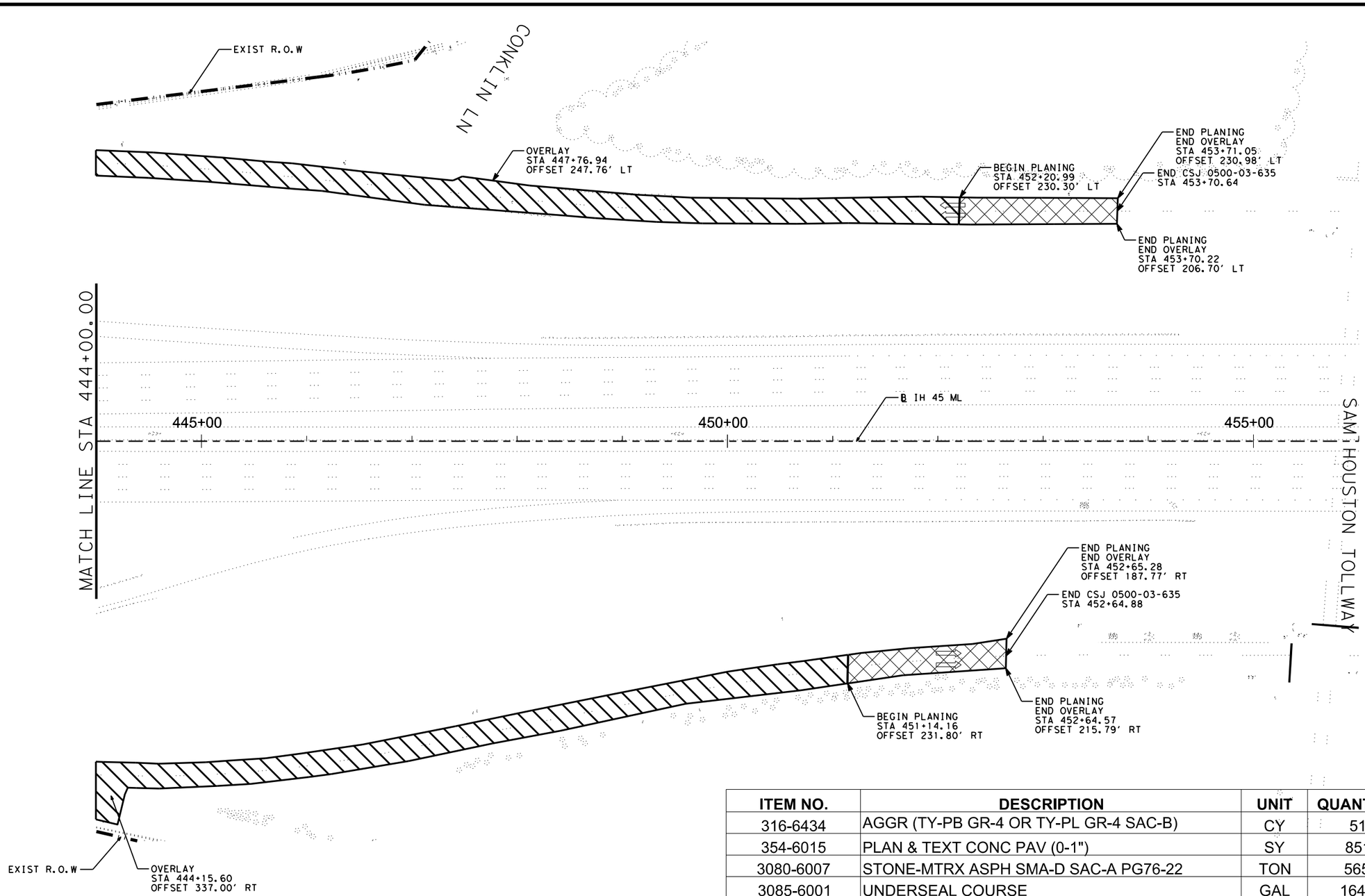

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
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3080-6007	STONE-MTRX ASPH SMA-D SAC-A PG76-22	TON	565
3085-6001	UNDERSEAL COURSE	GAL	1642
438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	736

LEGEND:

PROPOSED SEAL COAT AND 2" HOT MIX ASPHALT CONCRETE OVERLAY

THE PROPOSED 0" TO 1" PLANING TO BE FILLED WITH HOT MIX ASPHALT CONCRETE OVERLAY AND SEAL COAT

DIRECTION OF TRAFFIC FLOW

0 50 100 HORIZ
SCALE IN FEET

STATE OF TEXAS
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IH-45
ALMEDA-GENOA
TO SL8
ROADWAY
LAYOUT

SHEET 9 OF 9

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		92

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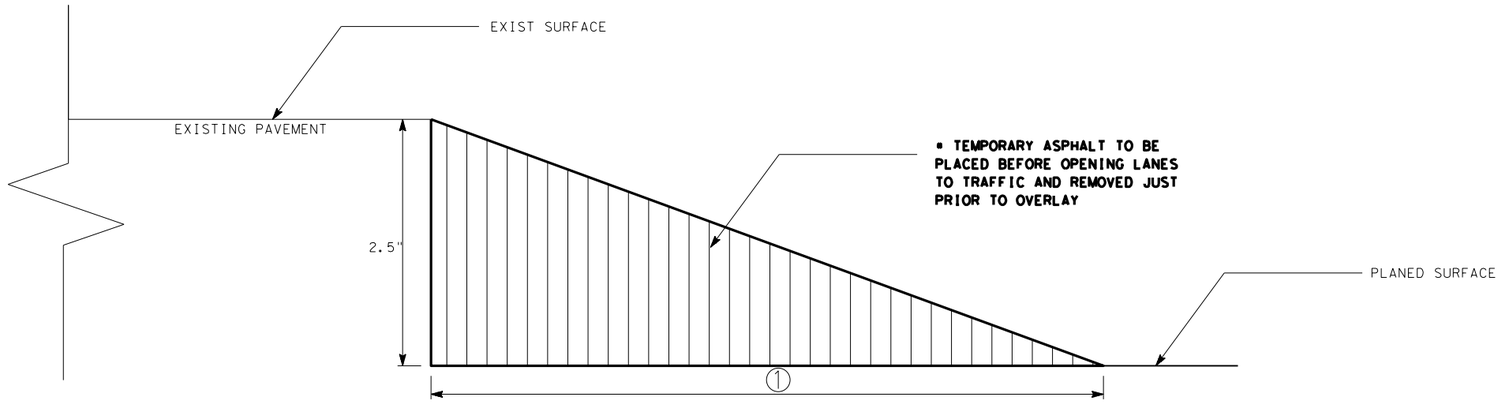
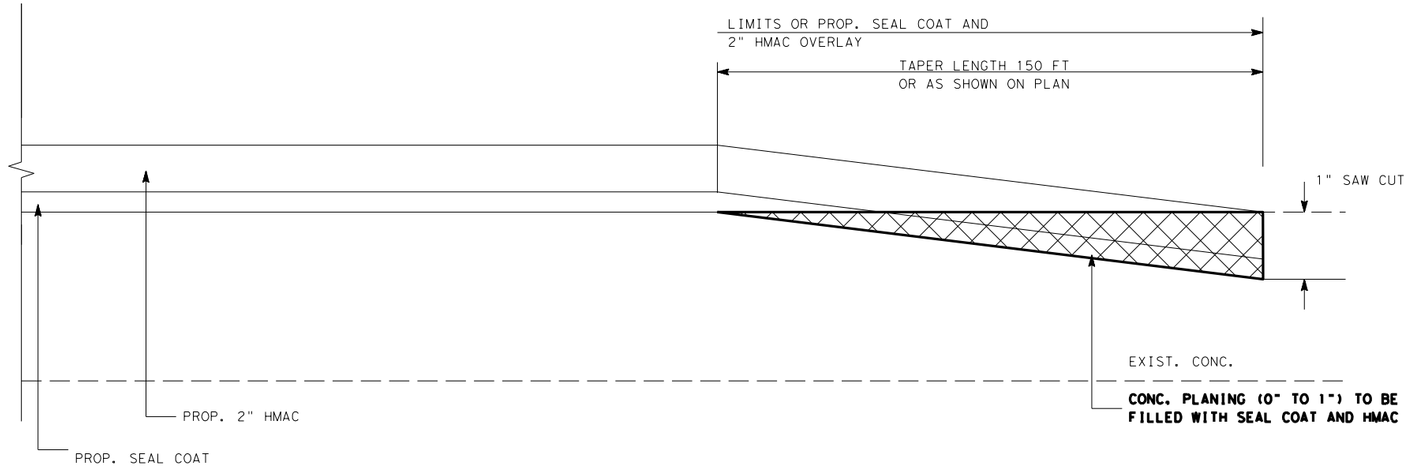


① ACROSS FLOW OF TRAFFIC: 2.5 FT (1 FT PER 1 IN)
ALONG FLOW OF TRAFFIC: 25FT (10FT PER 1 IN)

* THIS WORK WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PLANING BID ITEMS.

DETAIL 'A' - TEMPORARY ASPHALT DETAIL
N.T.S.



DETAIL 'B' - SURFACE TAPER (BEGINNING AND END)

NOTE:

1. MILLING OPERATION SHOULD NOT EXPOSE REINFORCING STEEL ESPECIALLY AT THE END OF TRANSITION WHERE MILLING DEPTH IS MAXIMUM.

2. SAW CUT IS SUBSIDIARY TO THE VARIOUS BID ITEMS

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IH-45
ROADWAY
DETAILS

N.T.S.
SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635,ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		93

DATE: 04/17/2024 03:20 PM
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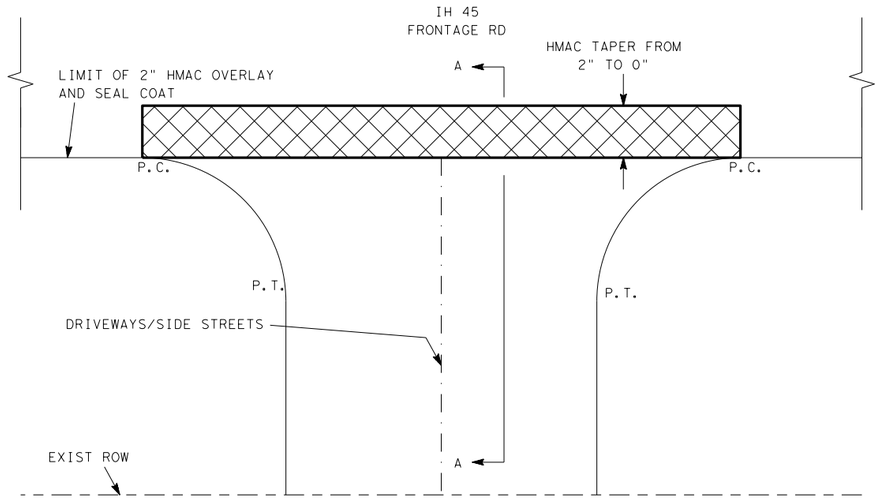
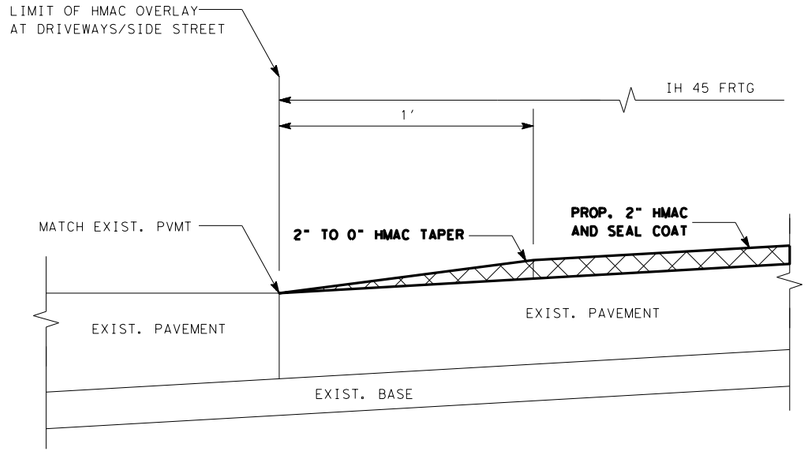
DETAIL 'C'

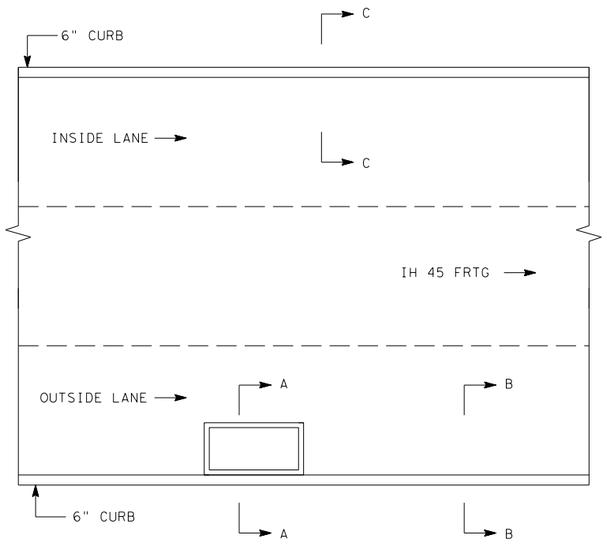


TAPER DETAILS
AT DRIVEWAYS/SIDE STREETS

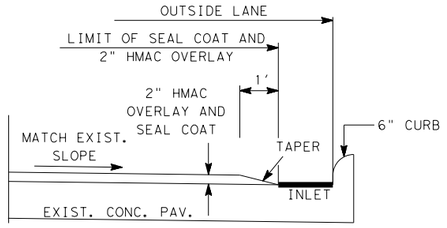


SECTION A-A
AT DRIVEWAYS/SIDESTREETS

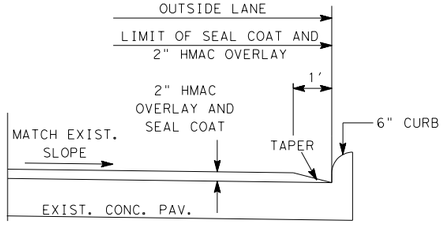
DETAIL 'D'



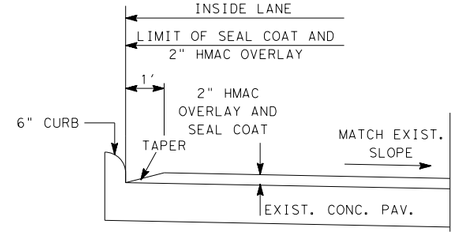
TAPER DETAILS
AT CURB AND INLETS



SECTION A-A



SECTION B-B



SECTION C-C

NOTE:

1. HAND FINISH OVERLAY AROUND INLET DRAINING OPENINGS

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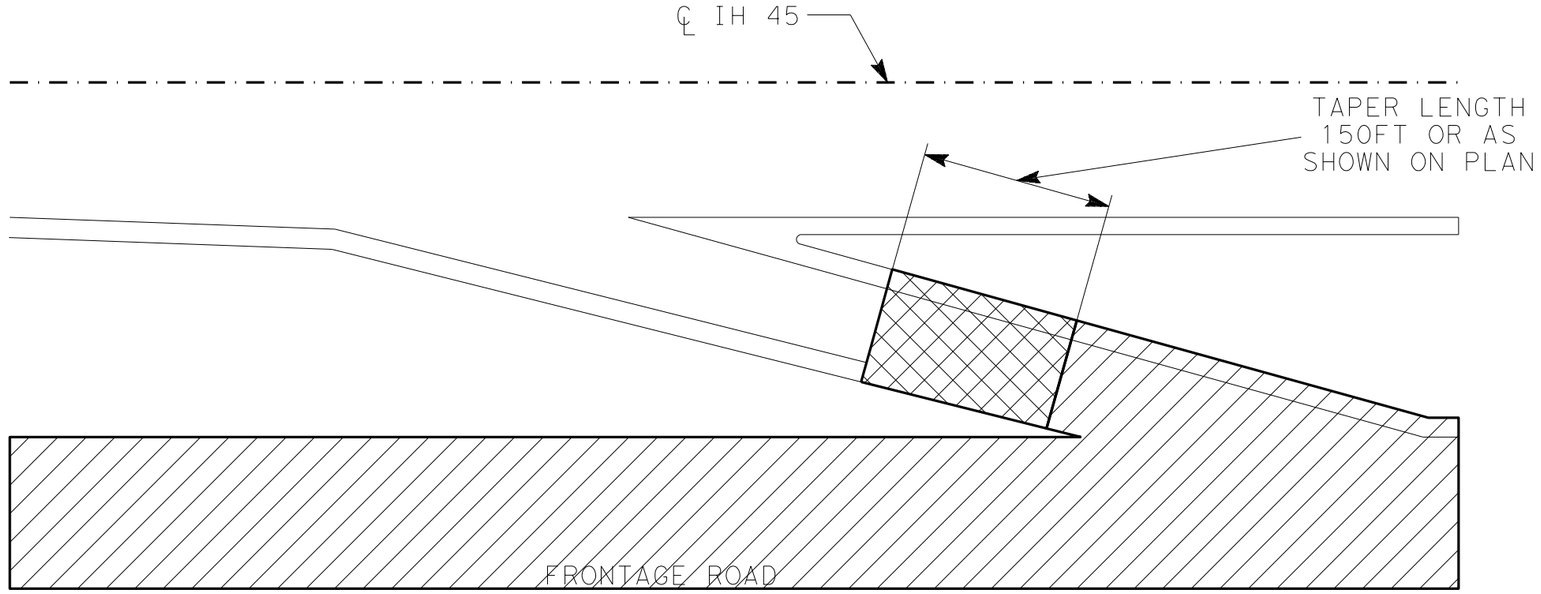
IH-45
ROADWAY
DETAILS

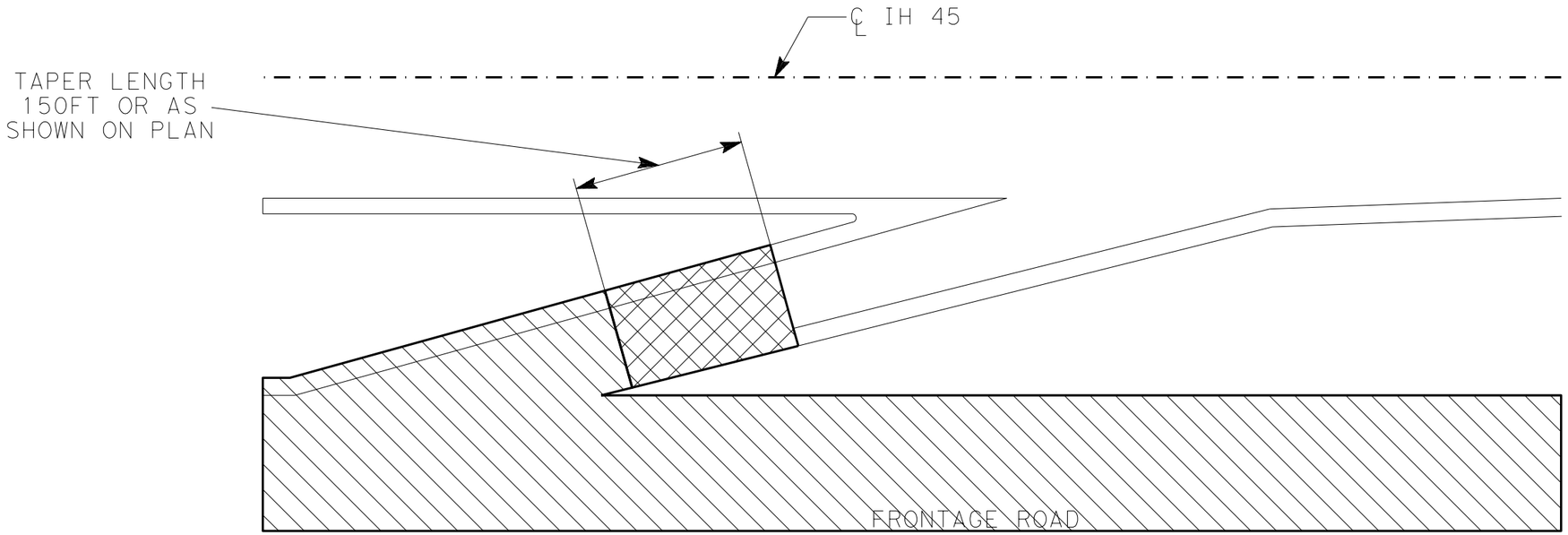
N. T. S.

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		93A





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4/22/2024

IH-45
ROADWAY
DETAILS

DETAIL 'E' - EXIT/ENTRANCE RAMP HMA OVERLAY DETAILS

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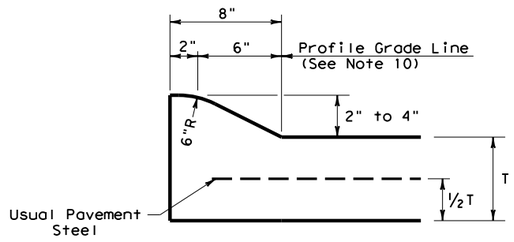
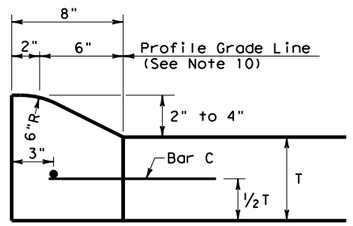
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		93B

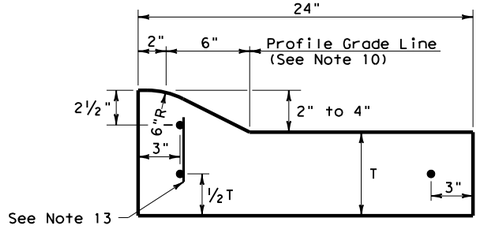
DATE:
FILE:



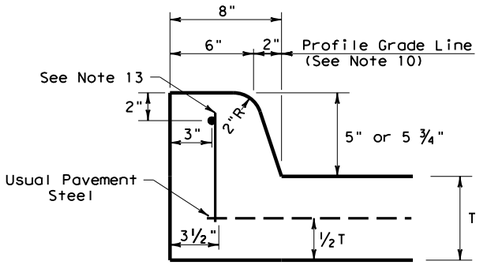
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



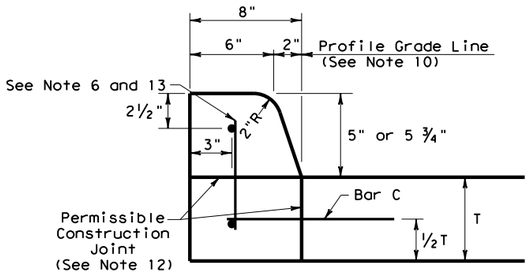
TYPE I CURB
2" - 4" HEIGHT



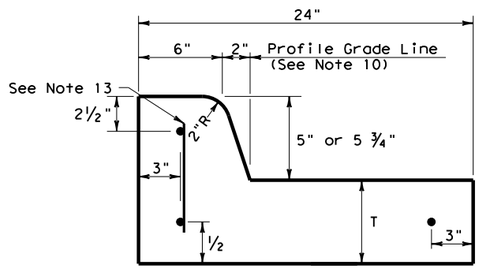
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



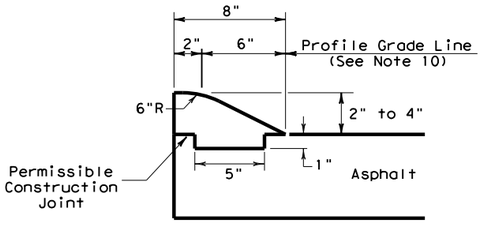
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



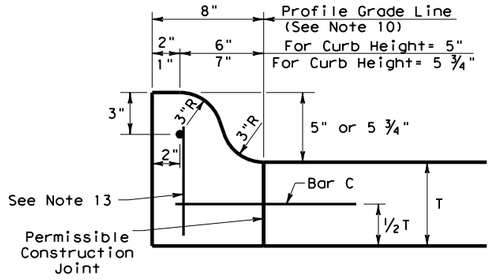
TYPE II CURB
5" - 5 ¾" HEIGHT



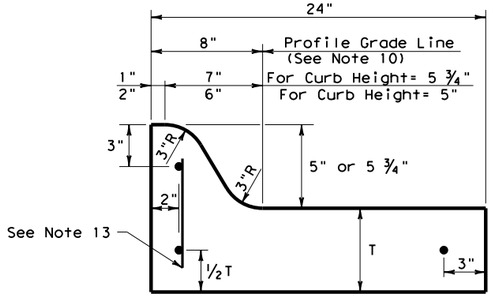
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



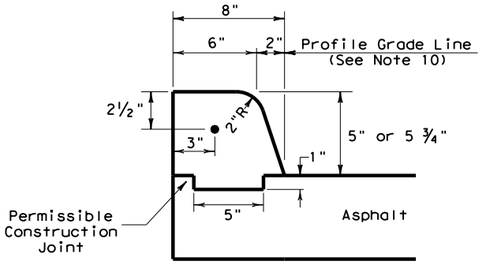
TYPE III CURB (KEYED)
2" - 4" HEIGHT



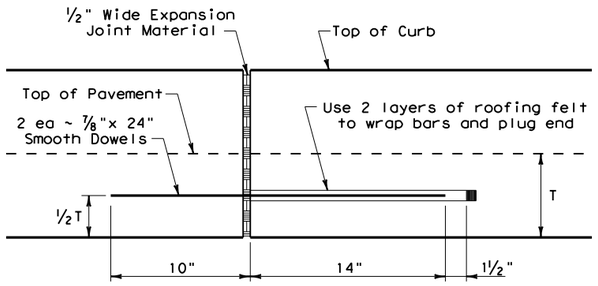
TYPE IIa CURB
5" - 5 ¾" HEIGHT



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

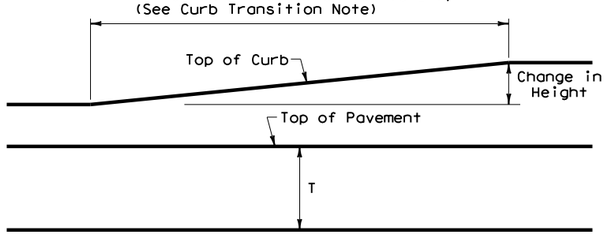


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

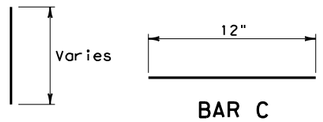
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



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 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 placement as needed (typically at four ft. C-C) 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-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		94

DATE:
FILE:

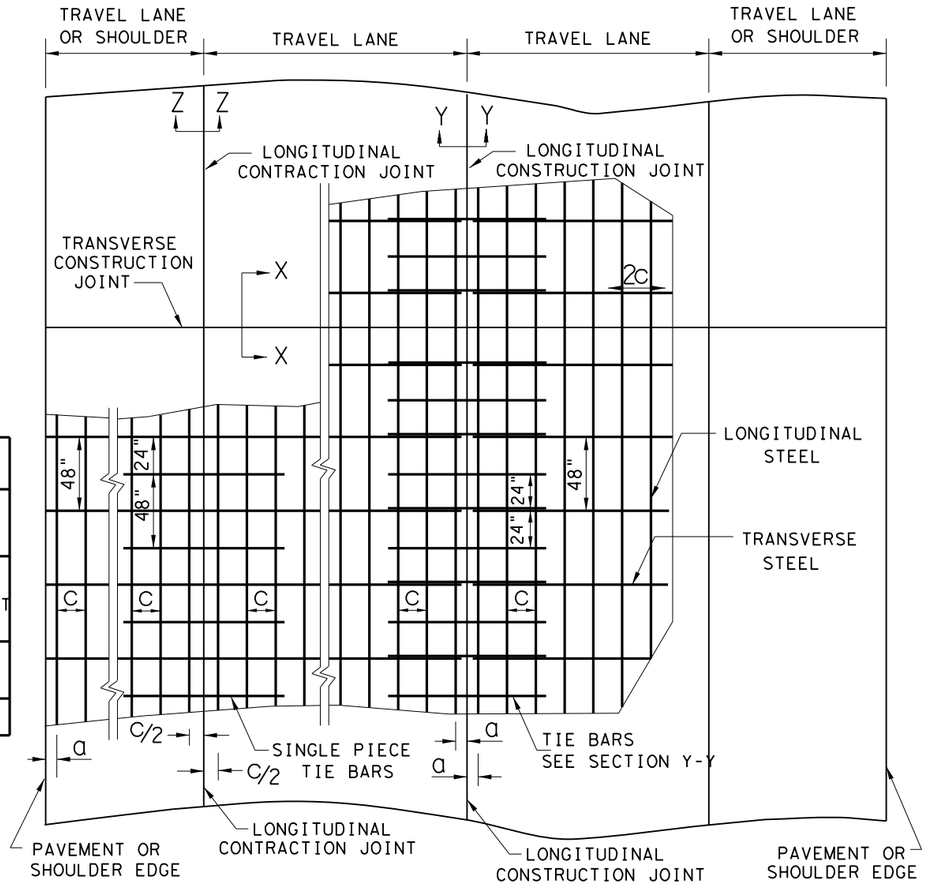
TABLE NO. 1 LONGITUDINAL STEEL

SLAB THICKNESS AND BAR SIZE		FOR BOTH STEEL MATS		LOWER STEEL MAT HEIGHT	TOP STEEL MAT HEIGHT
		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT		
T (IN.)	BAR SIZE	SPACING c (IN.)	SPACING a (IN.)	T1 (IN.)	T2 (IN.)
14	#6	9.5	3 TO 4	4.5	8.0
15	#6	8.5	3 TO 4	5.0	8.5

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS

SLAB THICKNESS T (IN.)	FOR BOTH STEEL MATS		FOR LOWER STEEL MAT ONLY		FOR BOTH STEEL MATS	
	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE*	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
14 - 15	#5	48	#6	48	#6	24

*CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE

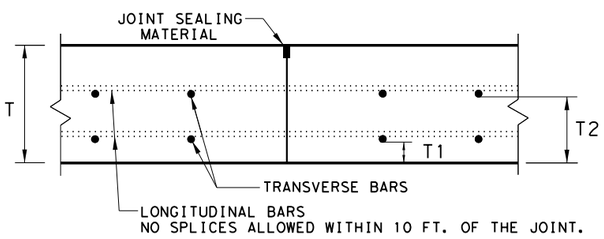


TYPICAL PAVEMENT LAYOUT

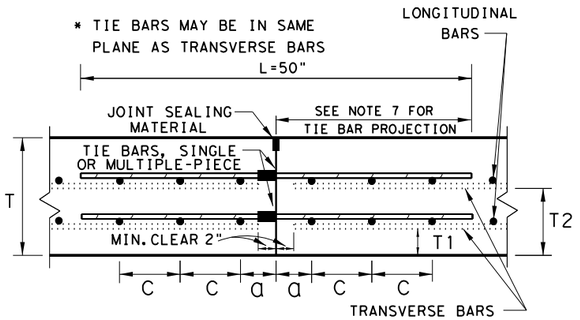
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

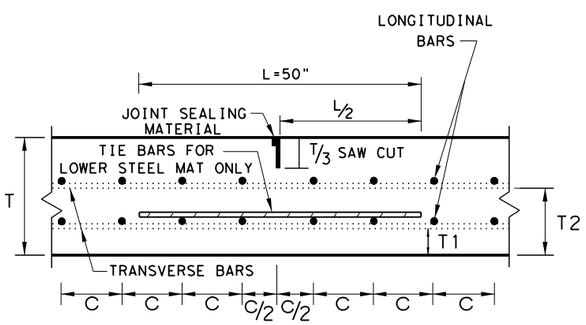
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS IN A SINGLE LAYER) SHALL CONFORM TO TABLE NO. 1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. for #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

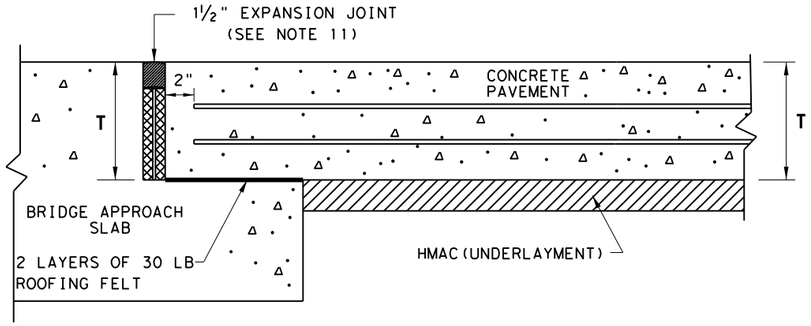
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

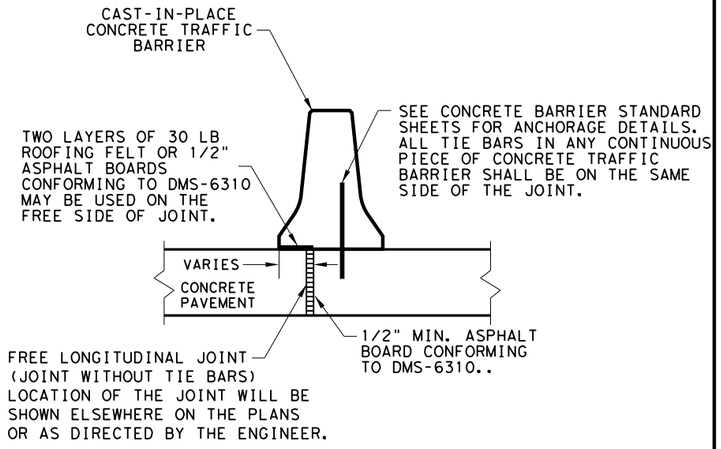
CRCP(2)-23

FILE: crcp223.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
APRIL 2023: REVISED ADDITIONAL TIEBAR AT TRANSVERSE CONSTRUCTION JOINTS	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		95

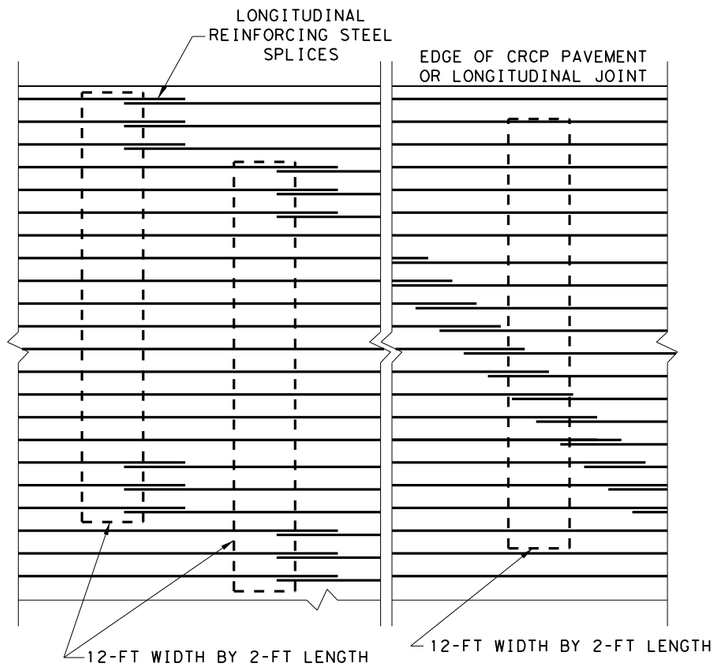
DATE:
FILE:



TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

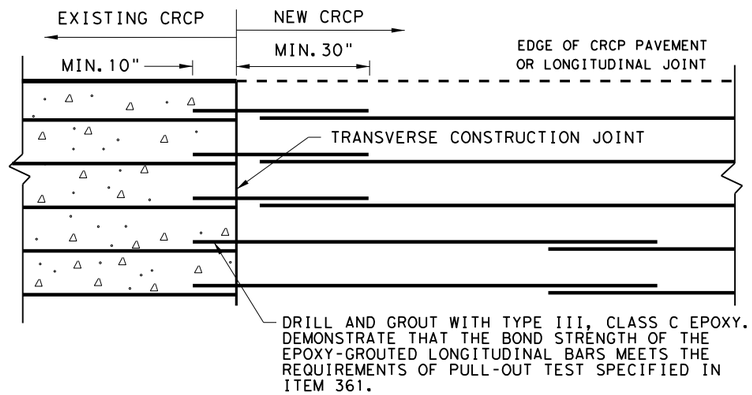


CENTERLINE FREE LONGITUDINAL JOINT DETAIL

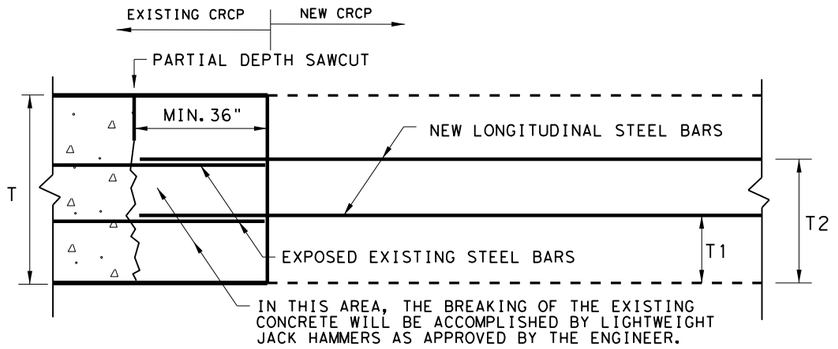


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)

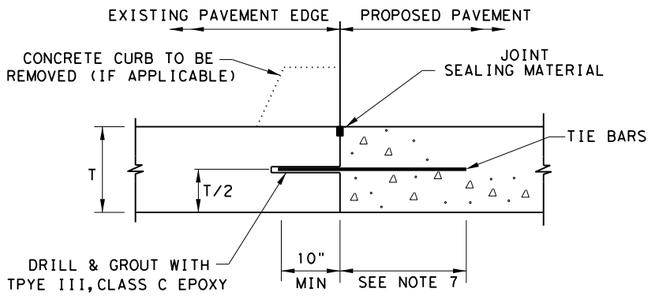


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP



1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING.

LONGITUDINAL WIDENING JOINT DETAIL

SHEET 2 OF 2

Texas Department of Transportation

Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

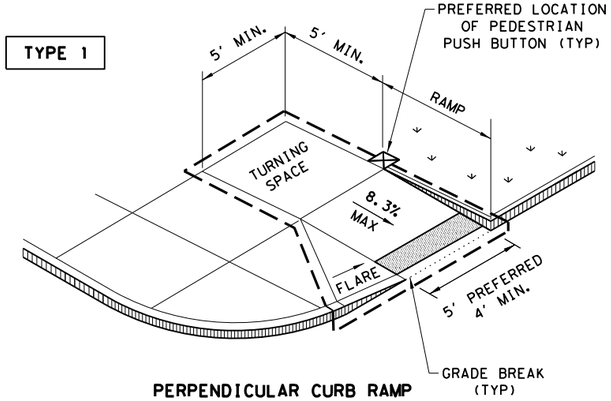
TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

CRCP(2)-23

FILE: crcp223.dgn	DN: TxDOT	CK: KM	DW: CES	CK:
©TxDOT: APRIL 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC.	IH 45
APRIL 2023: MODIFIED EXPANSION JOINT DETAIL AT BRIDGE APPROACH SLAB	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		96

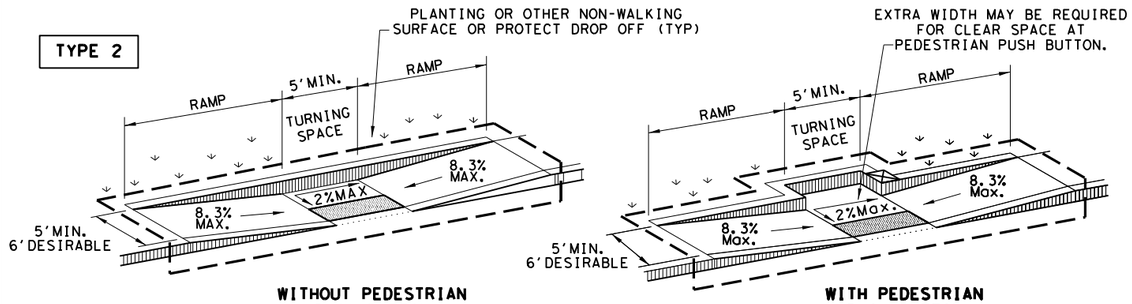
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

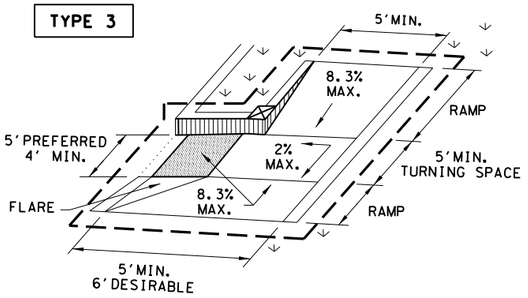


WITHOUT PEDESTRIAN PUSH BUTTON

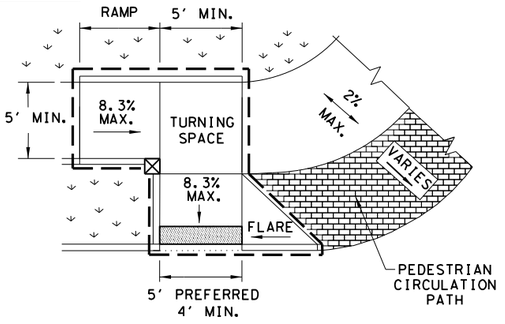
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

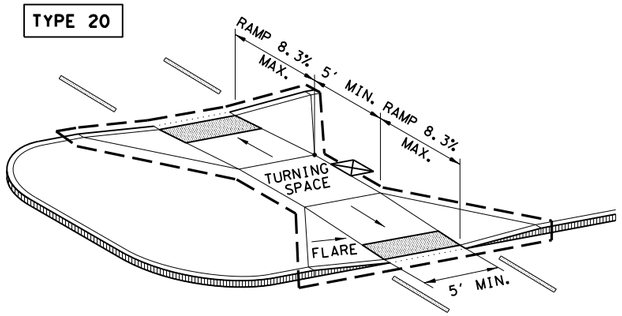


TYPE 6



COMBINATION CURB RAMPS

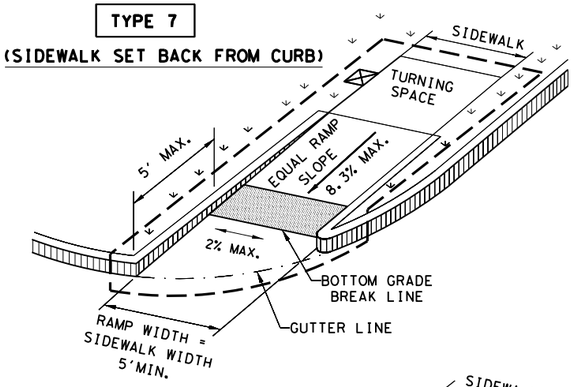
TYPE 20



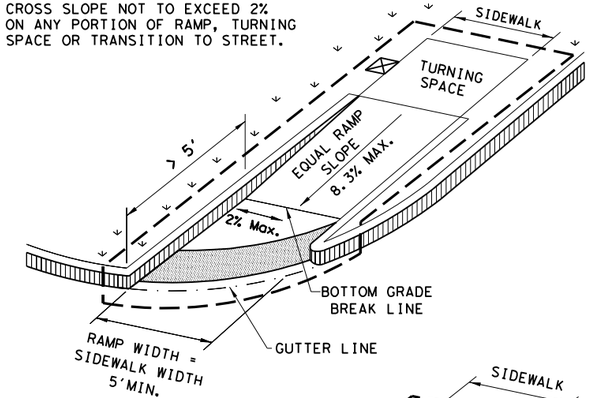
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

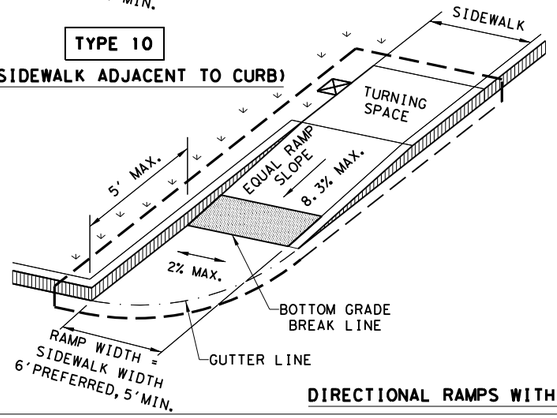


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

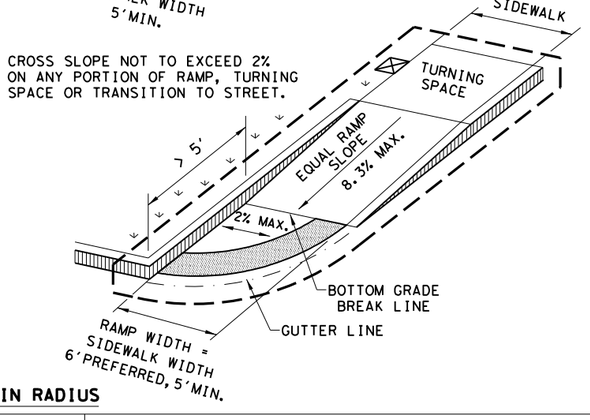


TYPE 10

(SIDEWALK ADJACENT TO CURB)

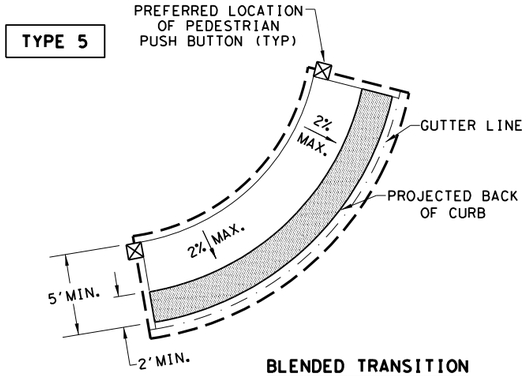


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

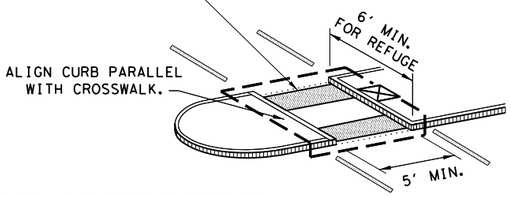
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

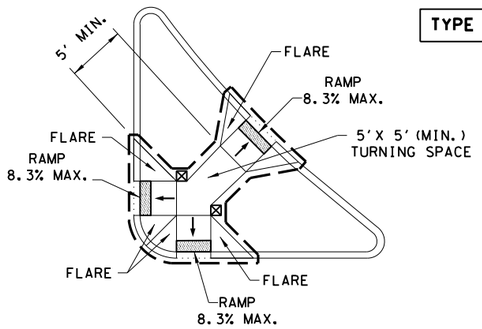
TYPE 21

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.



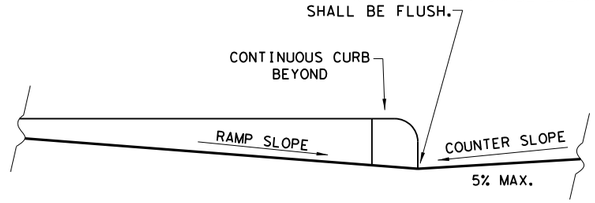
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

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

SHEET 1 OF 4

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		97

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

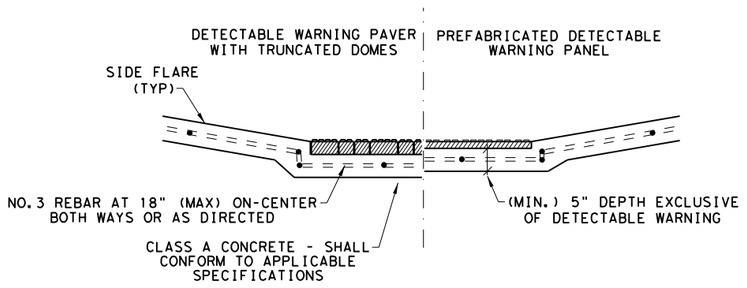
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material 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.

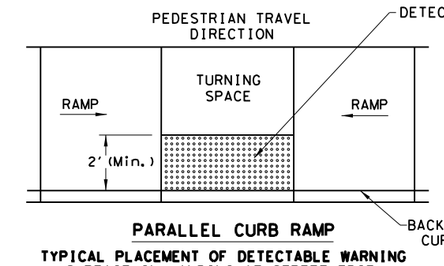
SIDEWALKS

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.

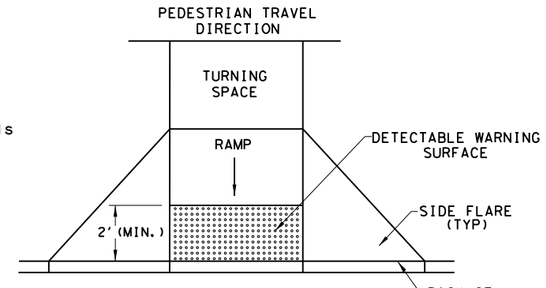


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

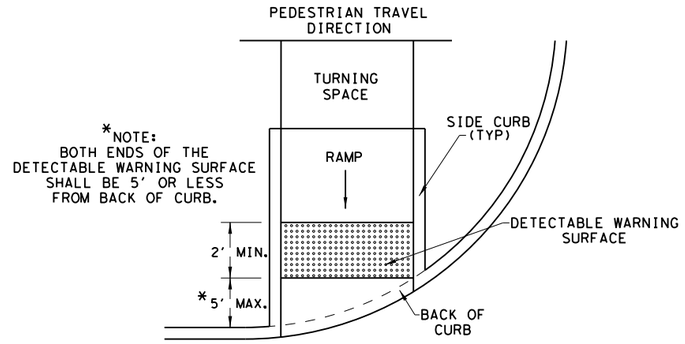
DETECTABLE WARNING SURFACE DETAILS



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

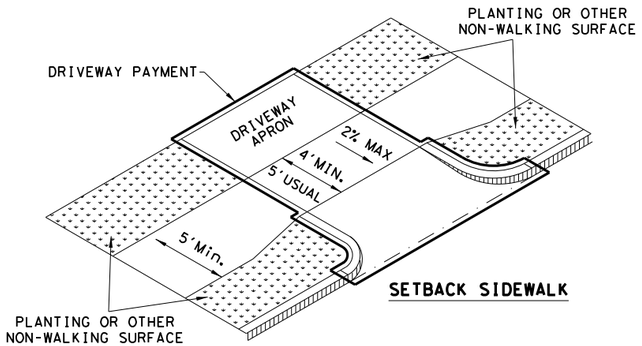
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

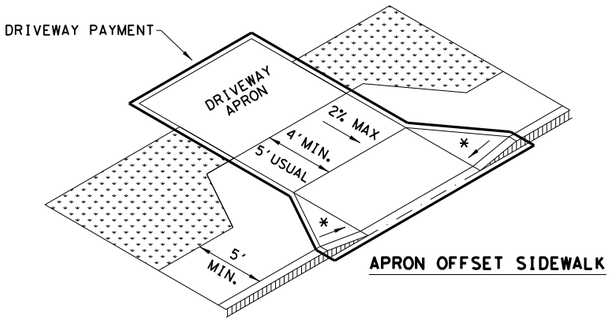
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0500	03	635, ETC.		IH 45
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	HARRIS			98

DATE:
FILE:

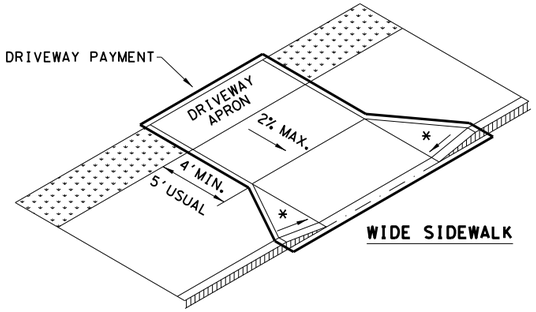
SIDEWALK TREATMENT AT DRIVEWAYS



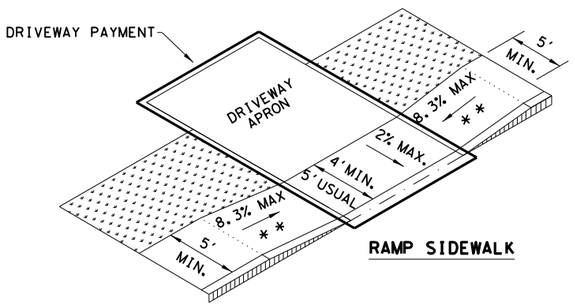
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

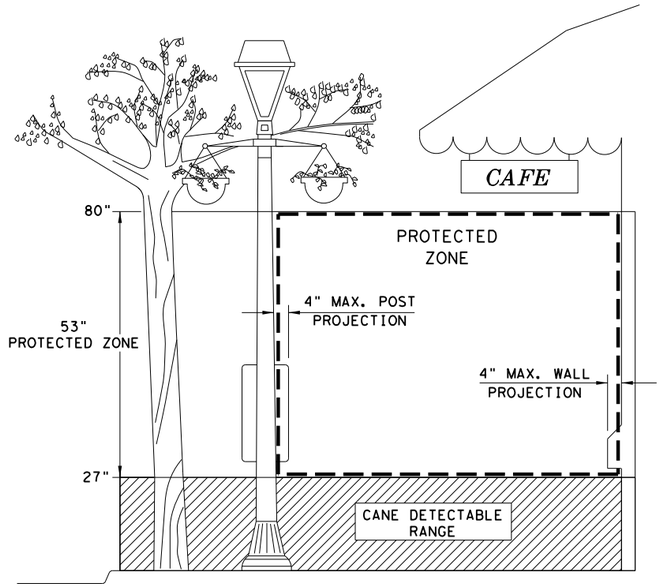


RAMP SIDEWALK

NOTES:

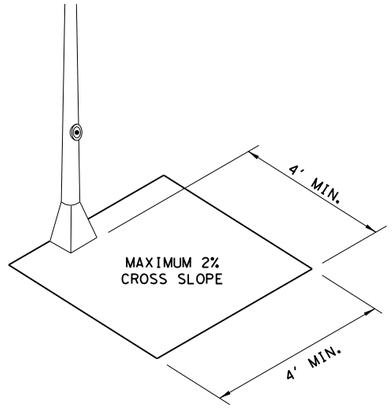
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

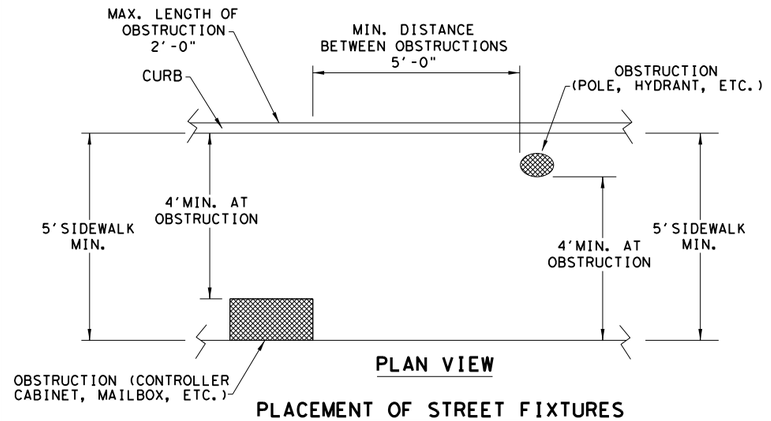


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



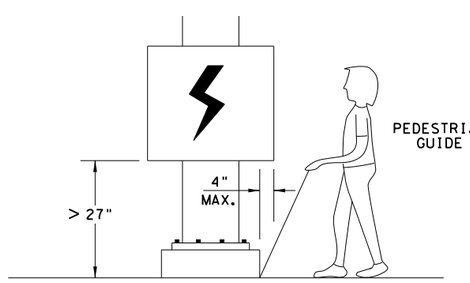
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



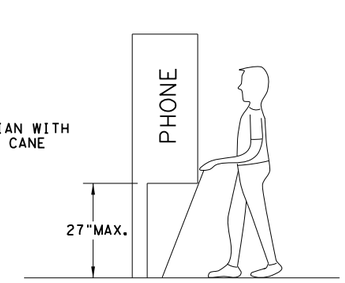
PLAN VIEW

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

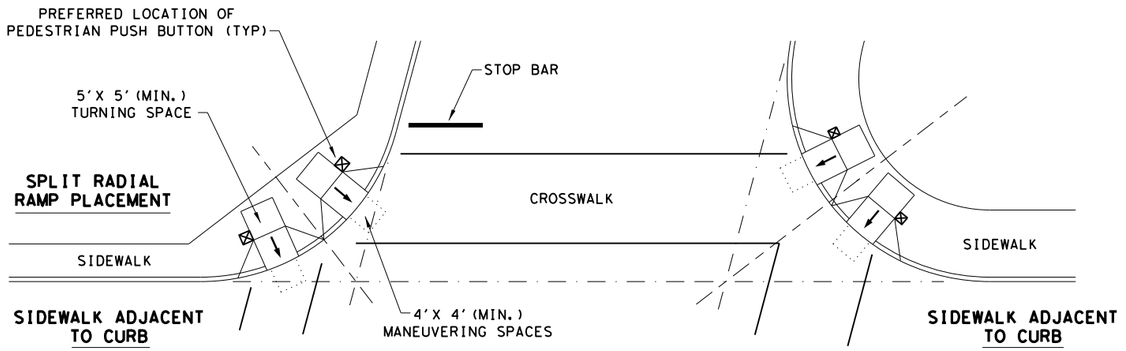
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0500	03	635, ETC.	IH 45	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		99	

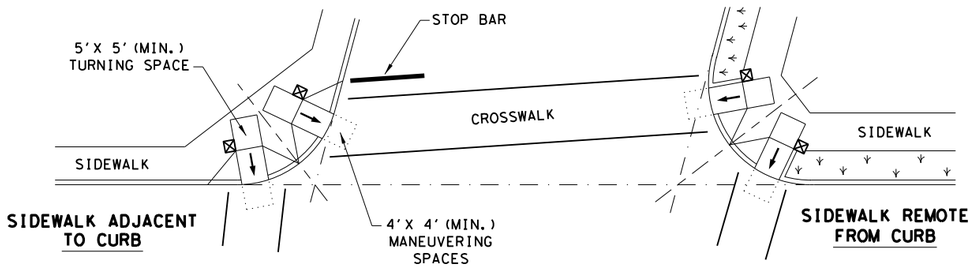
DATE:
FILE:

TYPICAL CROSSING LAYOUTS

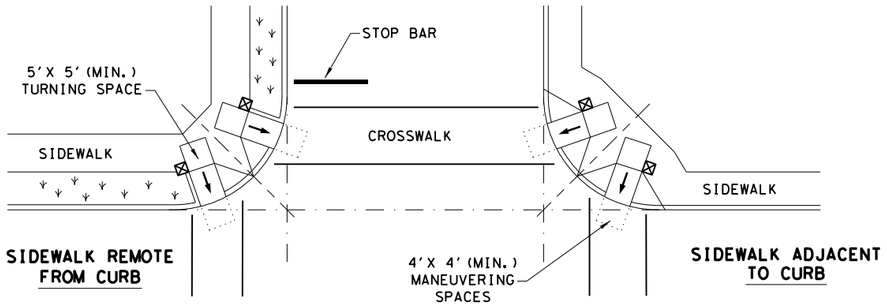
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



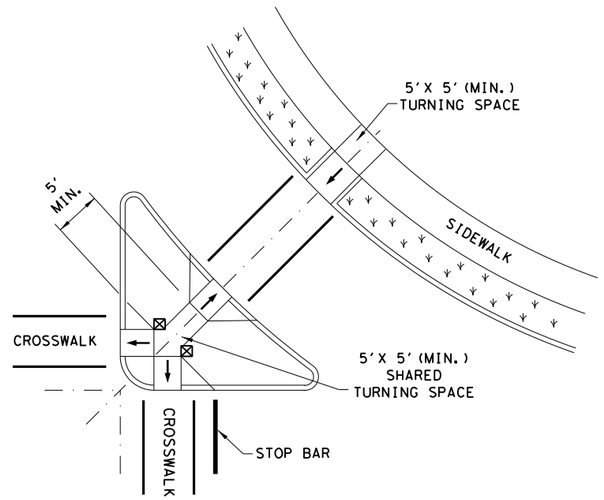
SKEWED INTERSECTION WITH "LARGE" RADIUS



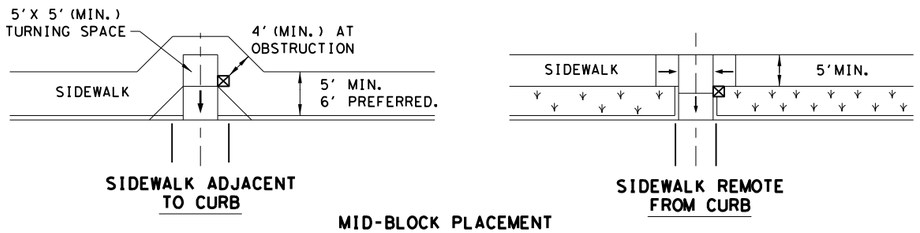
SKEWED INTERSECTION WITH "SMALL" RADIUS



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.

SHEET 4 OF 4

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0500	03	635, ETC.		IH 45
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	HOU	HARRIS			100

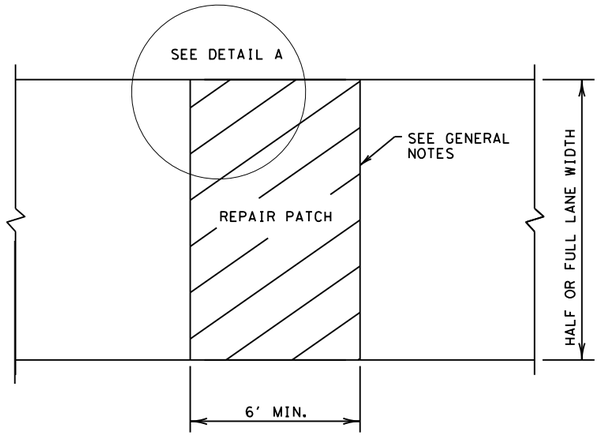
DATE:
FILE:

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

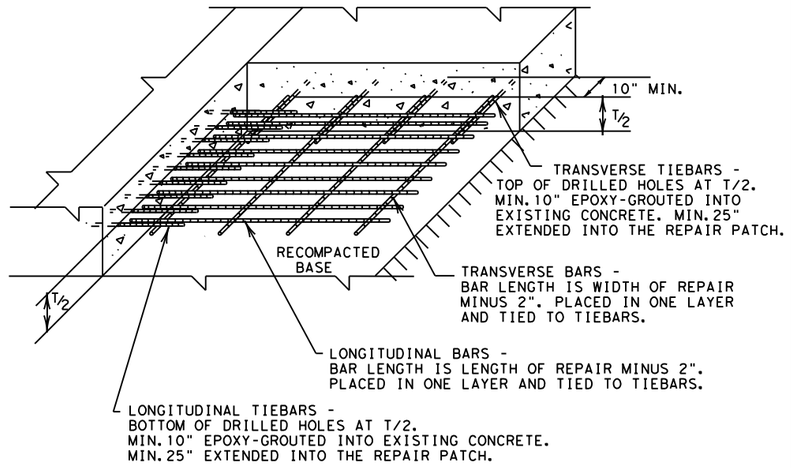
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

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

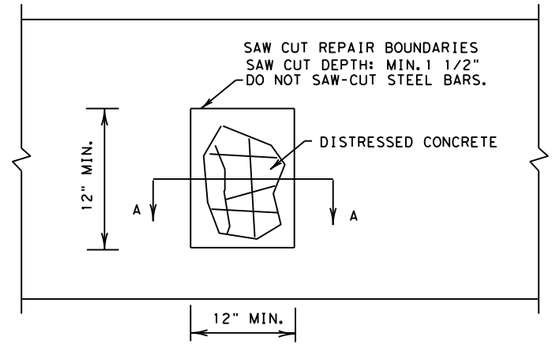


DETAIL A
GROUTED TIEBARS & REINFORCEMENT

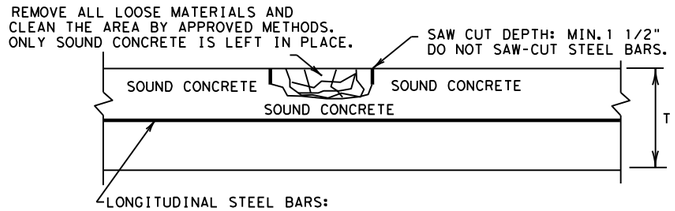
FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

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
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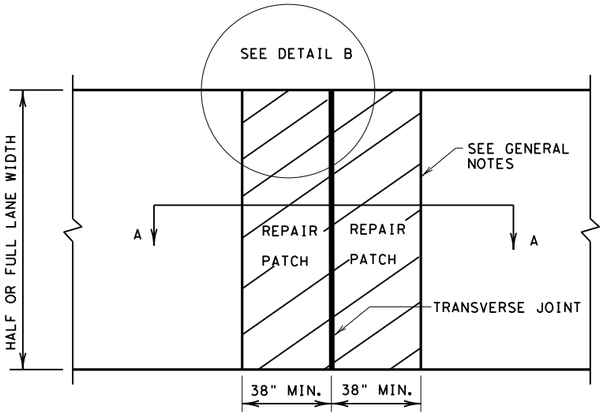
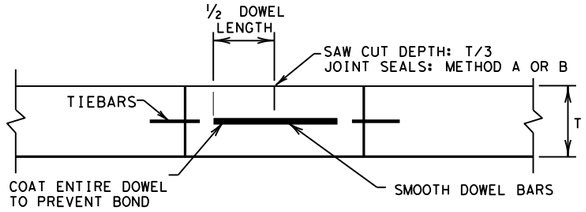
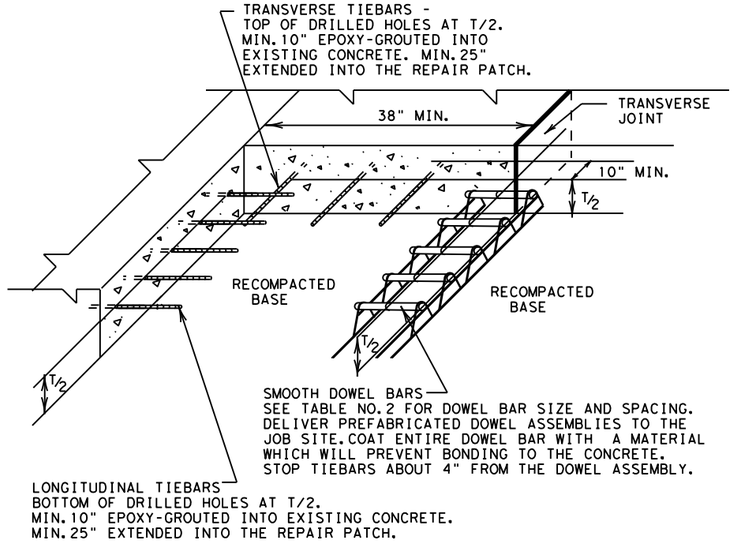
REVISIONS	0500	03	635,ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		101



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

DATE:
FILE:

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	
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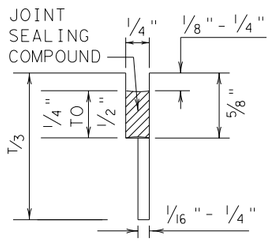
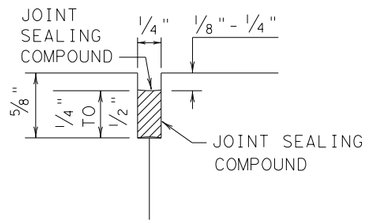
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		102	

DATE:
FILE:

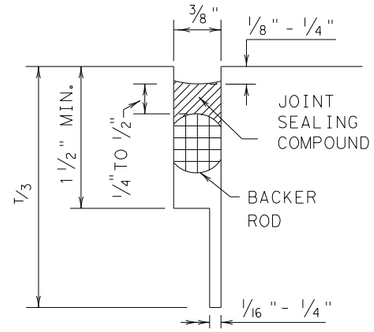
METHOD B: JOINT SEALING COMPOUND



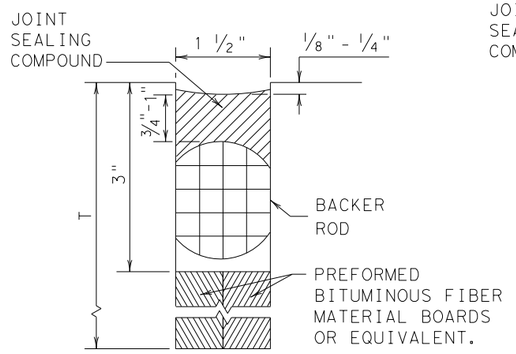
LONGITUDINAL SAWED CONTRACTION JOINT



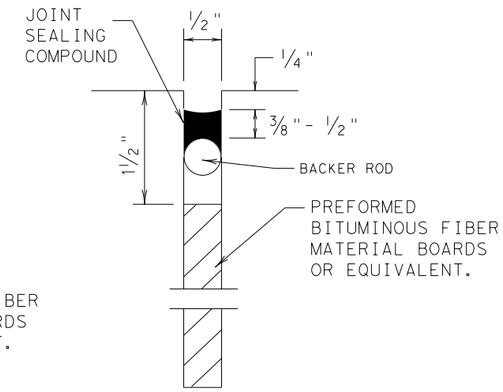
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

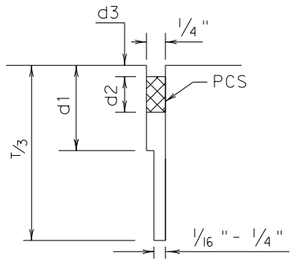


TRANSVERSE FORMED EXPANSION JOINT

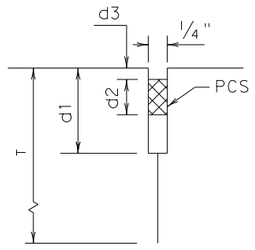


FORMED ISOLATION JOINT

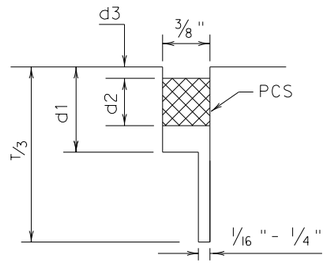
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



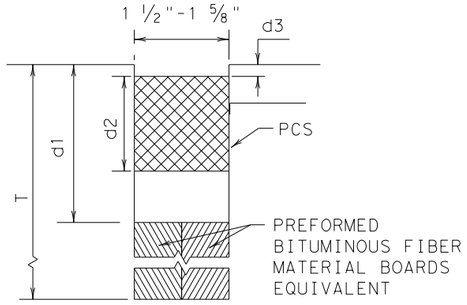
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVING DETAILS

JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT		DN: HC	DW: HC		CK: AN
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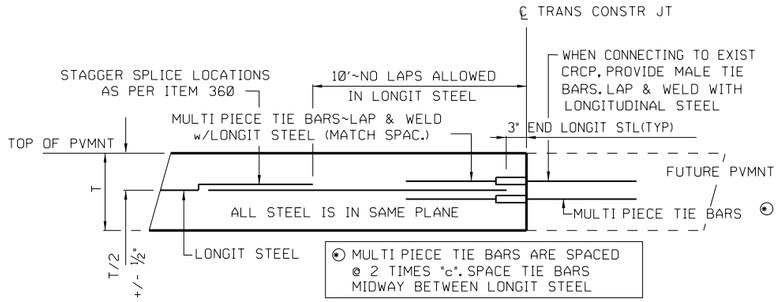
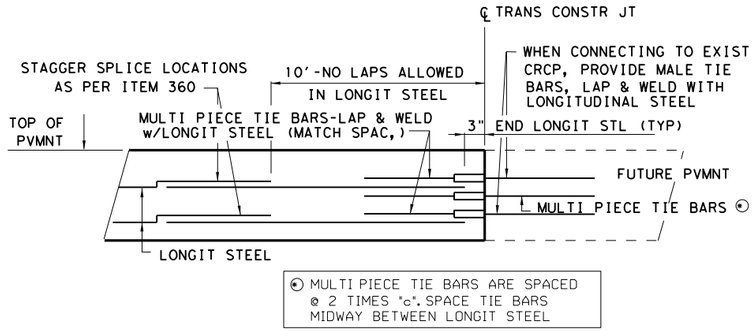
	DIST	COUNTY			SHEET NO.	
	HOU	HARRIS			103	



SECTION - SINGLE STEEL MAT

AT END OF PROJECT OR TEMPORARY END OF PAVEMENT



SECTION - DOUBLE STEEL MAT

AT END OF PROJECT OR TEMPORARY END OF PAVEMENT

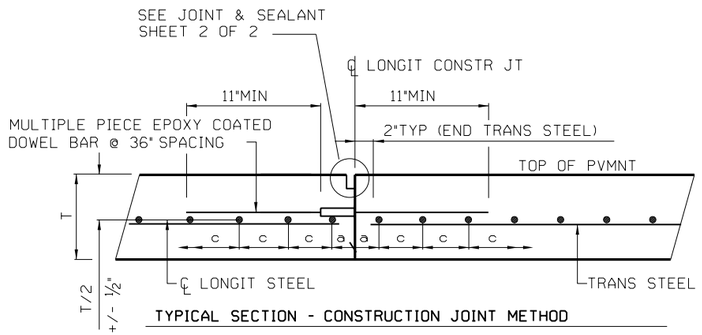
GENERAL NOTES

1. DETAILS FOR 7.0 IN. TO 13.0 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(1)-17. DETAILS FOR 14 IN. TO 15 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(2)-17.
2. DOWELS AND TIE BARS - DOWELS ARE ONE INCH MINIMUM DIAMETER. ENSURE DOWELS ARE FREE OF GREASE AND ARE EPOXY COATED. DO NOT SHEAR CUT DOWELS DURING FABRICATION. PROVIDE TIE BARS PER ITEM 360. FURNISH MULTI PIECE TIE BARS AND DOWELS WITH STOP COUPLINGS AND WITH THREADS ON THE BARS.
3. USE CHAIRS OF SUFFICIENT STRUCTURAL QUALITY AND NUMBER TO SUPPORT THE MAT TO THE VERTICAL TOLERANCES. CHAIRS WILL BE APPROVED BY THE ENGINEER AND DO NOT REQUIRE GALVANIZING.
4. MECHANICALLY PLACING REINFORCING STEEL IS NOT ALLOWED. NO BARS, DOWELS OR TIE BARS MAY BE VIBRATED INTO POSITION.
5. WHERE DIFFERENT THICKNESS PAVEMENTS MEET, TRANSITION THE THINNER SECTION TO THE THICKER SECTION OVER A DISTANCE OF 20 FT. PLACE REINFORCING STEEL WITHIN THE TRANSITION THE SAME AS IN THE THICKER PAVEMENT.
6. PERFORM WELDING PER ITEM 448. FURNISH WELDABLE REBAR PER ITEM 440.

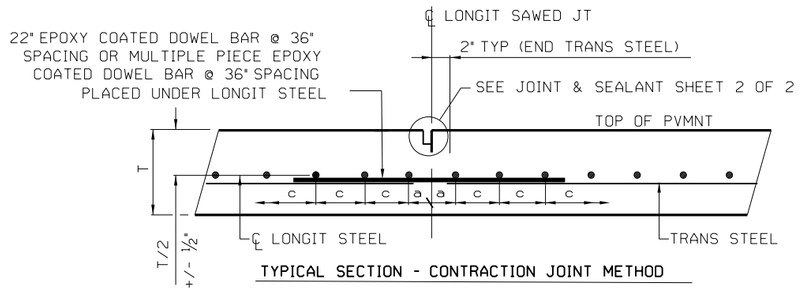
LONGITUDINAL DOWEL JOINT DETAILS

LOCATE WHERE SHOWN IN THE PLANS OR AS APPROVED. CONTRACTOR MAY USE EITHER METHOD

SINGLE STEEL MAT

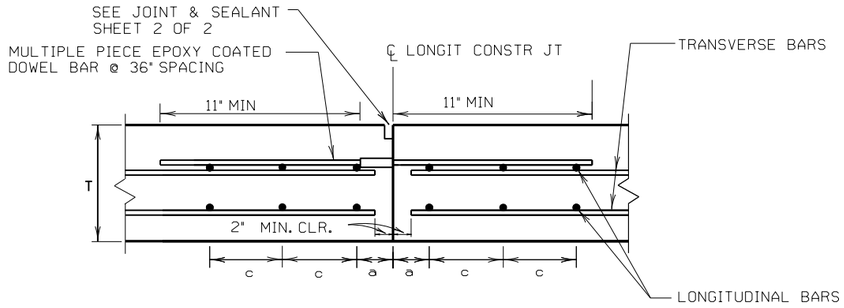


TYPICAL SECTION - CONSTRUCTION JOINT METHOD

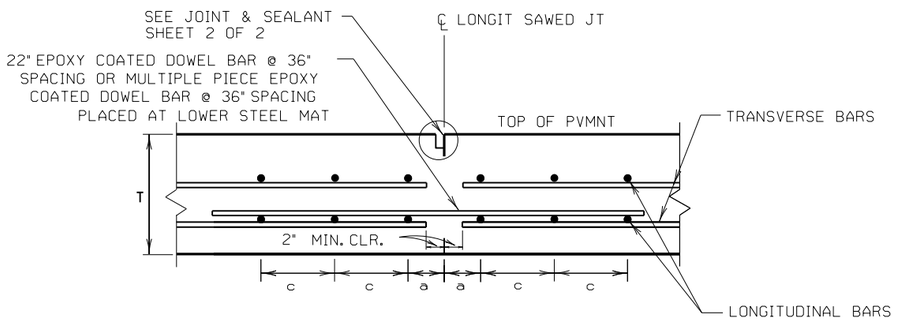


TYPICAL SECTION - CONTRACTION JOINT METHOD

DOUBLE STEEL MAT



TYPICAL SECTION - CONSTRUCTION JOINT METHOD



TYPICAL SECTION - CONTRACTION JOINT METHOD

SHEET 1 OF 2

Texas Department of Transportation
Houston District

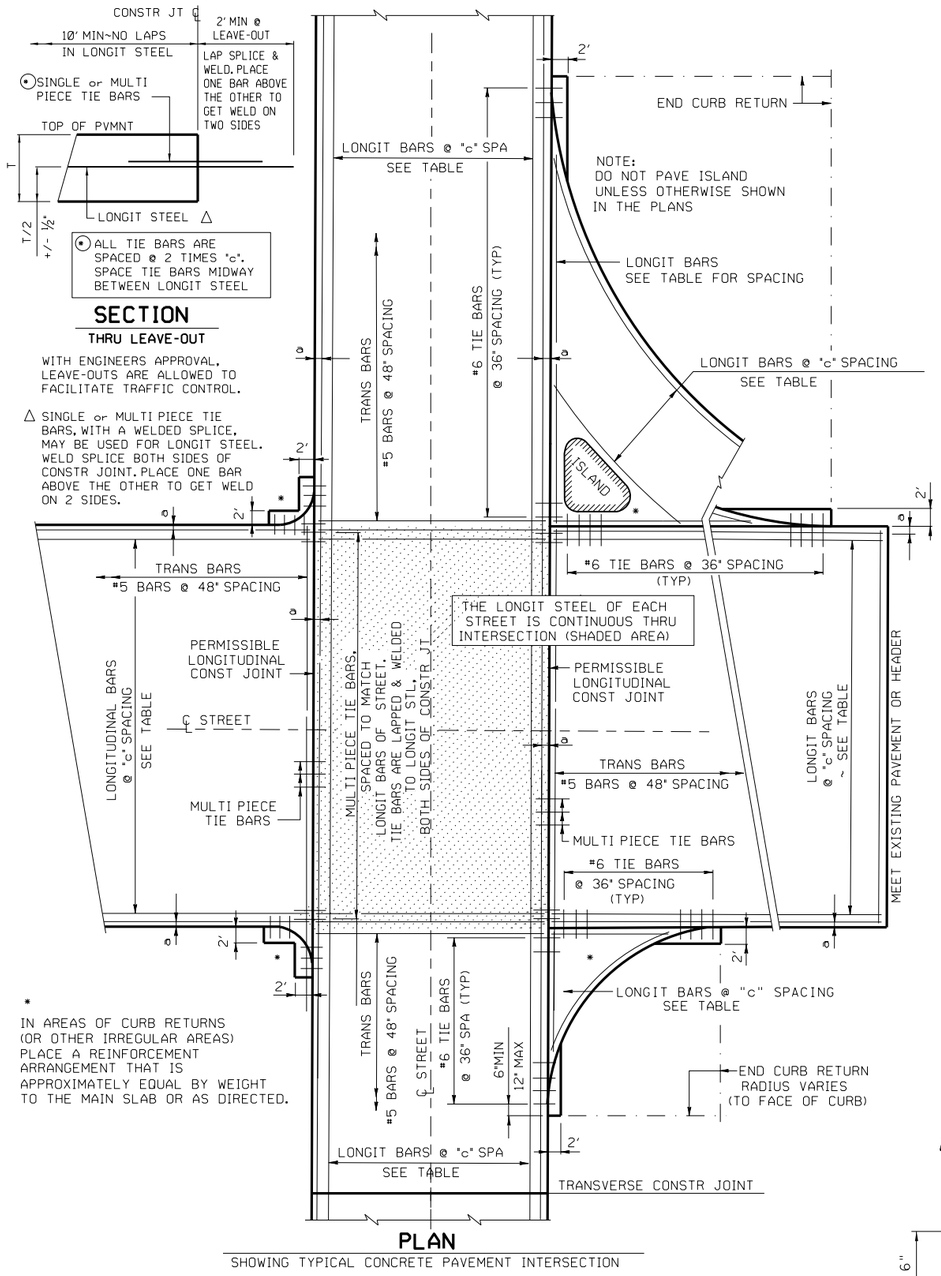
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT HOUSTON SUPPLEMENT CRCP-HS

DN: - CK: - DW: - CK: -

REVISIONS
4/12 CHANGED CTE FROM 6.0 TO 5.0
8/14 UPDATE TO REFERENCE CRCP-13 STND.
2/15 REVISED GENERAL NOTES, MINOR CORRECTIONS.
4/17 REVISED NOTE #3 OF GENERAL NOTES, MINOR CORRECTIONS.

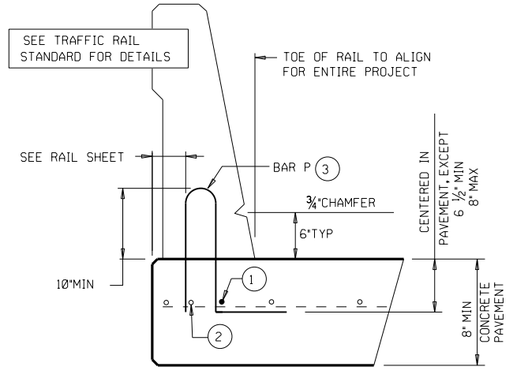
DISTRICT	PROJECT NO.			SHEET
HOU	0500-03-635, ETC.			104
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
HARRIS	500	03	635	IH 45

STD-B1A



PLAN

SHOWING TYPICAL CONCRETE PAVEMENT INTERSECTION



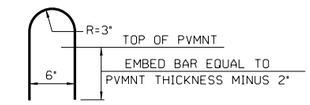
RAIL DETAIL

FOR ADDITIONAL DETAILS, SEE RAIL STANDARD SHEET.
THE MINIMUM LENGTH OF A CONCRETE RAILING PANEL IS FIVE FEET.

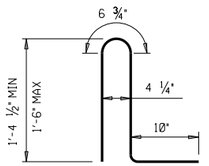
(1) AS AN AID IN SUPPORTING REINFORCEMENT, ADDITIONAL LONGITUDINAL BARS MAY BE USED IN THE SLAB WITH THE APPROVAL OF THE ENGINEER. FURNISH SUCH BARS AT NO EXPENSE TO THE DEPARTMENT.

(2) LONGITUDINAL SLAB BAR MAY BE ADJUSTED LATERALLY 3" +/- TO TIE REINFORCING.

(3) ANCHORAGE BAR SHOWN IS FOR AN SSTR OR T551 RAIL. SEE RAILING DETAIL SHEET FOR SPACING OF BAR P. FOR OTHER RAIL TYPES SEE RAILING DETAIL SHEET.

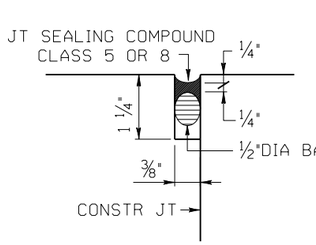


BAR A (#3)

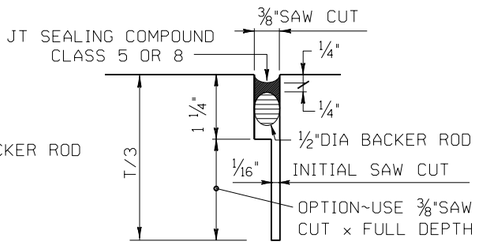


BAR P (#5)

RAIL ANCHOR INSTALLED IN PAVEMENT (3)

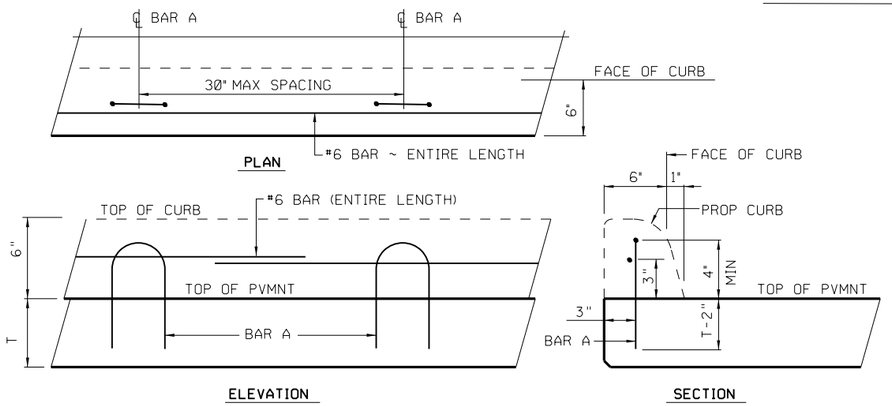


DETAIL 1 ~ CONSTR JOINT



DETAIL 2 ~ SAWED JOINT

JOINT AND SEALANT DETAILS



CURB DETAIL

SEE CC & DID STANDARD

SHEET 2 OF 2

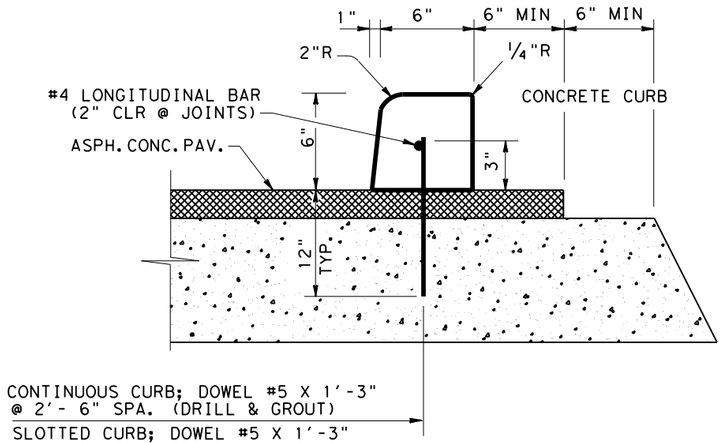
Texas Department of Transportation
Houston District

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT HOUSTON SUPPLEMENT CRCP-HS

DN: -	CK: -	DW: -	CK: -	
DISTRICT	PROJECT NO.			SHEET
HOU	0500-03-635, ETC.			105
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
HARRIS	500	03	635	IH 45

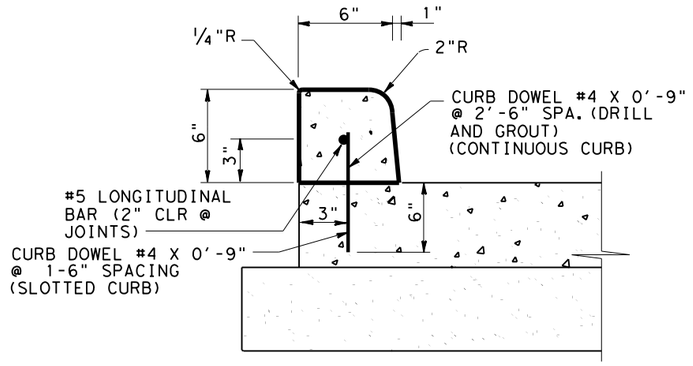
REVISIONS
4/12 CHANGED CTE FROM 6.0 TO 5.0 (ON SHEET 1)
2/15 MINOR CORRECTIONS.

STD-B1B



SHOWN ON EXISTING OR PROPOSED ACP PAVEMENT

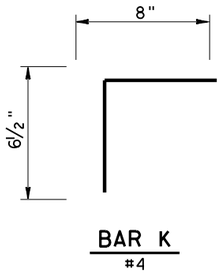
(PAY ITEM 529-6011) - FOR CONTINUOUS



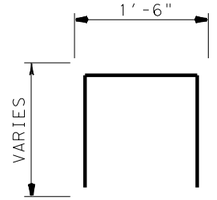
SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

(PAY ITEM 529-6011) - FOR CONTINUOUS

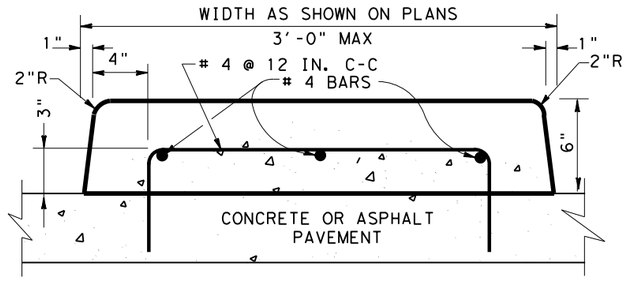
CONCRETE CURB (DOWEL) (6 IN.)



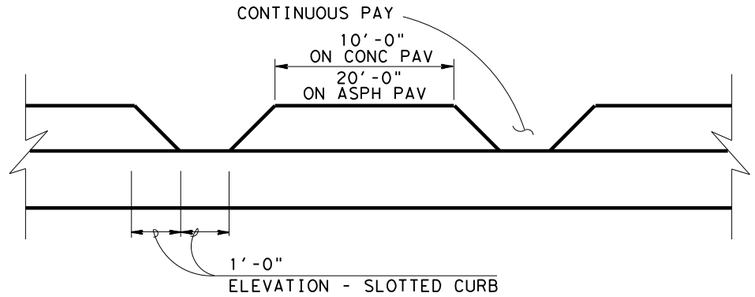
BAR K
#4



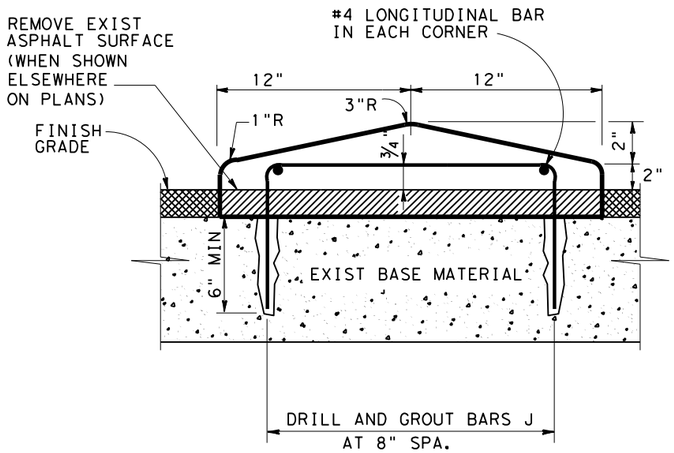
BAR J
#4



ITEM 536-6001 CONCRETE MEDIAN
SEE NOTE 2

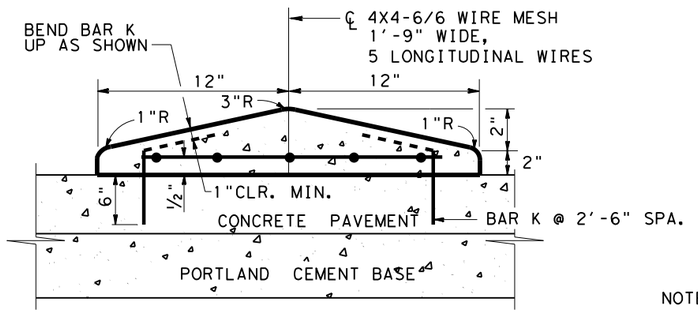


ITEM 529-6012 CONCRETE CURB (SLOTTED) - ON CONC.
ITEM 529-6009 CONC CURB (DOWEL)(SLOTTED) - ON ASPH.



SHOWN ON EXISTING ACP PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND



SHOWN ON EXISTING OR PROPOSED CONCRETE PAVEMENT

SEE NOTE 2 - ITEM 536-6003 CONC DIRECTIONAL ISLAND

NOTES:

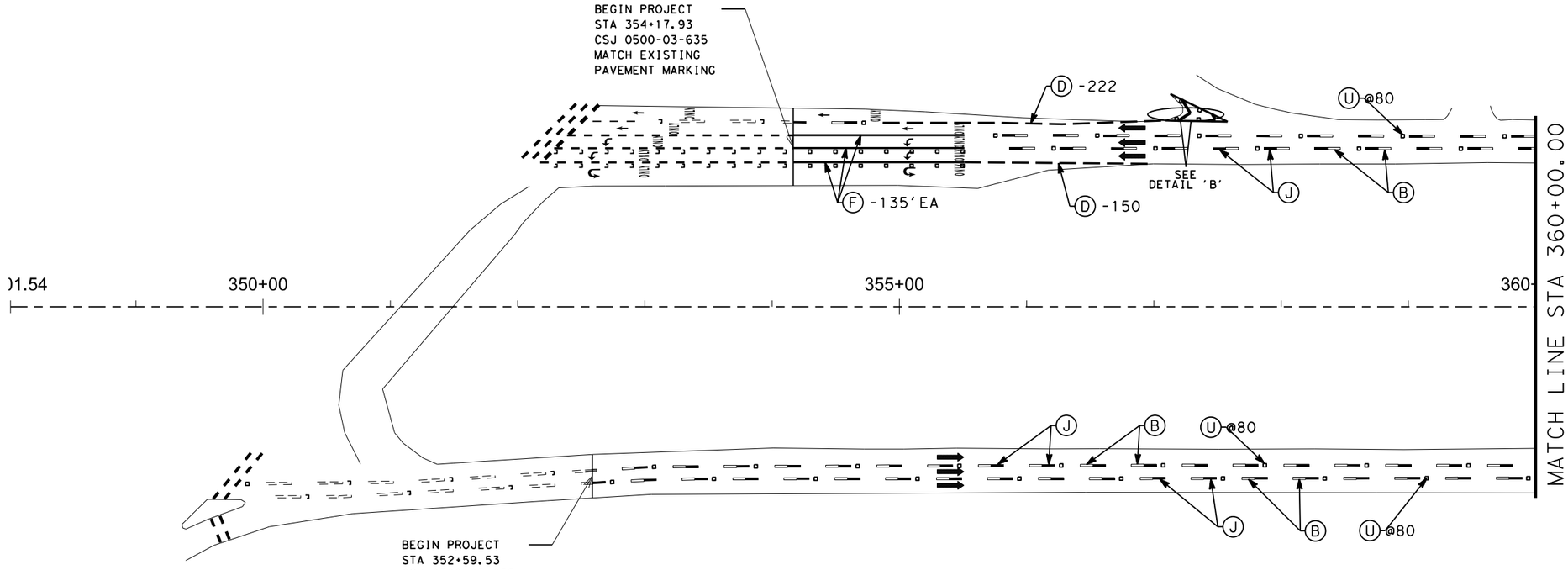
1. DRILL AND GROUT BARS SHOWN AS PER ITEM 420.4.7.10, 6" EMBEDMENT, MINIMUM ON CONC.
2. INSTALL A 2 INCH DRAINAGE OPENING AT 10 FT C-C WHEN CURB/ISLAND IS NOT ON TOP OF CROSS SECTION. (LOCATED ON A 2 OR 3 PERCENT TRANSVERSE GRADE, OR SUPERELEVATION.)

CONCRETE DIRECTIONAL ISLAND

Texas Department of Transportation
Houston District

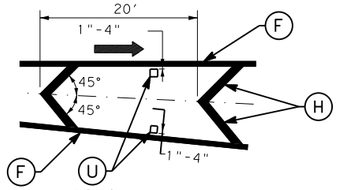
CONCRETE CURB AND DIRECTIONAL ISLAND DETAILS
CC & DID

FILE: STDB-9.dgn	DN:	CK:	DW:	CK:
©TxDOT 2014	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6	0500-03-635, ETC.	106
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	0500	03 635	IH 45



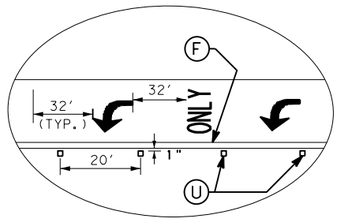
NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.

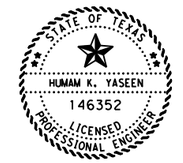


DETAIL 'B'

NOTE: (U) SHALL BE CENTERED BETWEEN CHEVRON OR GORE LINES.



DETAIL 'D'



The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on

APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

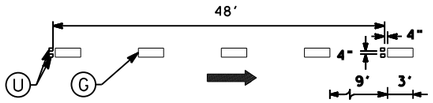
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100'

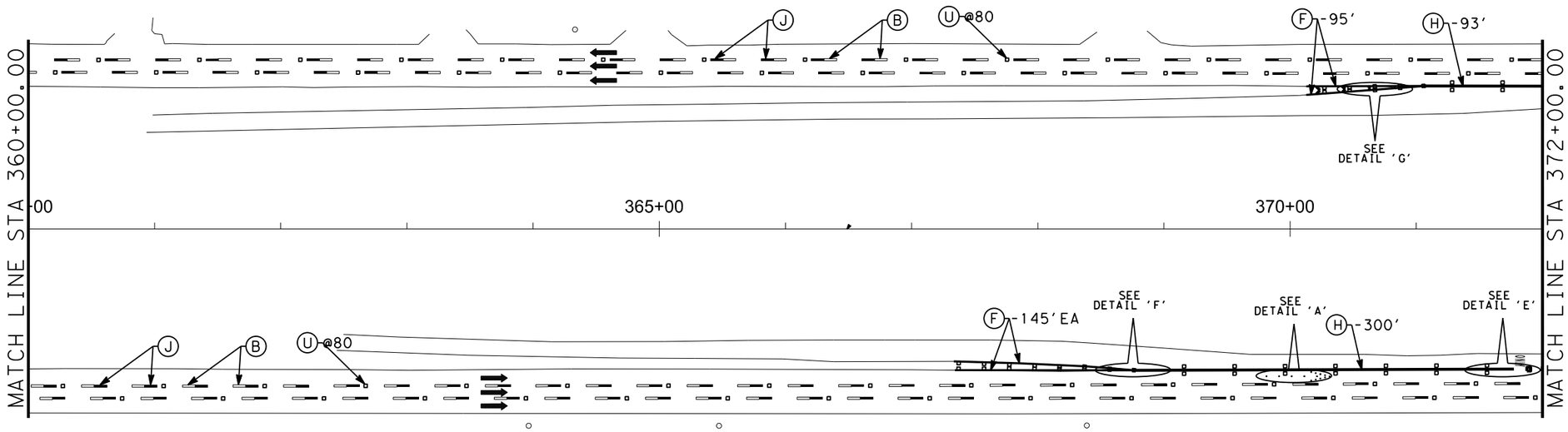
SHEET 1 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	REVISIONS	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.1-		HOU	6				107
CK.1-		COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DN.1-		HARRIS	0500	03	635, Etc.		IH 45
CK.1-							

$DATE$
$FILE$

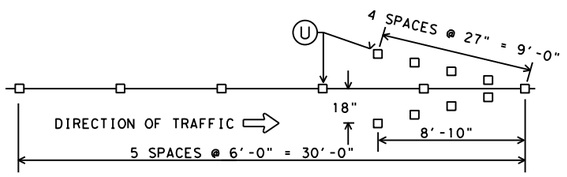


DETAIL 'E'

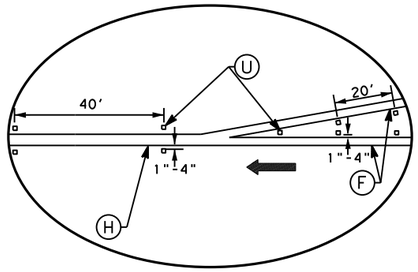


NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.



DETAIL 'A'



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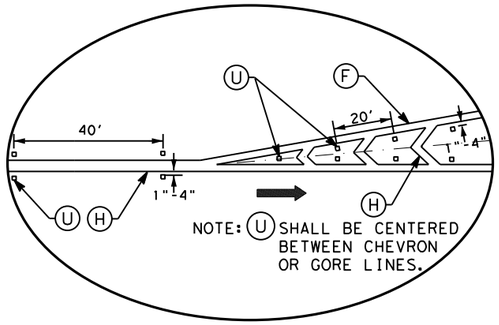


DETAIL 'G'

The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

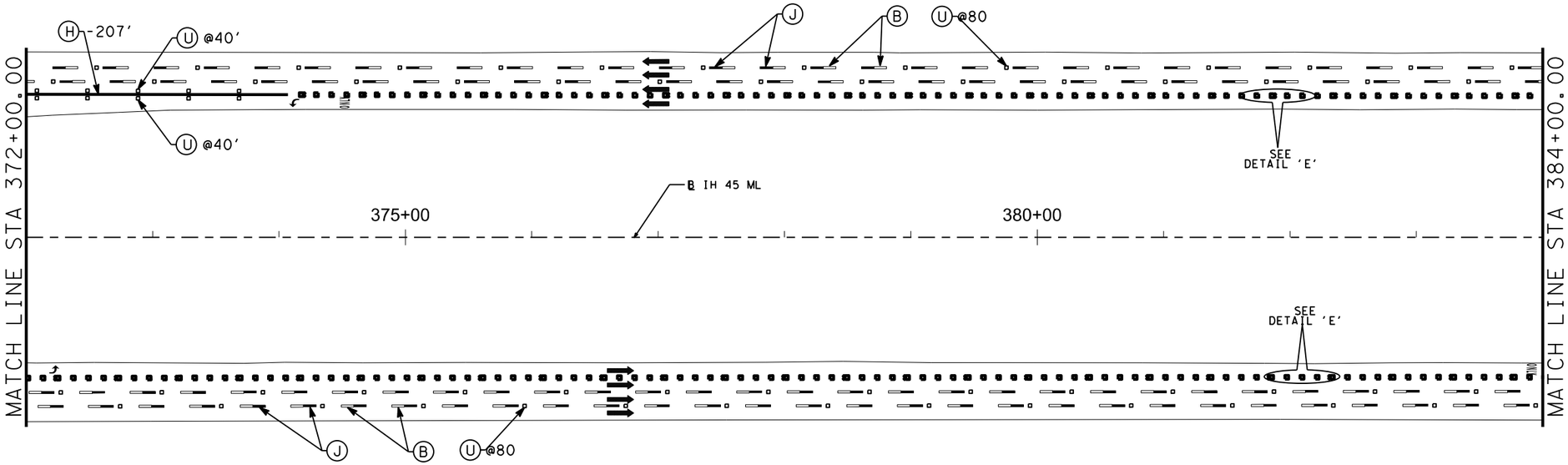
SCALE: 1" : 100' SHEET 2 OF 15

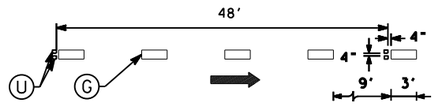
ORIGINAL DRAWING DATE: FEB, 2024		STATE DISTRICT	FEDERAL REGION	PROJECT NO		SHEET
DN.: - REVISIONS		HOU	6			108
CK.: -		COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DR.: -		HARRIS	0500	03	635, Etc.	IH 45
CK.: -						

$DATE$
$FILE$

NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.





DETAIL 'E'

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

PREFAB PAV MRK TY C (W)(DBL ARROW)
PREFAB PAV MRK TY C (W)(UTURN ARROW)
MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
PREFAB PAV MRK TY C (W)(ARROW)
DIRECTION OF TRAVEL
PROPOSED SMALL SIGN
(R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

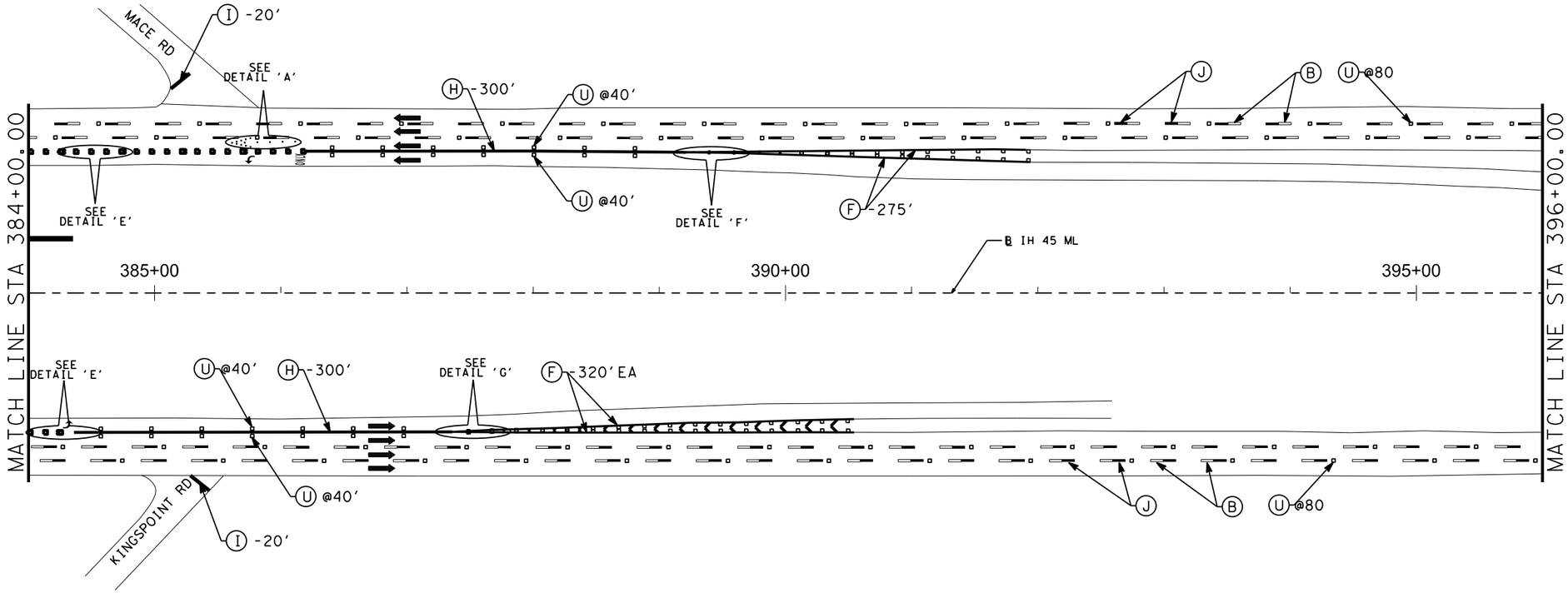
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100'

SHEET 3 OF 15

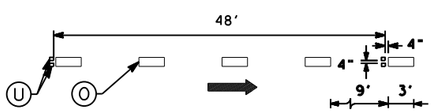
ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				109
CK.: -	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DR.: -	HARRIS	0500	03	635, Etc.		IH 45
CK.: -						

$DATE$
$FILE$

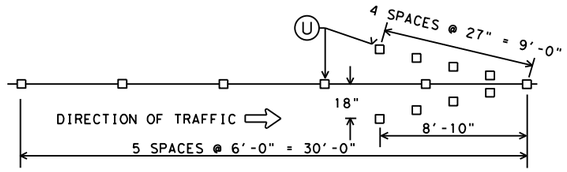


NOTE:

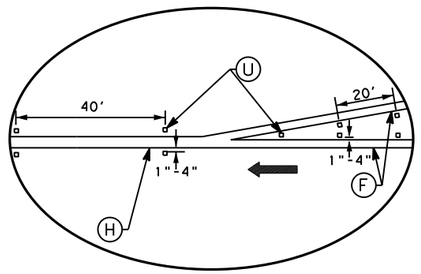
EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.



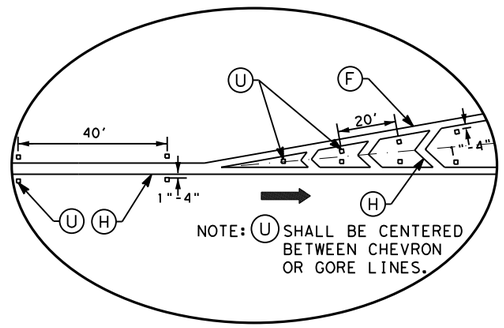
DETAIL 'E'



DETAIL 'A'



DETAIL 'F'



DETAIL 'G'

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

(A)	RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)	(M)	RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)	(Y)	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
(B)	RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)	(N)	PREFAB PAV MRK TY C (W)(SYMBOL)	(Z)	REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
(C)	RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)	(O)	PREFAB PAV MRK TY C (W)(36")(YLD TRI)	(AA)	MULTIPOLYMER PAV MRK (W)(6")(SLD)
(D)	REFL PAV MRK TY I (W) 8" (DOT)(100MIL)	(P)	PREFAB PAV MRK TY C (W)(BIKE ARROW)	(AB)	MULTIPOLYMER PAV MRK (W)(6")(BRK)
(E)	REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)	(Q)	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)	(AC)	MULTIPOLYMER PAV MRK (W)(6")(DOT)
(F)	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	(R)	REFL PAV MRKR TY I-A	(AD)	MULTIPOLYMER PAV MRK (W)(8")(SLD)
(G)	REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)	(S)	REFL PAV MRKR TY I-C	(AE)	MULTIPOLYMER PAV MRK (W)(12")(SLD)
(H)	REFL PAV MRK TY I (W) 12" (SLD)(100MIL)	(T)	REFL PAV MRKR TY II-A-A	(AF)	MULTIPOLYMER PAV MRK (W)(24")(SLD)
(I)	REFL PAV MRK TY I (W) 24" (SLD)(100MIL)	(U)	REFL PAV MRKR TY II-C-R	(AG)	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
(J)	RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)	(V)	REFL PAV MRK TY II (W) 24" SLD	(AH)	MULTIPOLYMER PAV MRK (Y)(6")(SLD)
(K)	REFL PAV MRK TY I (W) 6" (DOT)(100MIL)	(W)	REFL PAV MRK TY II (Y) 12" SLD	(AI)	MULTIPOLYMER PAV MRK (W)(8")(DOT)
(L)	REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)	(X)	REFL PAV MRK TY II (Y) 24" SLD		

PREFAB PAV MRK TY C (W)(DBL ARROW)
PREFAB PAV MRK TY C (W)(UTURN ARROW)
MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
PREFAB PAV MRK TY C (W)(ARROW)
DIRECTION OF TRAVEL
PROPOSED SMALL SIGN
(R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

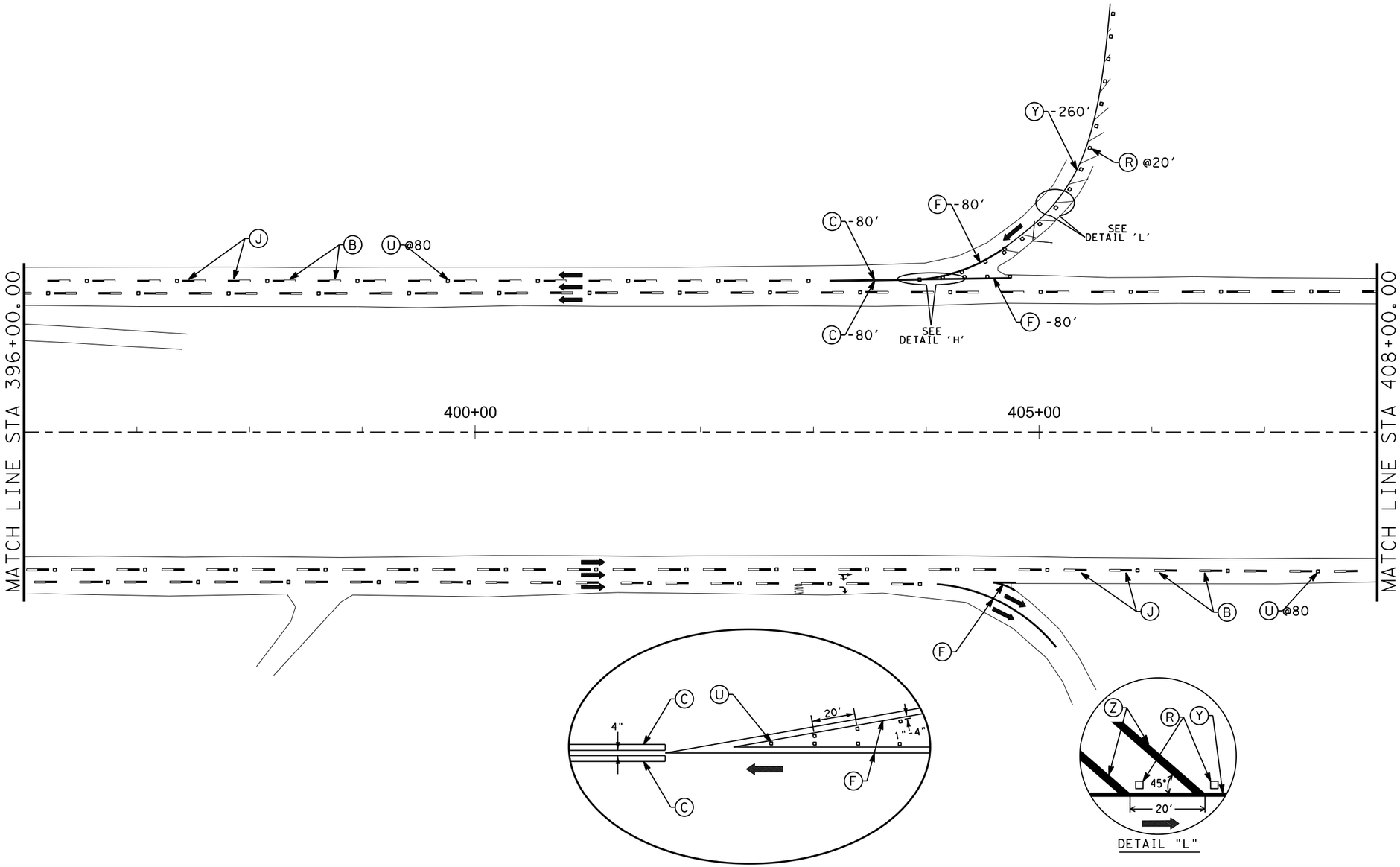
Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100' SHEET 4 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO		SHEET
DN.: - REVISIONS	HOU	6			110
CK.: -	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
DN.: -	HARRIS	0500	03	635, Etc.	IH 45
CK.: -					

$DATE$
$FILE$



DETAIL 'H'

DETAIL "L"

NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

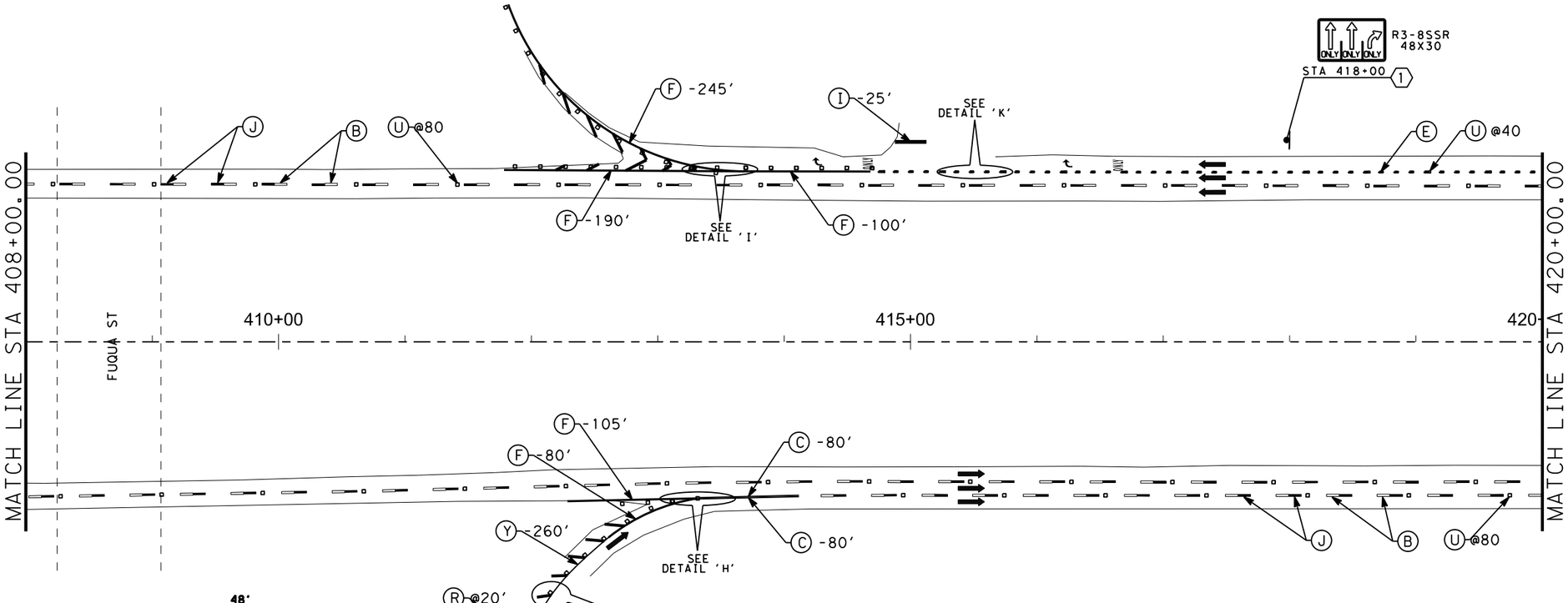
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

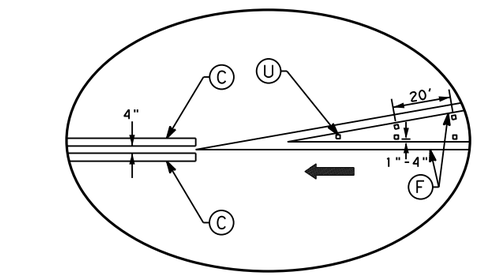
SCALE: 1" : 100'

SHEET 5 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				111
CK.: -	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DN.: -	HARRIS	0500	03	635, Etc.		IH 45
CK.: -						

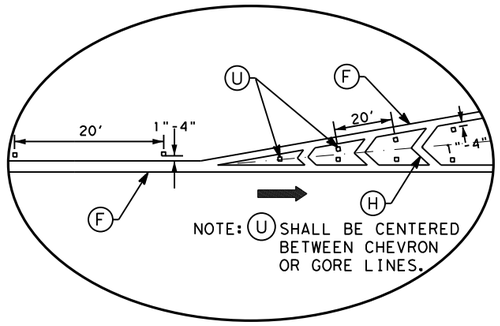
$DATE$
$FILE$



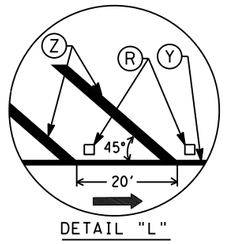


DETAIL 'K'

DETAIL 'H'



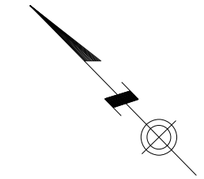
DETAIL 'I'

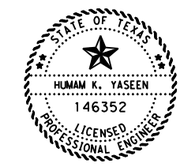


DETAIL "L"

NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.





The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

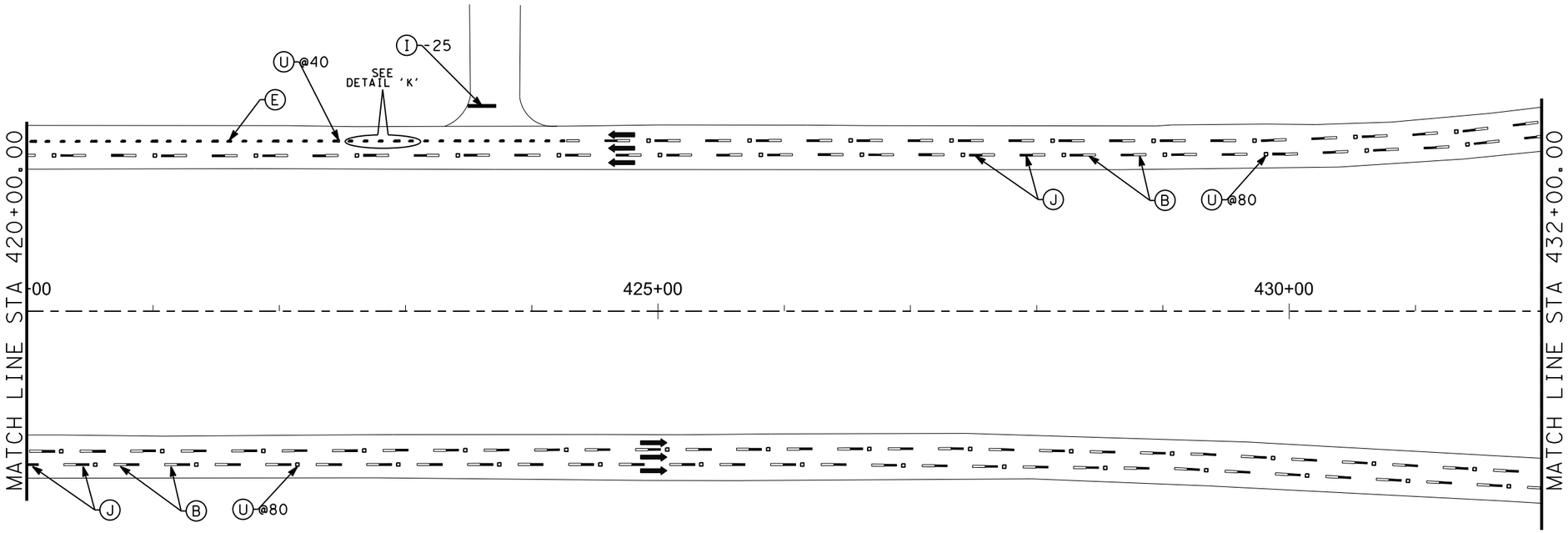
Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100' SHEET 6 OF 15

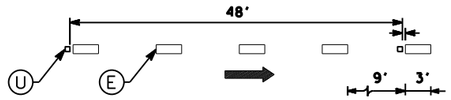
ORIGINAL DRAWING DATE: FEB, 2024	REVISIONS	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.:		HOU	6				112
CK.:		COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DW.:		HARRIS	0500	03	635, Etc.		IH 45
CK.:							

$DATE$
$FILE$



NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.



DETAIL 'K'

HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

A	RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)	M	RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)	Y	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
B	RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)	N	PREFAB PAV MRK TY C (W)(SYMBOL)	Z	REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
C	RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)	O	PREFAB PAV MRK TY C (W)(36")(YLD TRI)	AA	MULTIPOLYMER PAV MRK (W)(6")(SLD)
D	REFL PAV MRK TY I (W) 8" (DOT)(100MIL)	P	PREFAB PAV MRK TY C (W)(BIKE ARROW)	AB	MULTIPOLYMER PAV MRK (W)(6")(BRK)
E	REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)	Q	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)	AC	MULTIPOLYMER PAV MRK (W)(6")(DOT)
F	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	R	REFL PAV MRKR TY I-A	AD	MULTIPOLYMER PAV MRK (W)(8")(SLD)
G	REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)	S	REFL PAV MRKR TY I-C	AE	MULTIPOLYMER PAV MRK (W)(12")(SLD)
H	REFL PAV MRK TY I (W) 12" (SLD)(100MIL)	T	REFL PAV MRKR TY II-A-A	AF	MULTIPOLYMER PAV MRK (W)(24")(SLD)
I	REFL PAV MRK TY I (W) 24" (SLD)(100MIL)	U	REFL PAV MRKR TY II-C-R	AG	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
J	RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)	V	REFL PAV MRK TY II (W) 24" SLD	AH	MULTIPOLYMER PAV MRK (Y)(6")(SLD)
K	REFL PAV MRK TY I (W) 6" (DOT)(100MIL)	W	REFL PAV MRK TY II (Y) 12" SLD	AI	MULTIPOLYMER PAV MRK (W)(8")(DOT)
L	REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)	X	REFL PAV MRK TY II (Y) 24" SLD		

PREFAB PAV MRK TY C (W)(DBL ARROW)
PREFAB PAV MRK TY C (W)(UTURN ARROW)
MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
PREFAB PAV MRK TY C (W)(ARROW)
DIRECTION OF TRAVEL
PROPOSED SMALL SIGN
R- REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

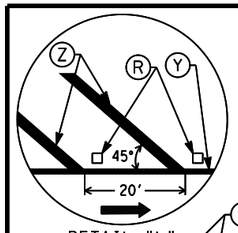
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100'

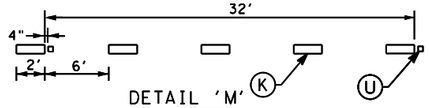
SHEET 7 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				113
CK.: -	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DR.: -	HARRIS	0500	03	635, Etc.		IH 45
CK.: -						

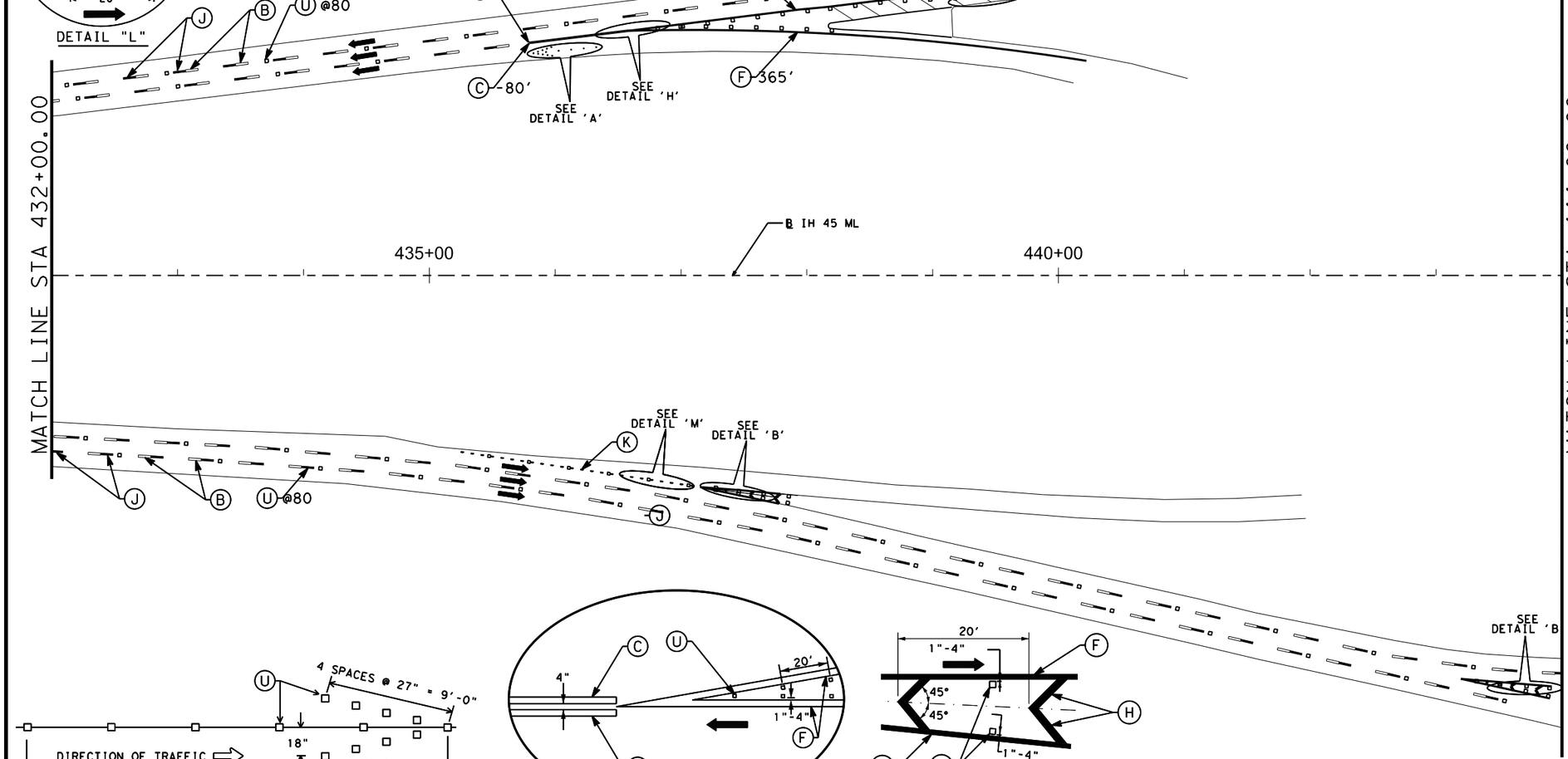
$DATE$
$FILE$



DETAIL "L"



DETAIL 'M'



DETAIL 'A'

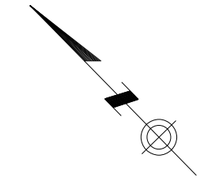
DETAIL 'H'

DETAIL 'B'

NOTE: (U) SHALL BE CENTERED BETWEEN CHEVRON OR GORE LINES.

NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.



The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on

APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

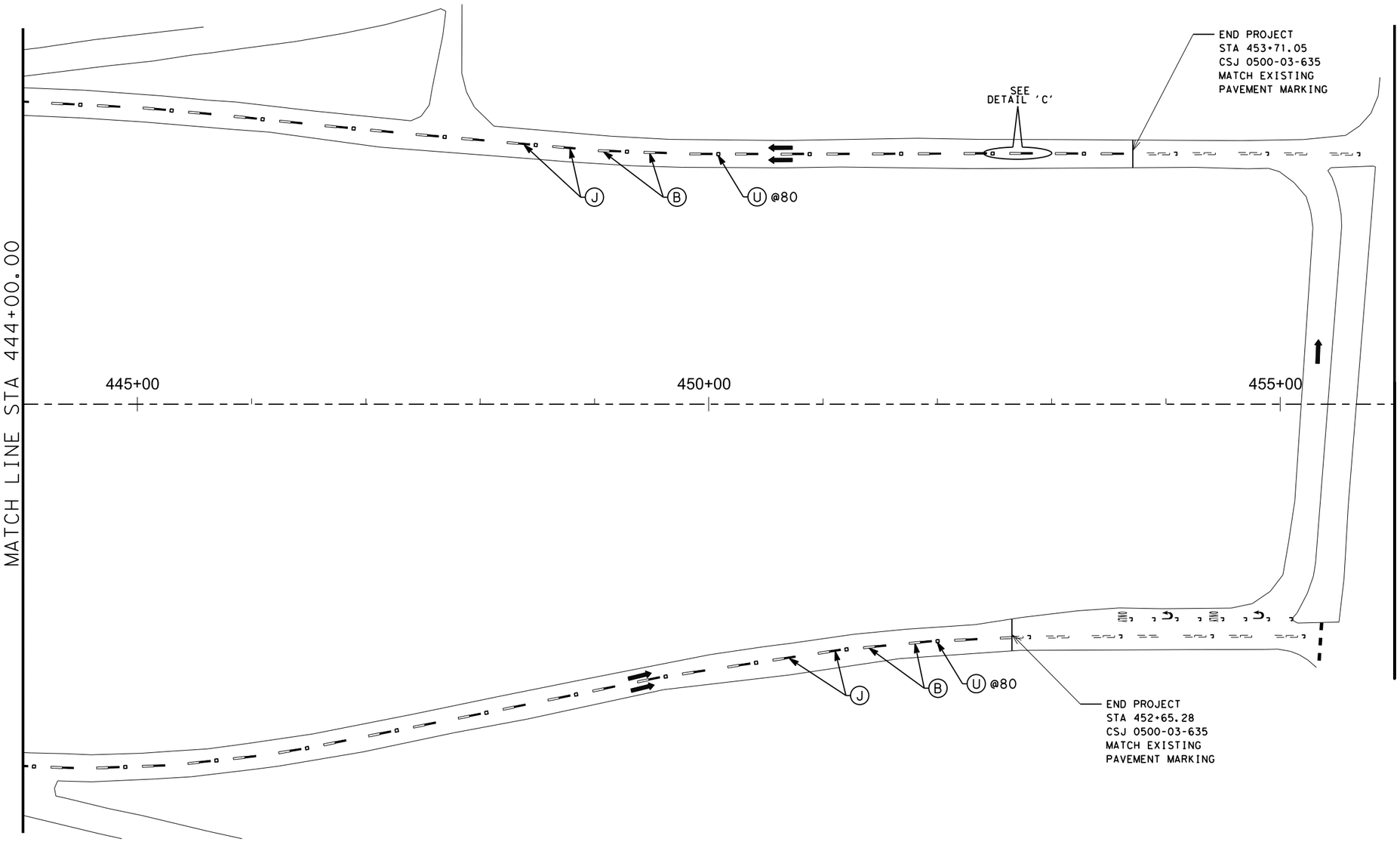
SCALE: 1" : 100'

SHEET 8 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				114
CK.: -	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DN.: -	HARRIS	0500	03	635, Etc.		IH 45
CK.: -						

$DATE$

$FILE$



NOTE:

EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.

STATE OF TEXAS
HUMAM K. YASEEN
146352
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by HUMAM K. YASEEN P.E. 146352, on APRIL ,2024

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)
- (AI) MULTIPOLYMER PAV MRK (W)(8")(DOT)

MERGE ONLY

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-635

Texas Department of Transportation

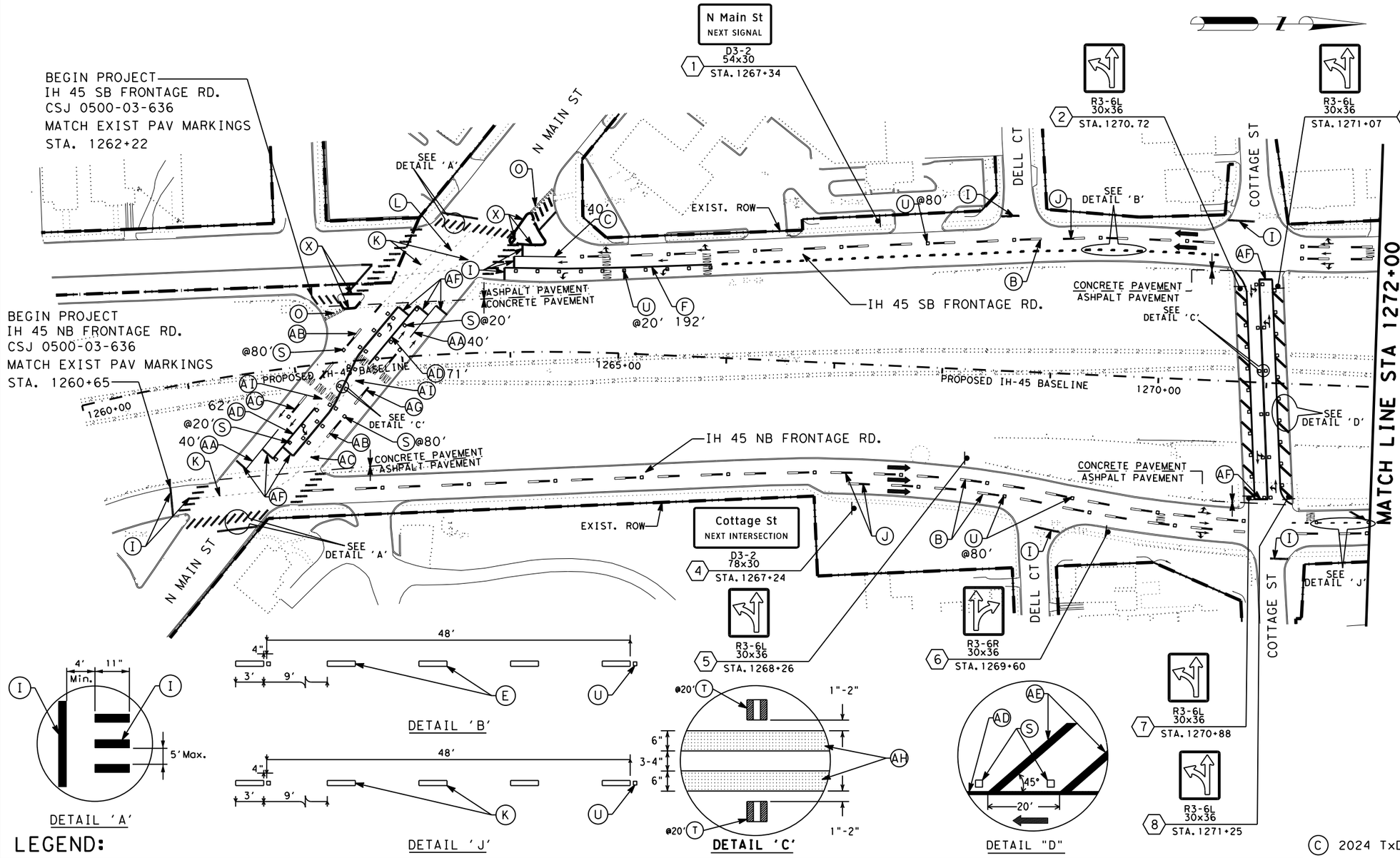
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100'

SHEET 9 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: REVISIONS	HOU	6				115
CK.:	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DN.:	HARRIS	0500	03	635, Etc.		IH 45
CK.:						

$DATE$
$FILE$



NOTES:

1. EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
2. THE CROSS LINES ARE TO REMAIN PARALLEL TO THE LANE LINES. REFER STANDARD PM(4)-22A FOR FURTHER DETAILS.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)

PREFAB PAV MRK TY C (W)(DBL ARROW)
PREFAB PAV MRK TY C (W)(UTURN ARROW)
MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
PREFAB PAV MRK TY C (W)(ARROW)
DIRECTION OF TRAVEL
PROPOSED SMALL SIGN
(R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-636

Texas Department of Transportation

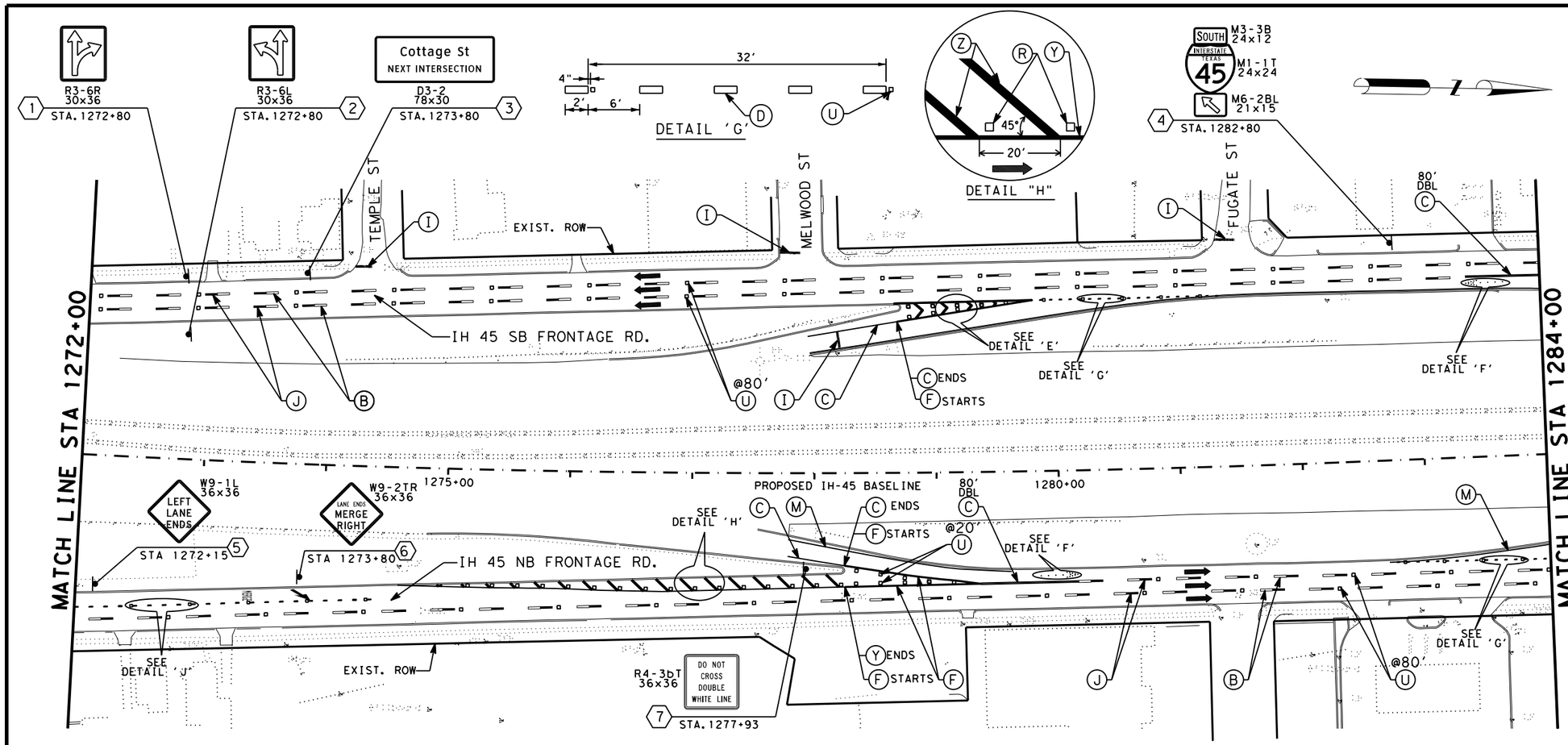
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100'

SHEET 10 OF 15

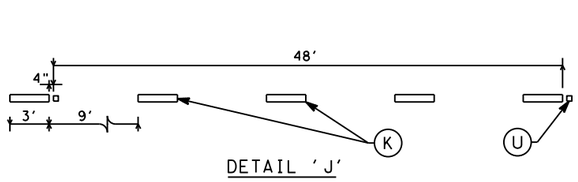
ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				116
CK.: -	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DN.: -	HARRIS	0500	03	635, Etc.		IH 45
CK.: -						

4/18/2024

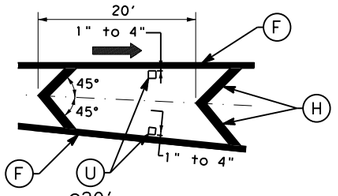


NOTES:

1. EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
2. THE CROSS LINES ARE TO REMAIN PARALLEL TO THE LANE LINES. REFER STANDARD PM(4)-22A FOR FURTHER DETAILS.

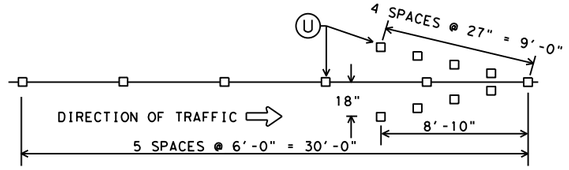


DETAIL 'J'



DETAIL 'E'

NOTE: (U) SHALL BE CENTERED BETWEEN CHEVRON OR GORE LINES.



DETAIL 'F'

LEGEND:

(A)	RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)	(M)	RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)	(Y)	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
(B)	RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)	(N)	PREFAB PAV MRK TY C (W)(SYMBOL)	(Z)	REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
(C)	RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)	(O)	PREFAB PAV MRK TY C (W)(36")(YLD TRI)	(AA)	MULTIPOLYMER PAV MRK (W)(6")(SLD)
(D)	REFL PAV MRK TY I (W) 8" (DOT)(100MIL)	(P)	PREFAB PAV MRK TY C (W)(BIKE ARROW)	(AB)	MULTIPOLYMER PAV MRK (W)(6")(BRK)
(E)	REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)	(Q)	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)	(AC)	MULTIPOLYMER PAV MRK (W)(6")(DOT)
(F)	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	(R)	REFL PAV MRKR TY I-A	(AD)	MULTIPOLYMER PAV MRK (W)(8")(SLD)
(G)	REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)	(S)	REFL PAV MRKR TY I-C	(AE)	MULTIPOLYMER PAV MRK (W)(12")(SLD)
(H)	REFL PAV MRK TY I (W) 12" (SLD)(100MIL)	(T)	REFL PAV MRKR TY II-A-A	(AF)	MULTIPOLYMER PAV MRK (W)(24")(SLD)
(I)	REFL PAV MRK TY I (W) 24" (SLD)(100MIL)	(U)	REFL PAV MRKR TY II-C-R	(AG)	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
(J)	RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)	(V)	REFL PAV MRK TY II (W) 24" SLD	(AH)	MULTIPOLYMER PAV MRK (Y)(6")(SLD)
(K)	REFL PAV MRK TY I (W) 6" (DOT)(100MIL)	(W)	REFL PAV MRK TY II (Y) 12" SLD		
(L)	REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)	(X)	REFL PAV MRK TY II (Y) 24" SLD		

PREFAB PAV MRK TY C (W)(DBL ARROW)
PREFAB PAV MRK TY C (W)(UTURN ARROW)
MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
PREFAB PAV MRK TY C (W)(ARROW)
DIRECTION OF TRAVEL
PROPOSED SMALL SIGN
(R-) REMOVE SM RD SN SUP&AM

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gaurang S. Pandit P.E. 111896, on

April 18 , 2024

CSJ: 0500-03-636

Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

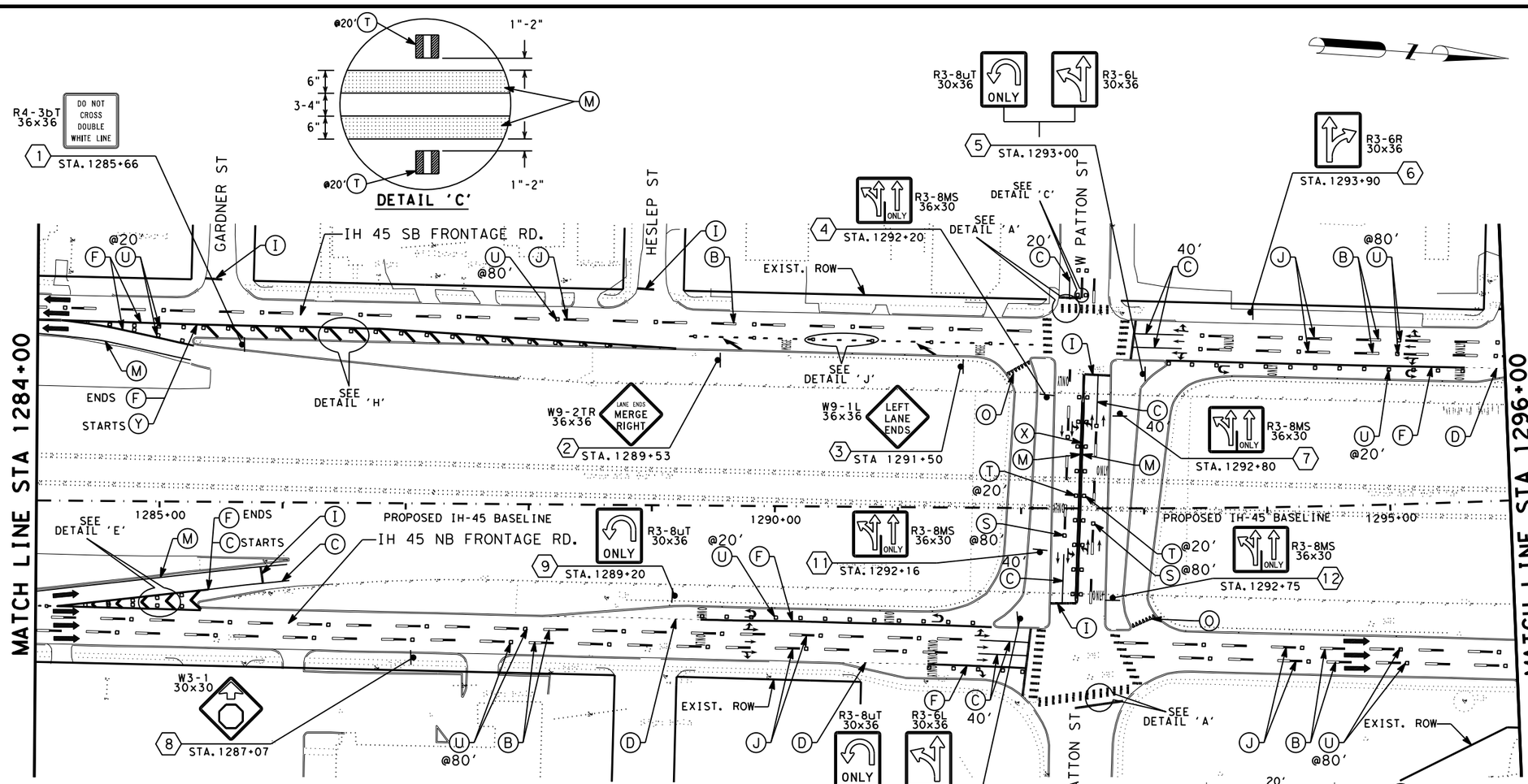
SCALE: 1" : 100'

SHEET 11 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				117
	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
	HARRIS	0500	03	635, Etc.		IH 45

4/18/2024

dwn:\\txdot.projectwiseonline.com:TXDOT13\Documents\12 - HOU\Design Projects\0500036351\4 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\05 PAVEMENT MARKINGS LAYOUTS\117 IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKING LAYOUT.dgn



NOTES:

1. EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
2. THE CROSS LINES ARE TO REMAIN PARALLEL TO THE LANE LINES. REFER STANDARD PM(4)-22A FOR FURTHER DETAILS.

NOTE: (U) SHALL BE CENTERED BETWEEN CHEVRON OR GORE LINES.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- PREFAB PAV MRK TY C (W)(WORD) — MERGE ONLY
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-636

Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

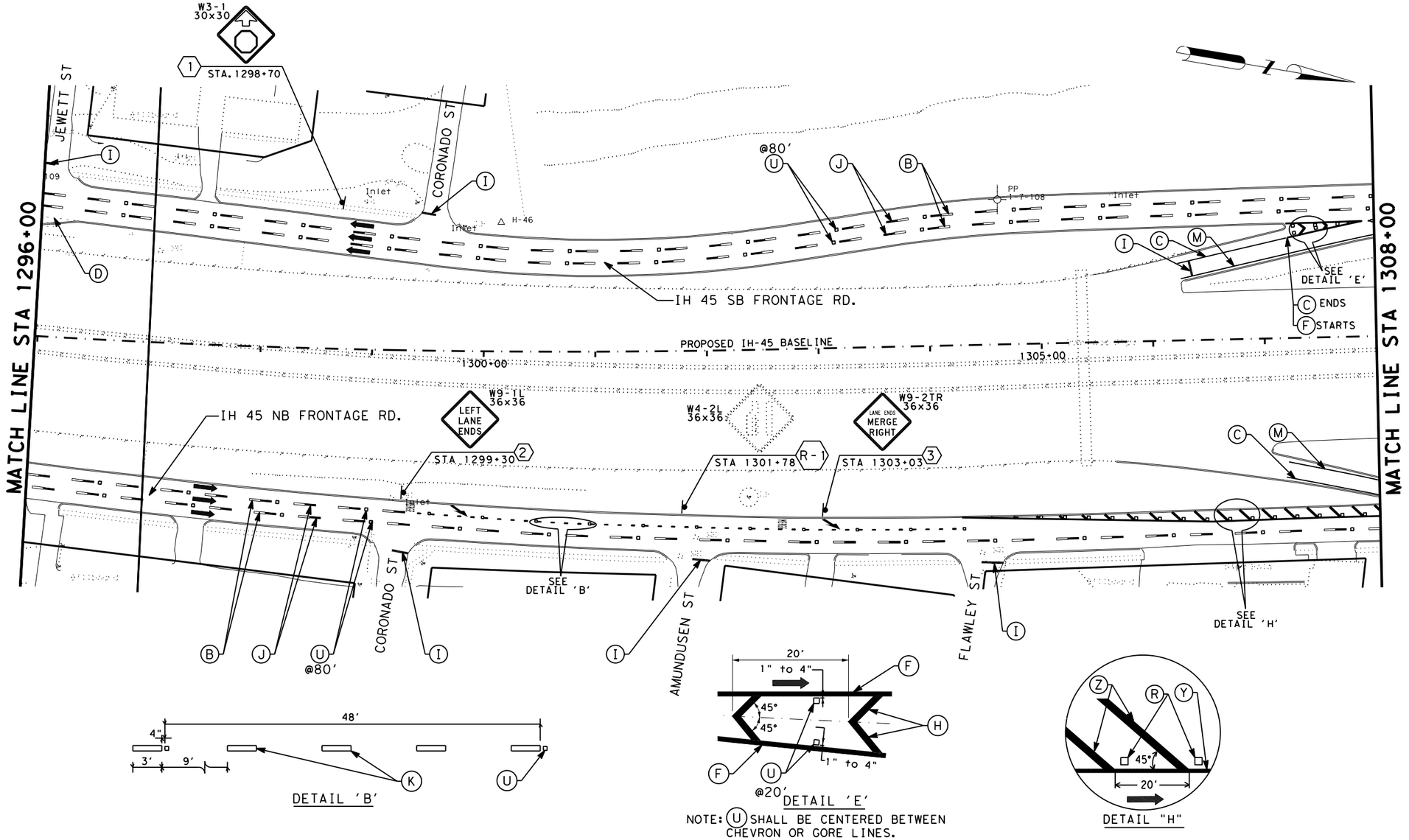
SCALE: 1" : 100'

SHEET 12 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: REVISIONS	HOU	6				118
CK.:	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DW.:	HARRIS	0500	03	635, Etc.		IH 45
CK.:						

4/18/2024

dw:\\txdot.projectwiseonline.com:TX0073\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\05 PAVEMENT MARKINGS LAYOUTS\118 IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKING LAYOUT.dgn



NOTE: (U) SHALL BE CENTERED BETWEEN CHEVRON OR GORE LINES.

NOTES:

1. EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
2. THE CROSS LINES ARE TO REMAIN PARALLEL TO THE LANE LINES. REFER STANDARD PM(4)-22A FOR FURTHER DETAILS.

LEGEND:

- (A) RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)
- (C) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (D) REFL PAV MRK TY I (W) 8" (DOT)(100MIL)
- (E) REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)
- (F) REFL PAV MRK TY I (W) 8" (SLD)(100MIL)
- (G) REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)
- (H) REFL PAV MRK TY I (W) 12" (SLD)(100MIL)
- (I) REFL PAV MRK TY I (W) 24" (SLD)(100MIL)
- (J) RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)
- (K) REFL PAV MRK TY I (W) 6" (DOT)(100MIL)
- (L) REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)
- (M) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (N) PREFAB PAV MRK TY C (W)(SYMBOL)
- (O) PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- (P) PREFAB PAV MRK TY C (W)(BIKE ARROW)
- (Q) PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
- (R) REFL PAV MRKR TY I-A
- (S) REFL PAV MRKR TY I-C
- (T) REFL PAV MRKR TY II-A-A
- (U) REFL PAV MRKR TY II-C-R
- (V) REFL PAV MRK TY II (W) 24" SLD
- (W) REFL PAV MRK TY II (Y) 12" SLD
- (X) REFL PAV MRK TY II (Y) 24" SLD
- (Y) REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
- (Z) REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
- (AA) MULTIPOLYMER PAV MRK (W)(6")(SLD)
- (AB) MULTIPOLYMER PAV MRK (W)(6")(BRK)
- (AC) MULTIPOLYMER PAV MRK (W)(6")(DOT)
- (AD) MULTIPOLYMER PAV MRK (W)(8")(SLD)
- (AE) MULTIPOLYMER PAV MRK (W)(12")(SLD)
- (AF) MULTIPOLYMER PAV MRK (W)(24")(SLD)
- (AG) MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
- (AH) MULTIPOLYMER PAV MRK (Y)(6")(SLD)

- PREFAB PAV MRK TY C (W)(DBL ARROW)
- PREFAB PAV MRK TY C (W)(UTURN ARROW)
- MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
- PREFAB PAV MRK TY C (W)(ARROW)
- DIRECTION OF TRAVEL
- PROPOSED SMALL SIGN
- (R-) REMOVE SM RD SN SUP&AM

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gaurang S. Pandit P.E. 111896, on

April 18 , 2024

CSJ: 0500-03-636

Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

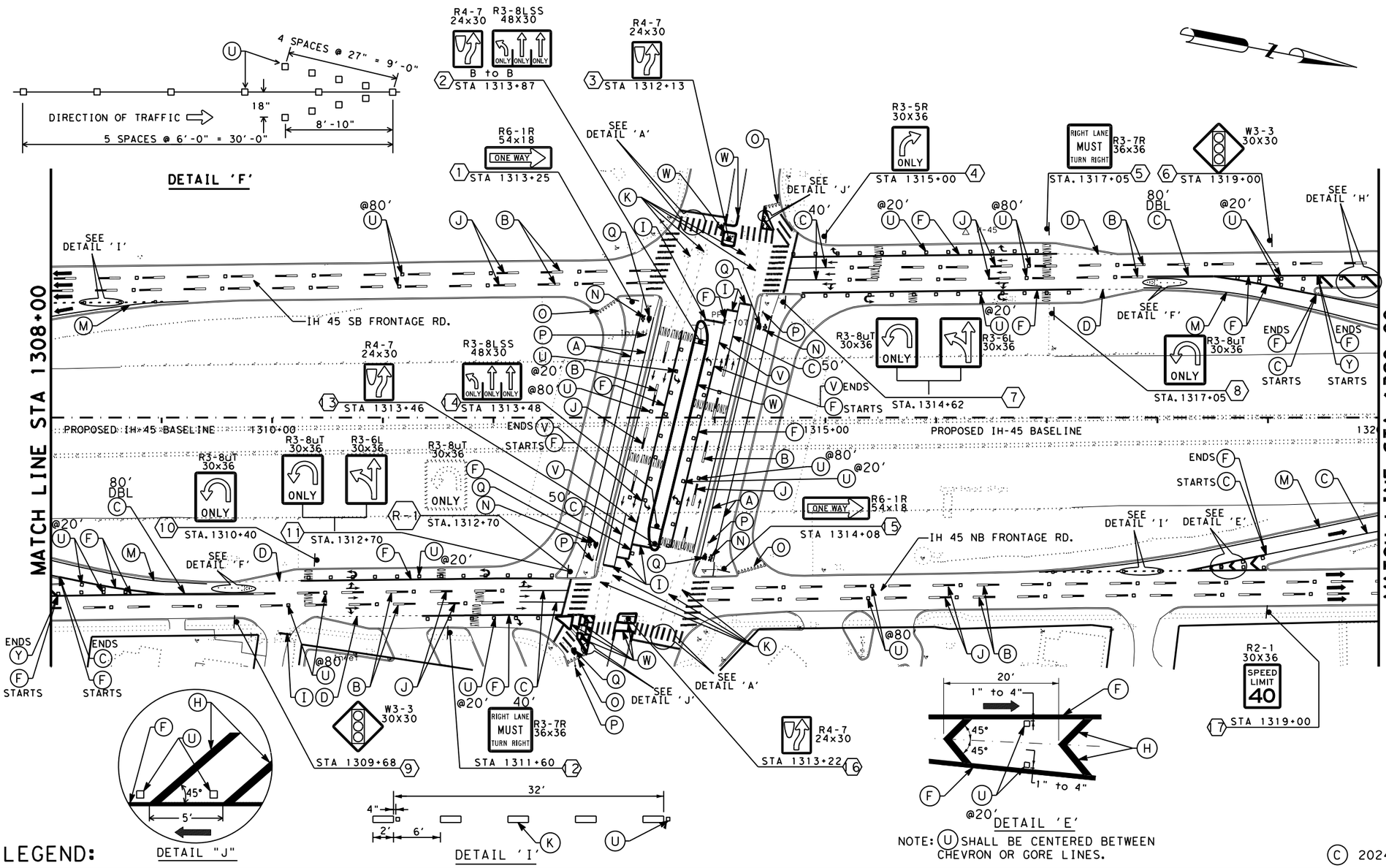
SCALE: 1" : 100'

SHEET 13 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				119
	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
	HARRIS	0500	03	635, Etc.		IH 45

4/18/2024

dw:\\txdot.projectwiseonline.com:TX0073\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\8. Traffic\SIGNING and PAVEMENT MARKINGS\05 PAVEMENT MARKINGS LAYOUTS\119 IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKING LAYOUT.dgn



NOTES:

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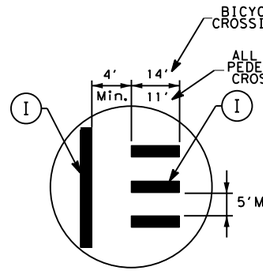
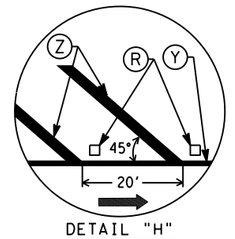
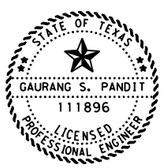
2. THE CROSS LINES ARE TO REMAIN PARALLEL TO THE LANE LINES. REFER STANDARD PM(4)-22A FOR FURTHER DETAILS.



DETAIL 'A'



DETAIL "H"



The seal appearing on this document was authorized by Gaurang S. Pandit P.E. 111896, on April 18 , 2024

LEGEND:

(A)	RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)	(M)	RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)	(Y)	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)
(B)	RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)	(N)	PREFAB PAV MRK TY C (W)(SYMBOL)	(Z)	REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)
(C)	RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)	(O)	PREFAB PAV MRK TY C (W)(36")(YLD TRI)	(AA)	MULTIPOLYMER PAV MRK (W)(6")(SLD)
(D)	REFL PAV MRK TY I (W) 8" (DOT)(100MIL)	(P)	PREFAB PAV MRK TY C (W)(BIKE ARROW)	(AB)	MULTIPOLYMER PAV MRK (W)(6")(BRK)
(E)	REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)	(Q)	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)	(AC)	MULTIPOLYMER PAV MRK (W)(6")(DOT)
(F)	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	(R)	REFL PAV MRKR TY I-A	(AD)	MULTIPOLYMER PAV MRK (W)(8")(SLD)
(G)	REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)	(S)	REFL PAV MRKR TY I-C	(AE)	MULTIPOLYMER PAV MRK (W)(12")(SLD)
(H)	REFL PAV MRK TY I (W) 12" (SLD)(100MIL)	(T)	REFL PAV MRKR TY II-A-A	(AF)	MULTIPOLYMER PAV MRK (W)(24")(SLD)
(I)	REFL PAV MRK TY I (W) 24" (SLD)(100MIL)	(U)	REFL PAV MRKR TY II-C-R	(AG)	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)
(J)	RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)	(V)	REFL PAV MRK TY II (W) 24" SLD	(AH)	MULTIPOLYMER PAV MRK (Y)(6")(SLD)
(K)	REFL PAV MRK TY I (W) 6" (DOT)(100MIL)	(W)	REFL PAV MRK TY II (Y) 12" SLD		
(L)	REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)	(X)	REFL PAV MRK TY II (Y) 24" SLD		

PREFAB PAV MRK TY C (W)(DBL ARROW)
PREFAB PAV MRK TY C (W)(UTURN ARROW)
MERGE ONLY PREFAB PAV MRK TY C (W)(WORD)
PREFAB PAV MRK TY C (W)(ARROW)
DIRECTION OF TRAVEL
PROPOSED SMALL SIGN
(R-) REMOVE SM RD SN SUP&AM

CSJ: 0500-03-636

Texas Department of Transportation

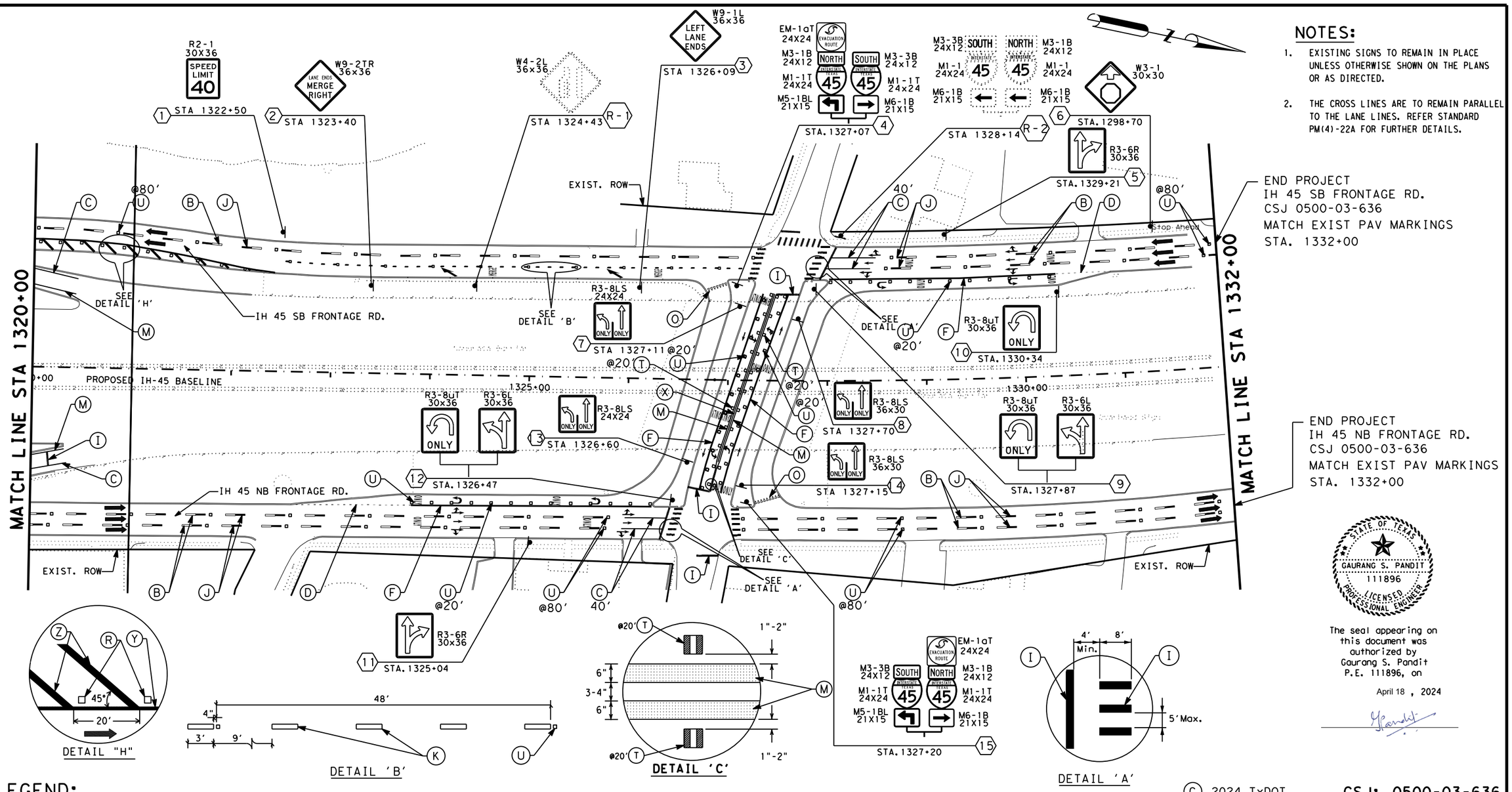
IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

SCALE: 1" : 100'

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
REVISIONS	HOU	6				120
	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
	HARRIS	0500	03	635, Etc.		IH 45

4/18/2024

dwl:\\txdot.projectwiseonline.com\TX0073\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\05 PAVEMENT MARKINGS LAYOUTS\120 IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKING LAYOUT.dgn



NOTES:

1. EXISTING SIGNS TO REMAIN IN PLACE UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED.
2. THE CROSS LINES ARE TO REMAIN PARALLEL TO THE LANE LINES. REFER STANDARD PM(4)-22A FOR FURTHER DETAILS.

STATE OF TEXAS
GAURANG S. PANDIT
111896
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Gaurang S. Pandit P.E. 111896, on

April 18 , 2024

LEGEND:

(A)	RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)	(M)	RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
(B)	RE PM W/RET REQ TY I (W) 6" (BRK)(100MIL)	(N)	PREFAB PAV MRK TY C (W)(SYMBOL)
(C)	RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)	(O)	PREFAB PAV MRK TY C (W)(36")(YLD TRI)
(D)	REFL PAV MRK TY I (W) 8" (DOT)(100MIL)	(P)	PREFAB PAV MRK TY C (W)(BIKE ARROW)
(E)	REFL PAV MRK TY I (W) 8" (LNDP)(100MIL)	(Q)	PREFAB PAV MRK TY C (W)(BIKE SYMBOL)
(F)	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	(R)	REFL PAV MRKR TY I-A
(G)	REFL PAV MRK TY I (W) 12" (LNDP)(100MIL)	(S)	REFL PAV MRKR TY I-C
(H)	REFL PAV MRK TY I (W) 12" (SLD)(100MIL)	(T)	REFL PAV MRKR TY II-A-A
(I)	REFL PAV MRK TY I (W) 24" (SLD)(100MIL)	(U)	REFL PAV MRKR TY II-C-R
(J)	RE PV MRK TY I (BLACK) 6" (SHADOW)(100MIL)	(V)	REFL PAV MRK TY II (W) 24" SLD
(K)	REFL PAV MRK TY I (W) 6" (DOT)(100MIL)	(W)	REFL PAV MRK TY II (Y) 12" SLD
(L)	REFL PAV MRK TY I (Y) 6" (DOT)(100MIL)	(X)	REFL PAV MRK TY II (Y) 24" SLD

(Y)	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)		PREFAB PAV MRK TY C (W)(DBL ARROW)
(Z)	REFL PAV MRK TY I (Y) 12" (SLD)(100MIL)		PREFAB PAV MRK TY C (W)(UTURN ARROW)
(AA)	MULTIPOLYMER PAV MRK (W)(6")(SLD)	MERGE ONLY	PREFAB PAV MRK TY C (W)(WORD)
(AB)	MULTIPOLYMER PAV MRK (W)(6")(BRK)		PREFAB PAV MRK TY C (W)(ARROW)
(AC)	MULTIPOLYMER PAV MRK (W)(6")(DOT)		DIRECTION OF TRAVEL
(AD)	MULTIPOLYMER PAV MRK (W)(8")(SLD)		PROPOSED SMALL SIGN
(AE)	MULTIPOLYMER PAV MRK (W)(12")(SLD)	R-	REMOVE SM RD SN SUP&AM
(AF)	MULTIPOLYMER PAV MRK (W)(24")(SLD)		
(AG)	MULTIPOLYMER PAV MRK (BLK)(6")(BRK)		
(AH)	MULTIPOLYMER PAV MRK (Y)(6")(SLD)		

CSJ: 0500-03-636

Texas Department of Transportation

IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKINGS LAYOUT

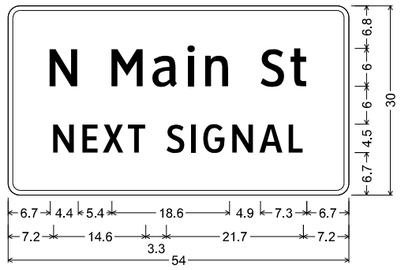
SCALE: 1" : 100'

SHEET 15 OF 15

ORIGINAL DRAWING DATE: FEB, 2024	STATE DISTRICT	FEDERAL REGION	PROJECT NO			SHEET
DN.: - REVISIONS	HOU	6				121
CK.: -	COUNTY	CONTROL	SECTION	JOB		HIGHWAY
DN.: -	HARRIS	0500	03	635, Etc.		IH 45
CK.: -						

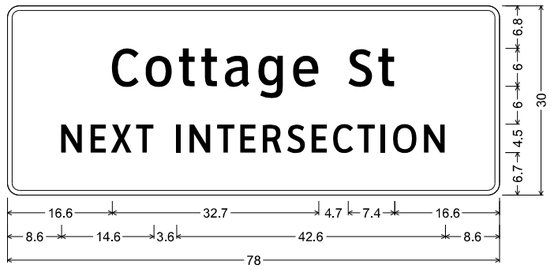
4/18/2024

Dan\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\05 PAVEMENT MARKINGS LAYOUTS\12] IH 45 FRONTAGE ROAD SIGNING & PAVEMENT MARKING LAYOUT.dgn



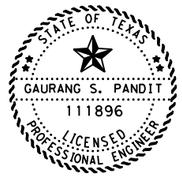
D3-2 54x30;
1.9" Radius, 0.8" Border, White on Green;
"N Main St", ClearviewHwy-3-W;
"NEXT SIGNAL", ClearviewHwy-3-W;

LAYOUT 10 OF 15: SIGN No: 1



D3-2 78x30;
1.9" Radius, 0.8" Border, White on Green;
"Cottage St", ClearviewHwy-3-W;
"NEXT INTERSECTION", ClearviewHwy-3-W;

LAYOUT 10 OF 15: SIGN No: 4
LAYOUT 11 OF 15: SIGN No: 3



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April 18 , 2024

TEXAS DEPARTMENT OF TRANSPORTATION

IH 45 FRONTAGE ROAD SMALL GUIDE SIGNS DETAILS

SCALE: NTS

SHEET 1 OF 1

ORIGINAL DRAWING DATE: APR, 2024		STATE DISTRICT	FEDERAL REGION	PROJECT NO.			SHEET
DN.: GS	REVISIONS	HOU	06				122
CK.:		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
DN.:		HARRIS		0500	03	635, Etc.	IH 45
CK.:							

DATE: 4/18/2024
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0500036354 - Design\Plan Set\8. Traffic\SIGNING AND PAVEMENT MARKINGS\06 SMALL GUIDE SIGNS DETAILS\122 SMALL SIGNS DETAILS.dgn

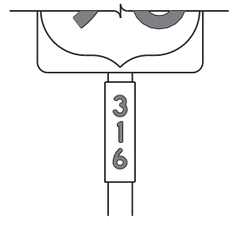
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

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

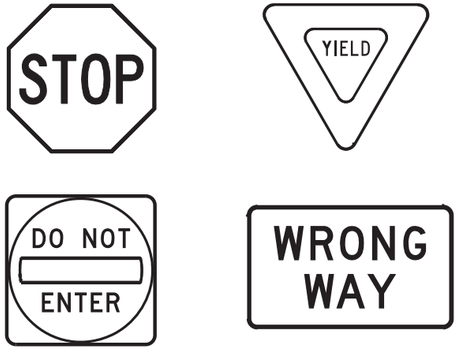
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635, Etc.	IH 45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	HARRIS		123

DATE: $DATE$
FILE: $FILE$

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

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.

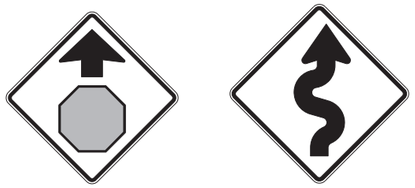
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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/

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

DATE: $DATE$
FILE: $FILE$

Texas Department of Transportation

Traffic Operations Division Standard

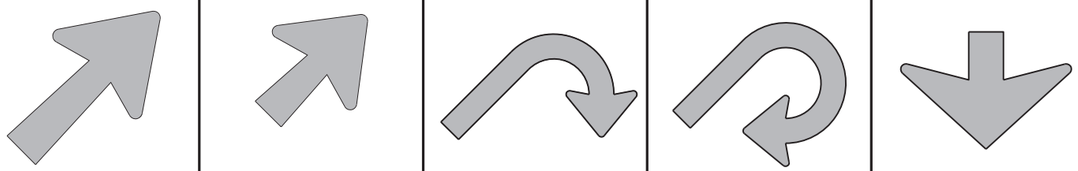
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635, Etc.	IH 45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	HARRIS		124

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

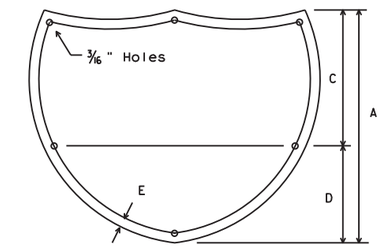
NOTE

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.

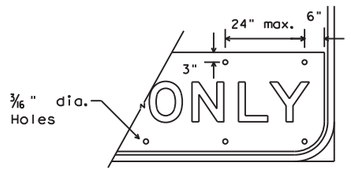
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

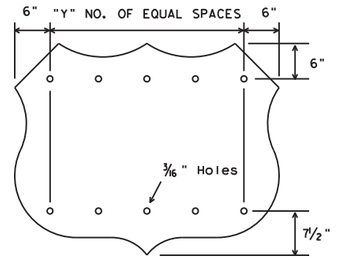


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

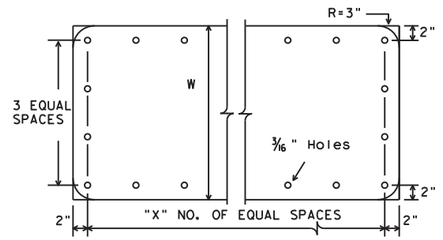


EXIT ONLY PANEL



U.S. ROUTE MARKERS

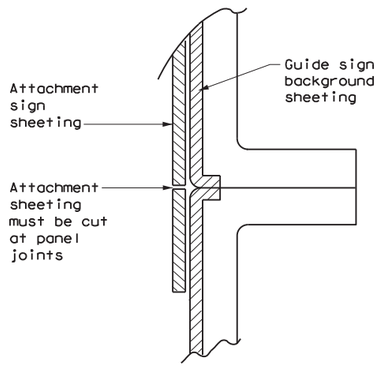
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



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

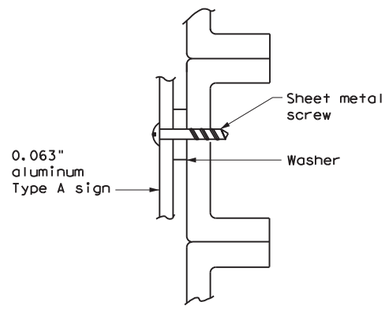
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



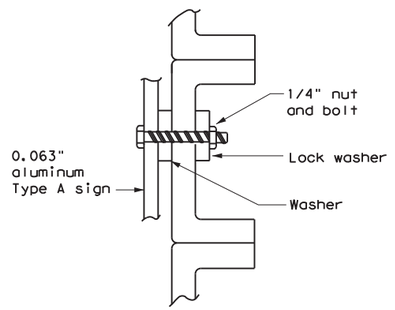
DIRECT APPLIED ATTACHMENT

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



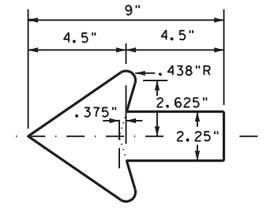
NUT/BOLT ATTACHMENT

NOTE:

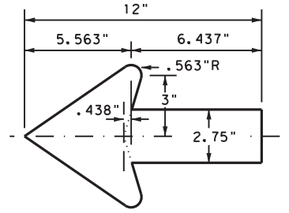
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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

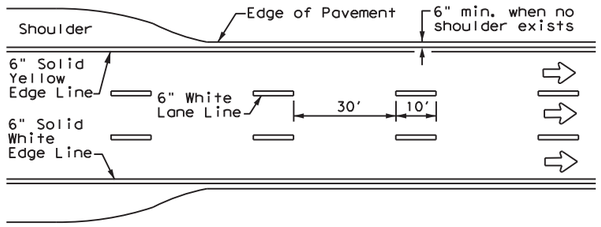
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

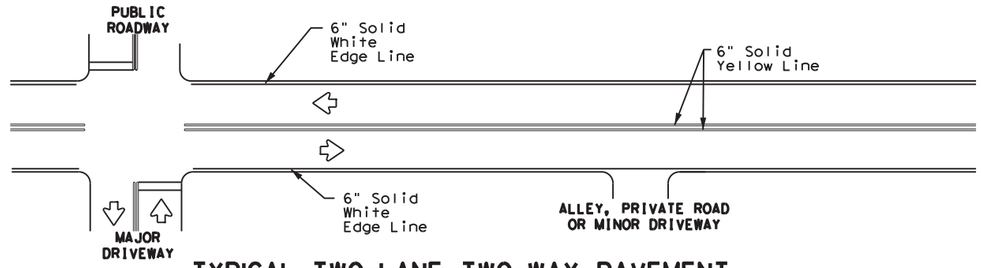
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635, Etc.	IH 45
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	HOU	HARRIS		125

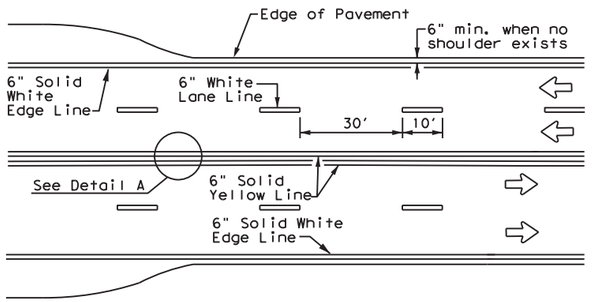
DATE: $DATE$
FILE: $FILE$

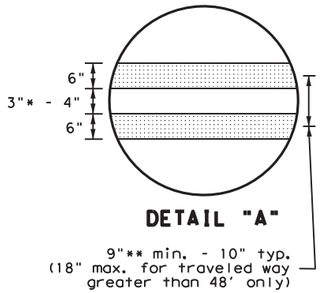


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

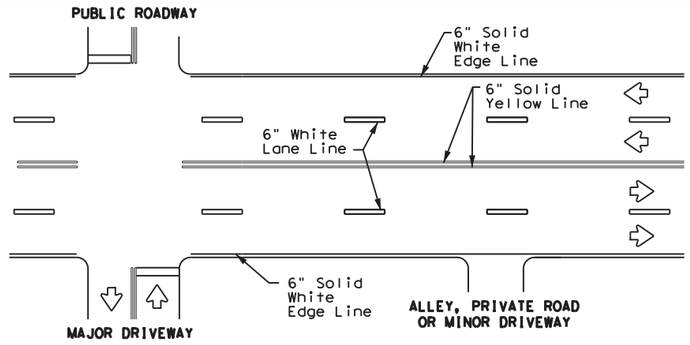




CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

** 8" minimum for restripe projects when approved by the Engineer.



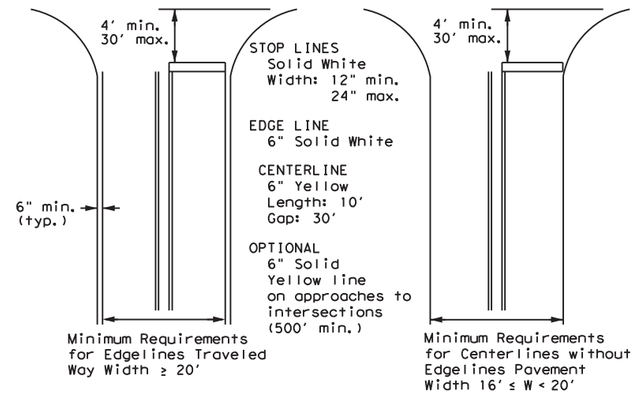
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

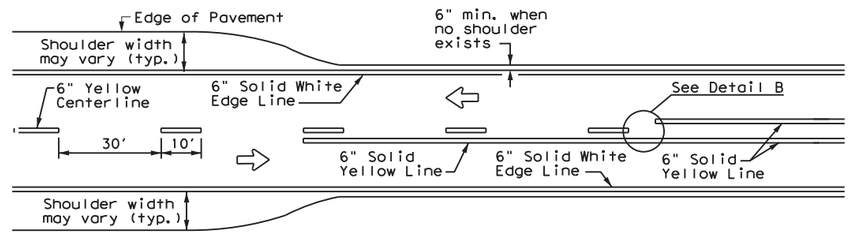
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



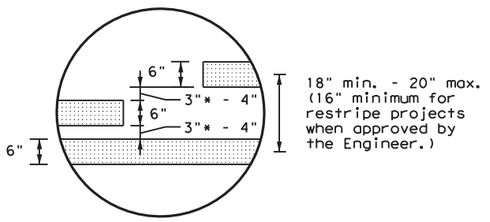
NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

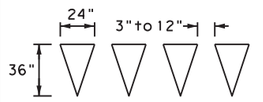


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

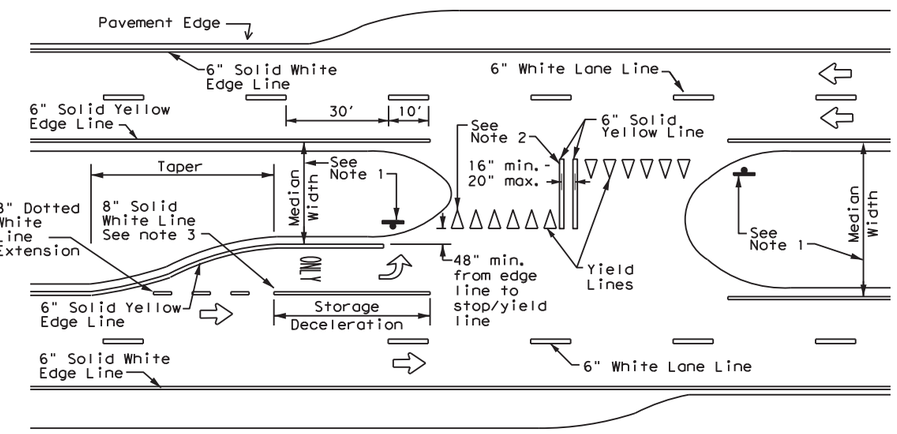
* 2" minimum for restripe projects when approved by the Engineer.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES

For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
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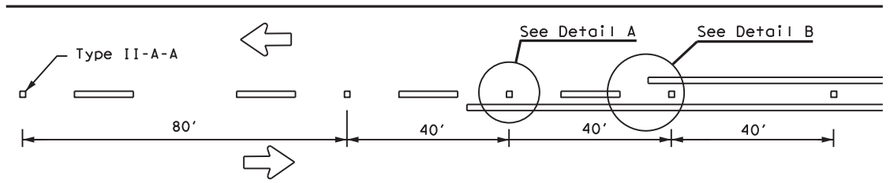
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		126

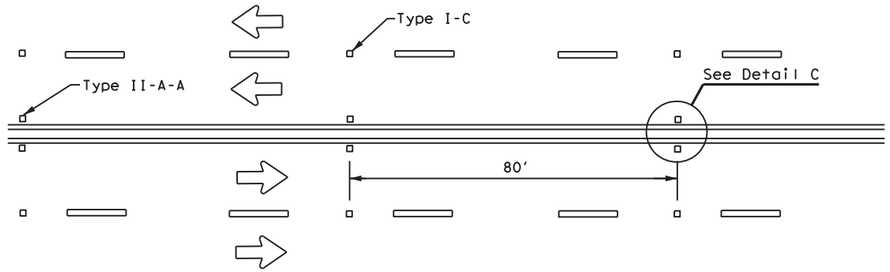
22A

DATE: $DATE$
FILE: $FILE$

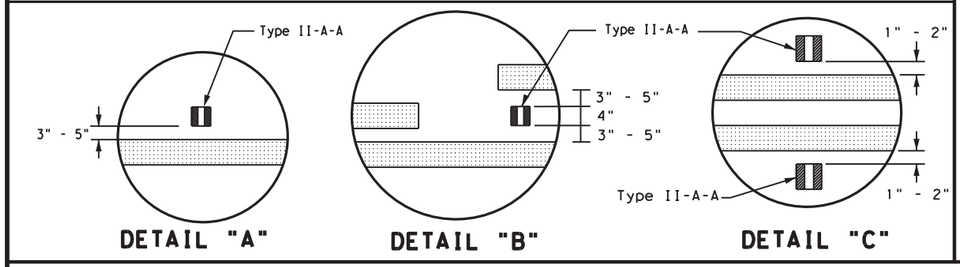
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



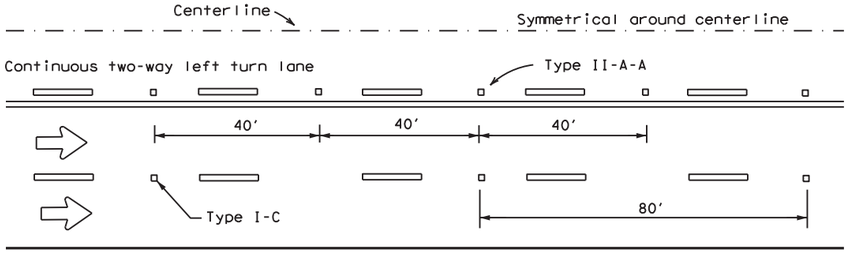
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



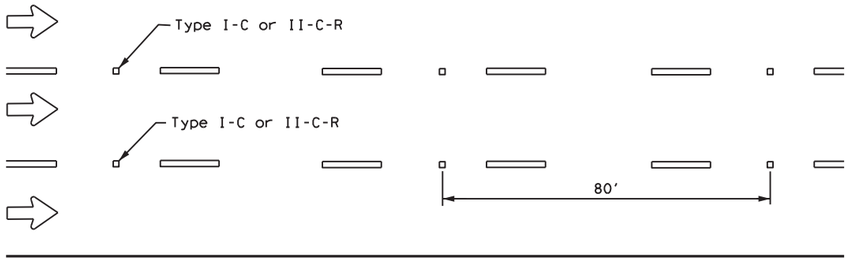
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



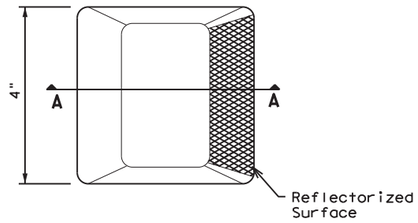
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

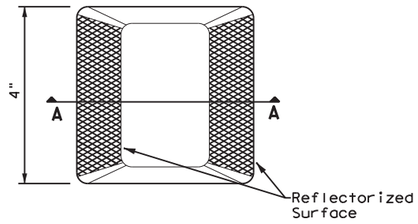
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

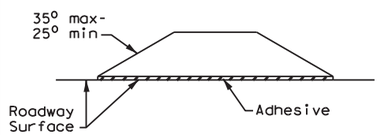
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

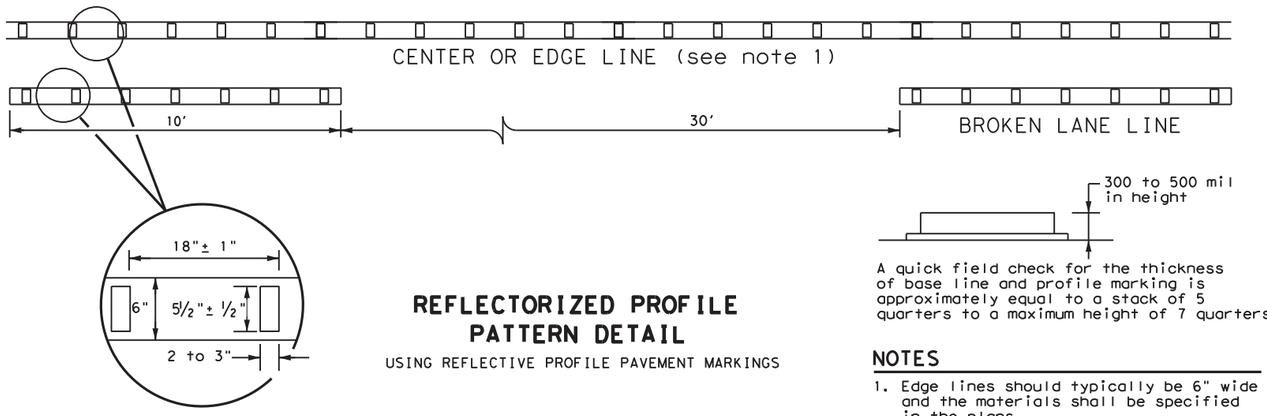


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
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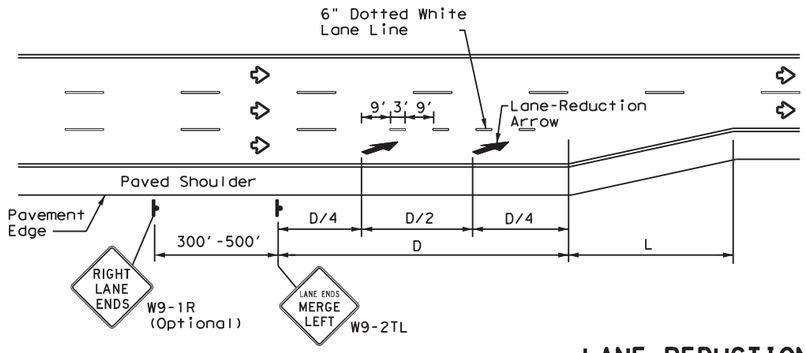
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		127

22B

DATE: $DATE$
FILE: $FILE$



LANE REDUCTION

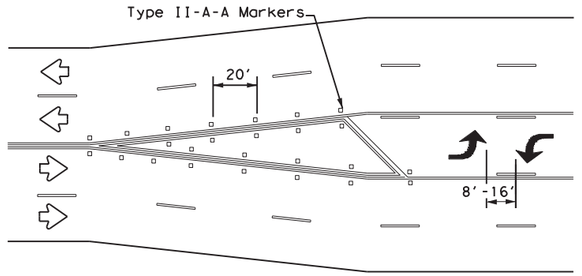
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

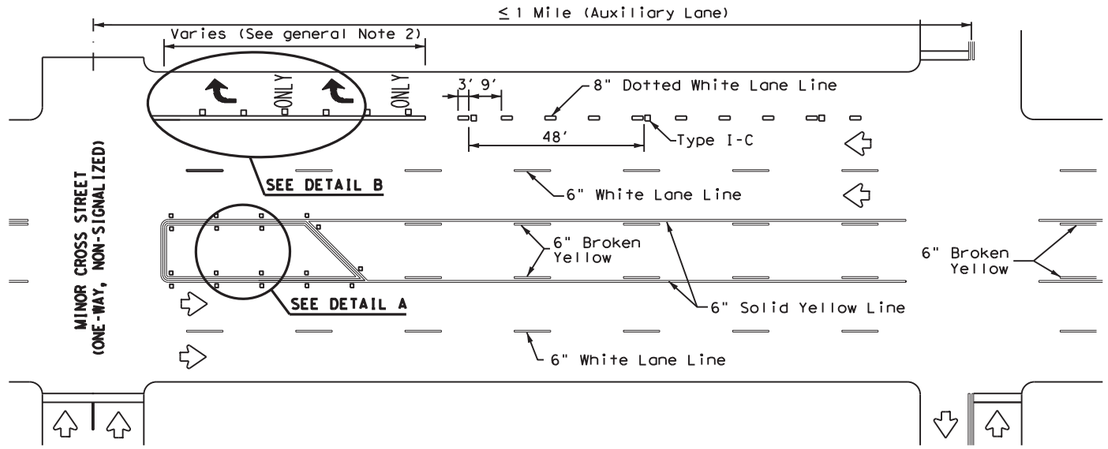


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

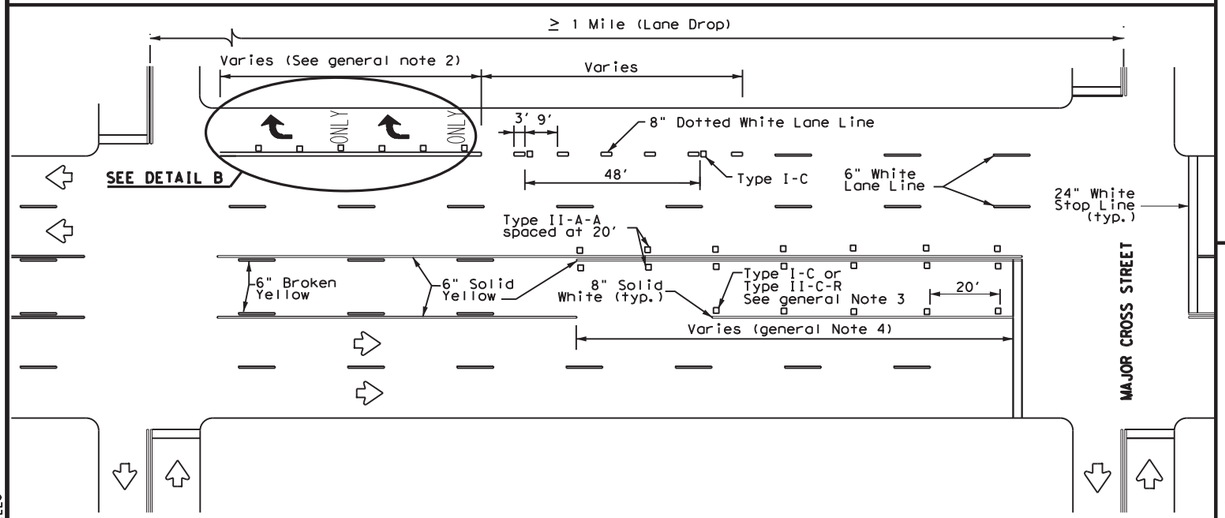
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

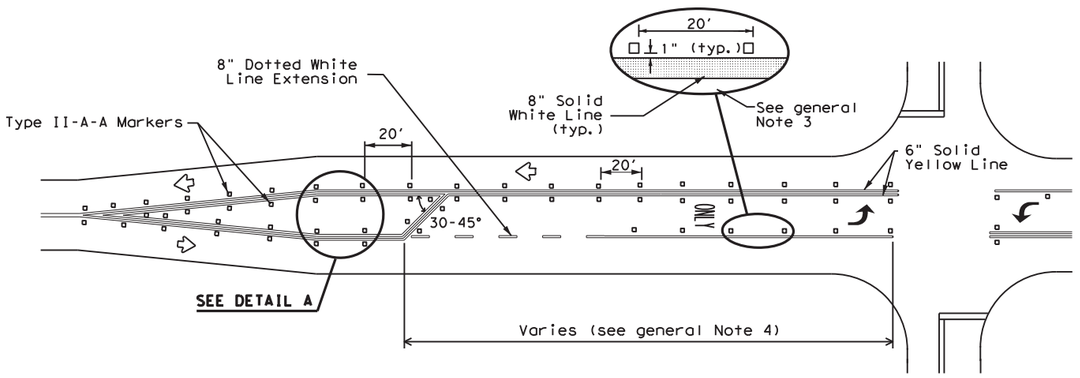
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



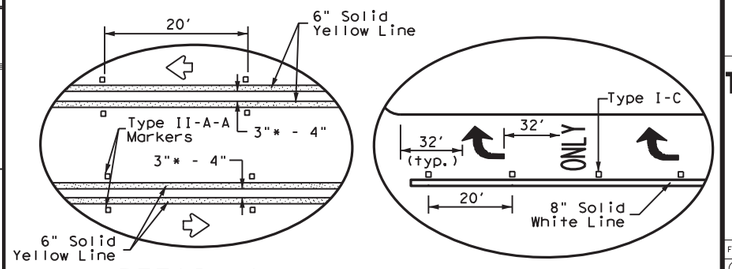
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
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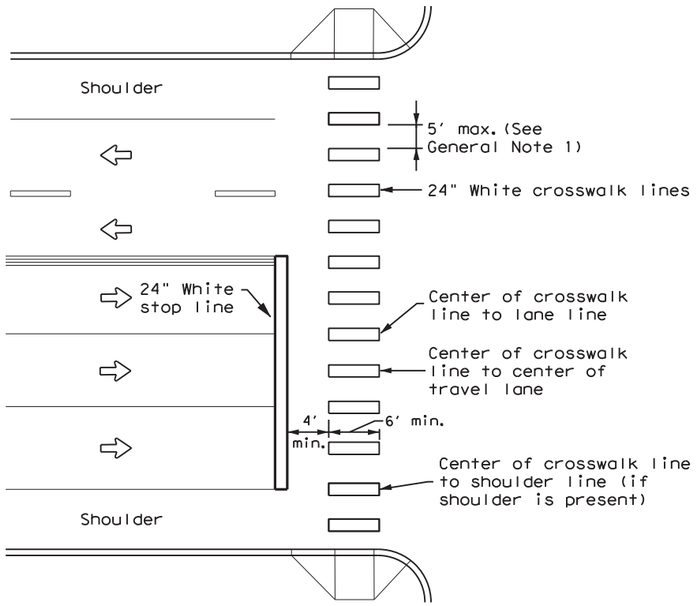
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		128

22C

DATE: $DATE$
FILE: $FILE$



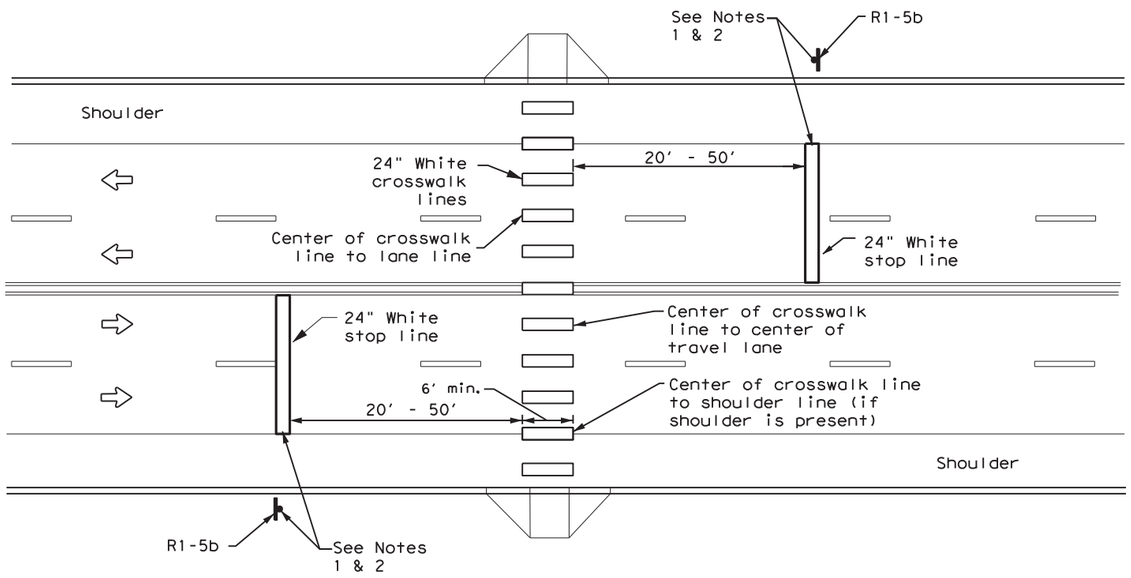
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

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 and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
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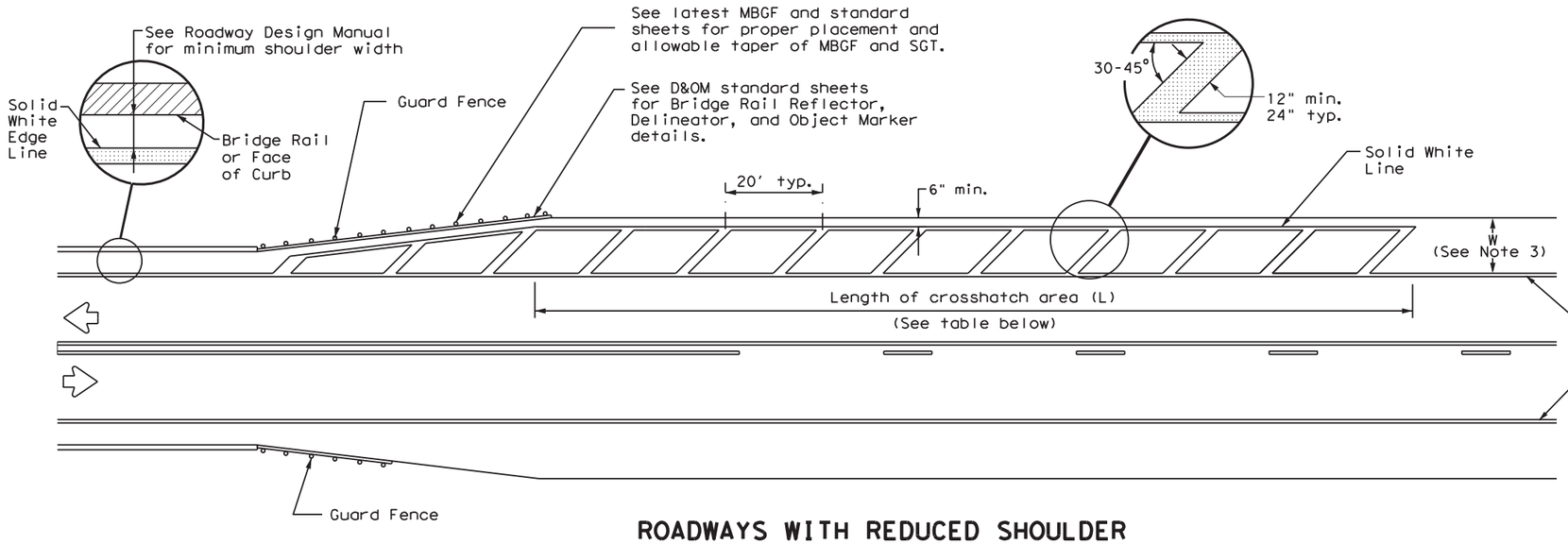
REVISIONS 6-20 6-22 12-22	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		129

220

DATE: $DATE$
FILE: $FILE$



ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

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.

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

Texas Department of Transportation

Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

PM(5)-22

FILE: pm5-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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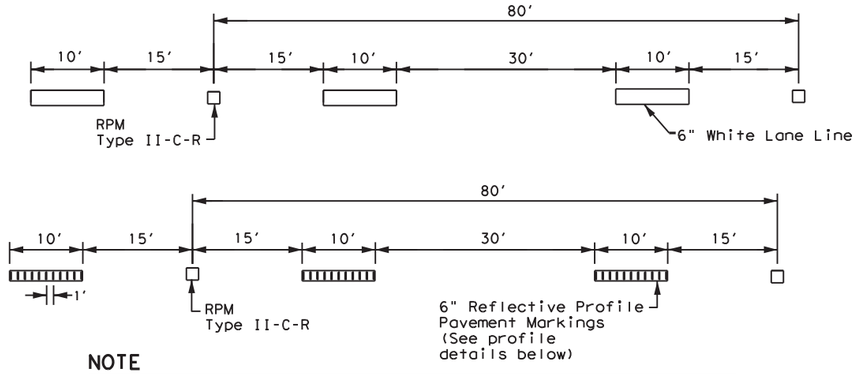
REVISIONS	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		130

22E

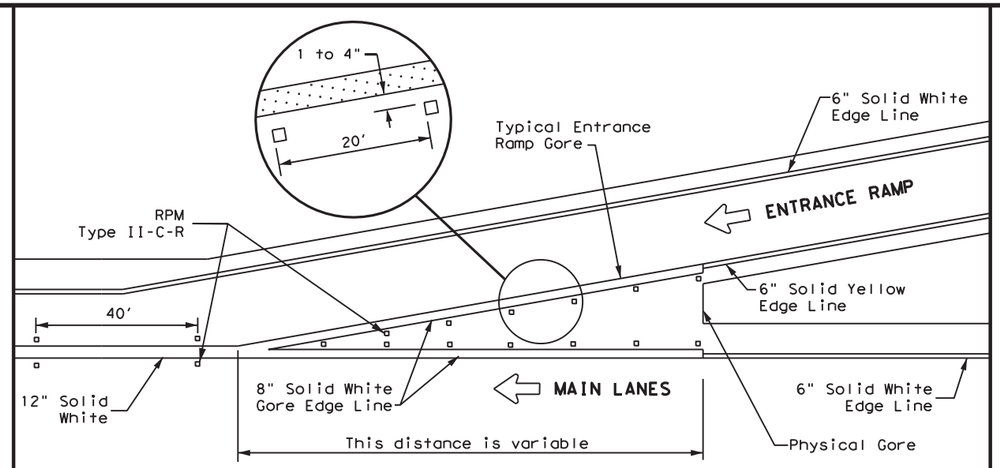
DATE: $DATE$
FILE: $FILE$



NOTE

Reflectorized raised pavement markers Type II-C-R shall be spaced on 80'centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING



TYPICAL ENTRANCE RAMP GORE MARKING

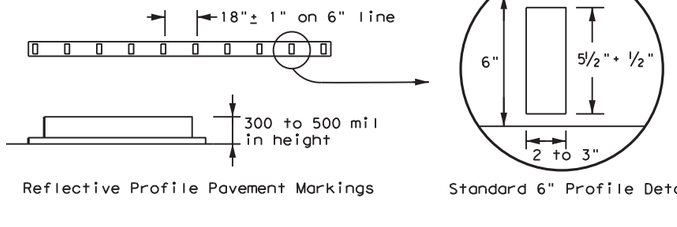
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R

GENERAL NOTE

On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



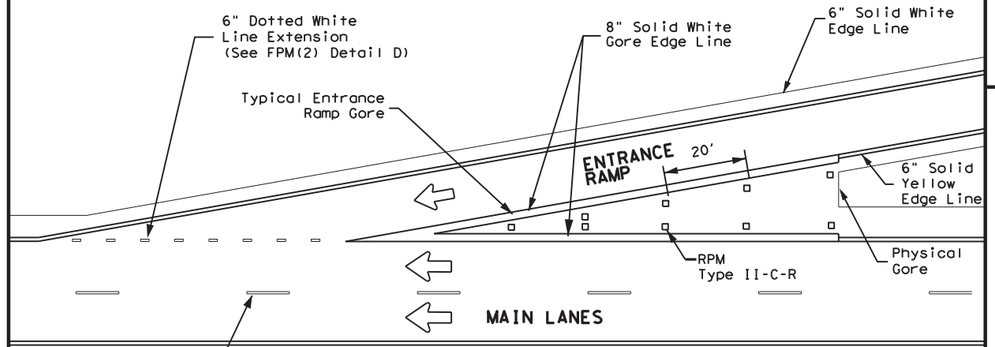
Reflective Profile Pavement Markings

Standard 6" Profile Detail

NOTE

Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

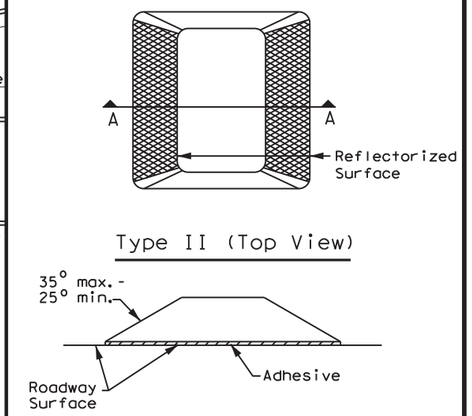
EDGE LINE PAVEMENT MARKINGS



NOTE

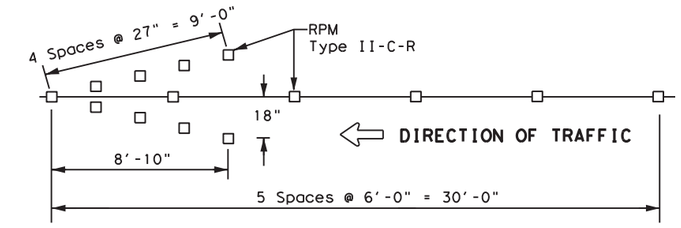
See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE



SECTION A

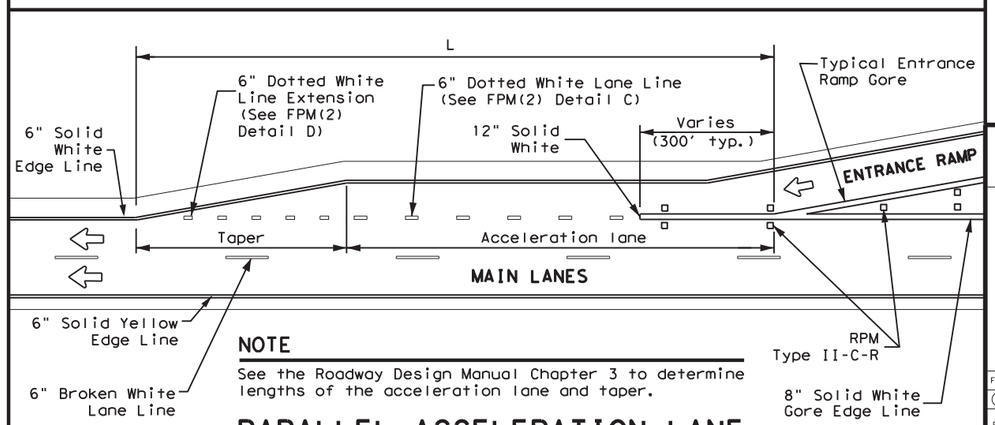
REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



NOTES

1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

WRONG WAY ARROW



NOTE

See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

PARALLEL ACCELERATION LANE

Texas Department of Transportation

Traffic Safety Division Standard

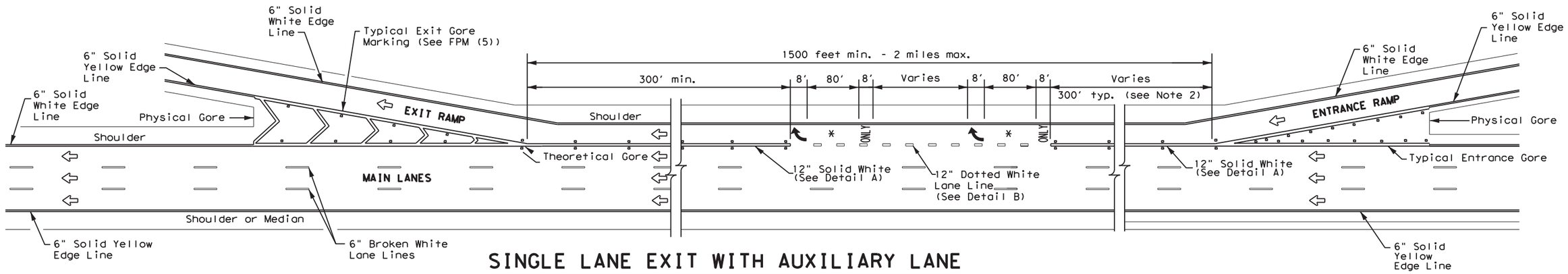
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-22

FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635, Etc.	IH 45
5-74 8-00 2-12	DIST	COUNTY		SHEET NO.
4-92 2-08 10-22	HOU	HARRIS		131
5-00 2-10				

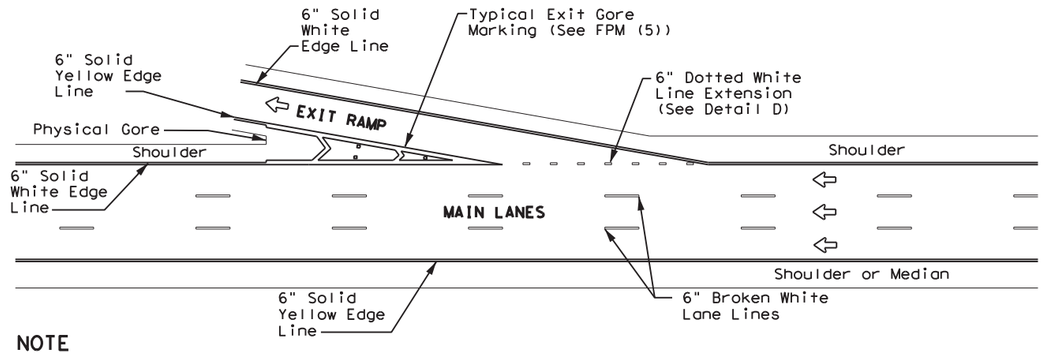
23A

DATE:$DATE$
FILE:$FILE$



SINGLE LANE EXIT WITH AUXILIARY LANE

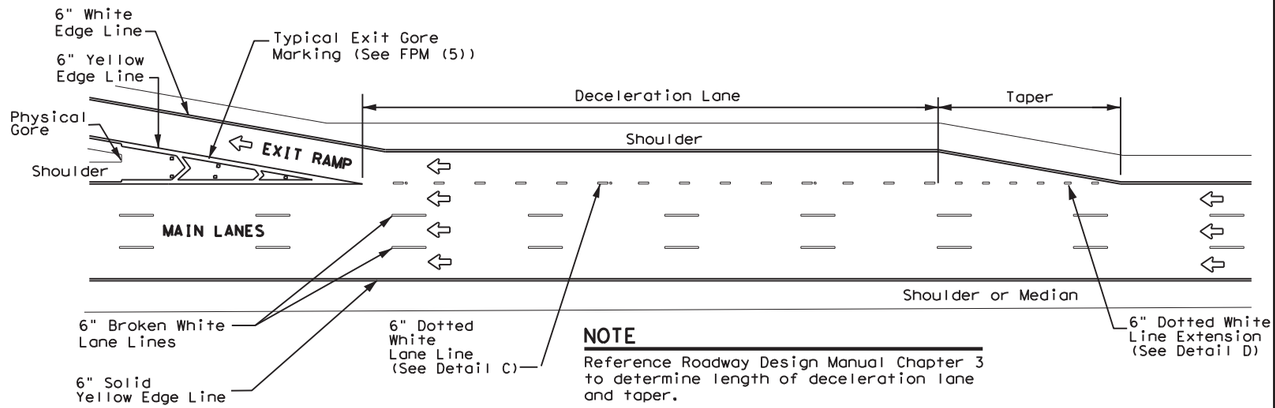
(See Note 2)



NOTE

Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

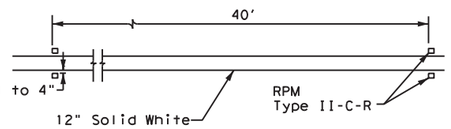
TAPERED DECELERATION LANE



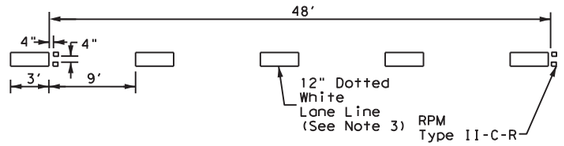
NOTE

Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.

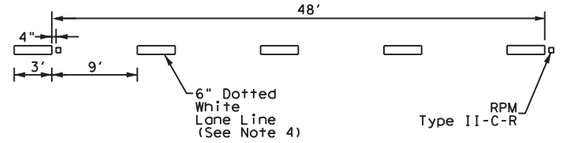
PARALLEL DECELERATION LANE



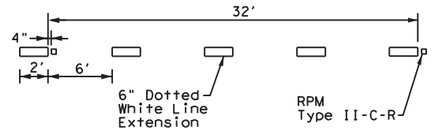
DETAIL A



DETAIL B



DETAIL C



DETAIL D

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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.

Texas Department of Transportation

Traffic Safety Division Standard

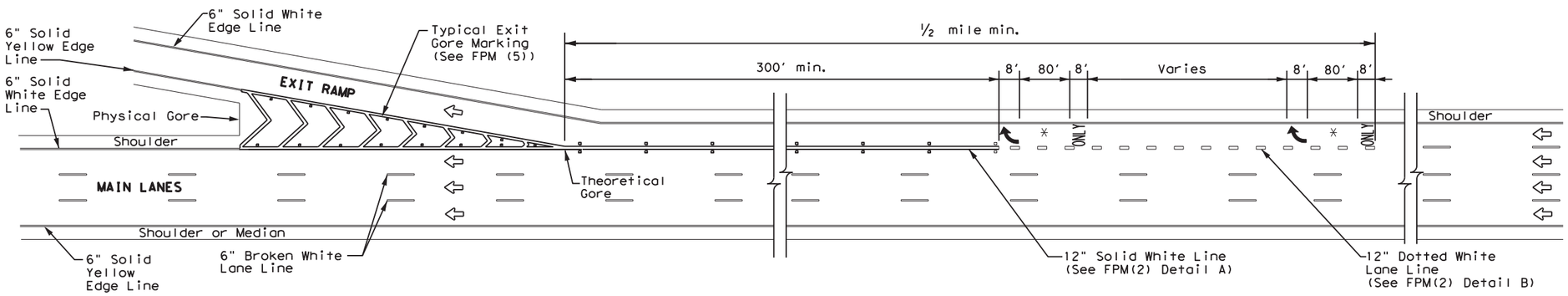
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-22

FILE: fpm(2)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-77 5-00 2-12 4-92 8-00 10-22 8-95 2-10	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		132

23B

DATE:$DATE$
FILE:$FILE$

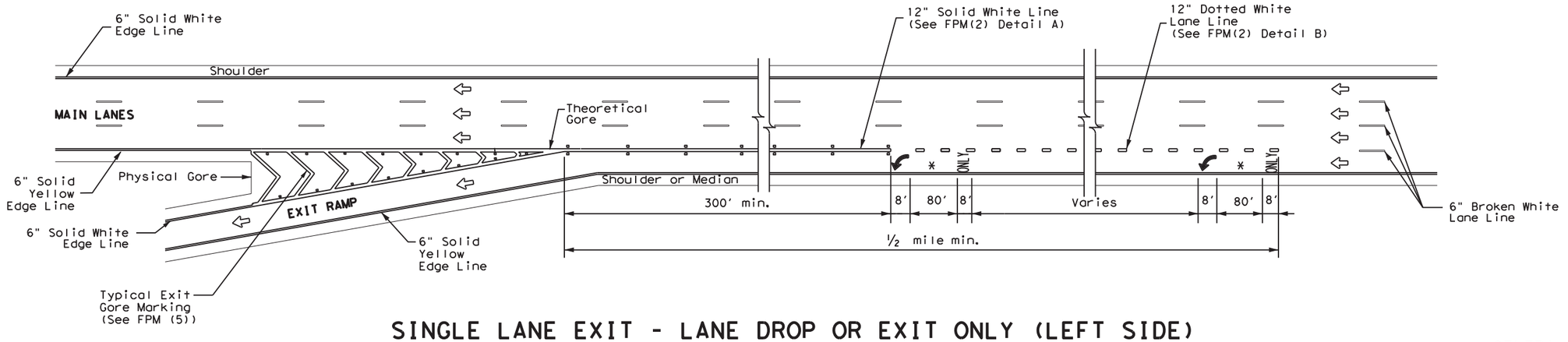


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

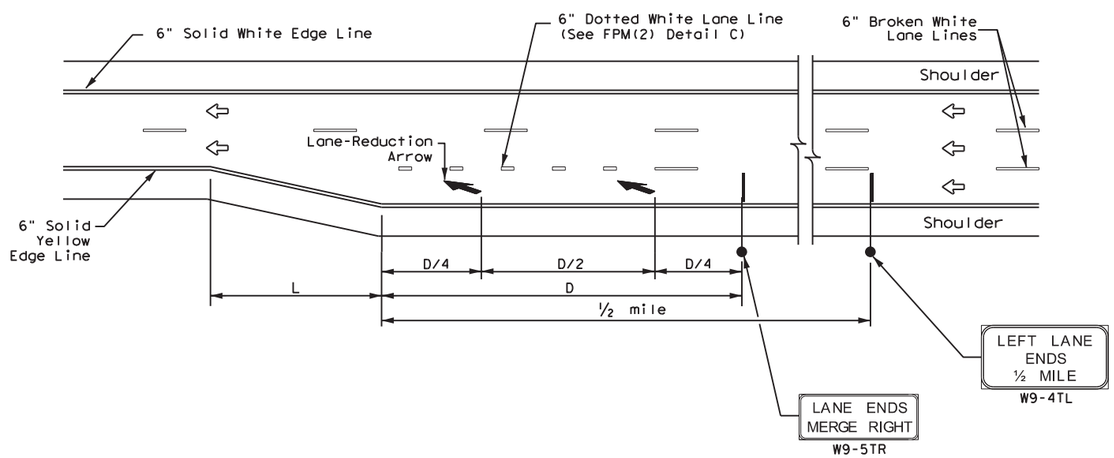
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFT SIDE)



FREEWAY LANE REDUCTION

NOTES

1. Large Guide signs shall conform to the TxDOT Freeway Signing Handbook.
2. 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.
3. Arrows and sign details can be found in the Standard Highway Sign Designs for Texas (SHSD) at http://www.txdot.gov.
4. These guidelines may also be applied to the design of a right side lane reduction. Use LANE ENDS MERGE LEFT (W9-5TL) and RIGHT LANE ENDS 1/2 MILE (W9-4TR) signs in lieu of what is shown on drawing.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
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	
80 MPH	1,500	
85 MPH	1,625	

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

Texas Department of Transportation

Traffic Safety Division Standard

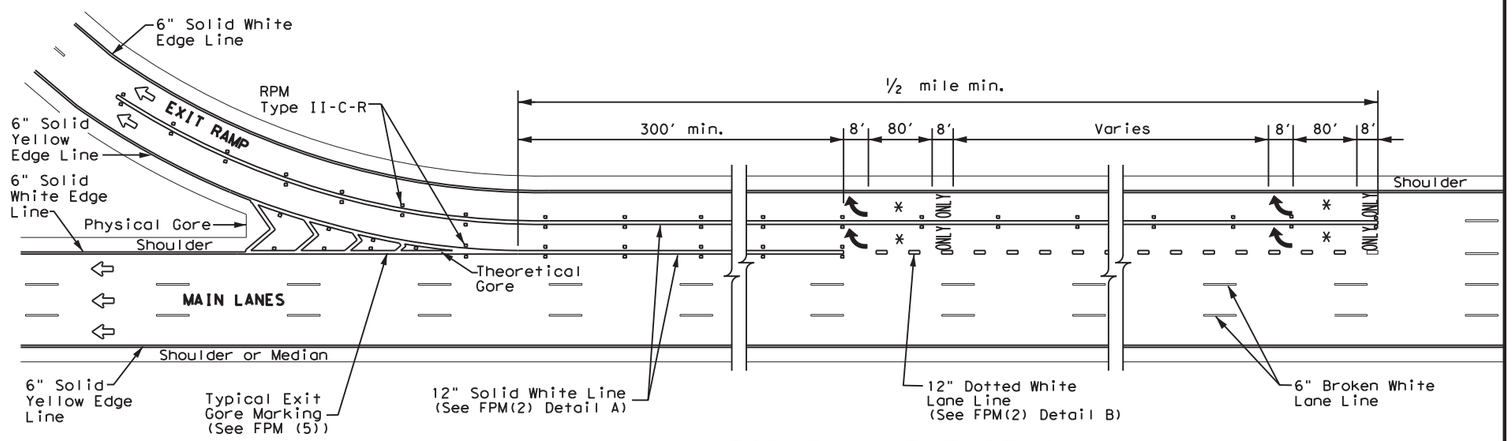
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS SINGLE LANE DROP (EXIT ONLY) AND LANE REDUCTION DETAILS

FPM(3)-22

FILE: fpm(3)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0500	03	635, Etc.	IH 45
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 10-22	HOU	HARRIS		133

23C

DATE: $DATE$
FILE: $FILE$



MULTIPLE LANE EXIT ONLY

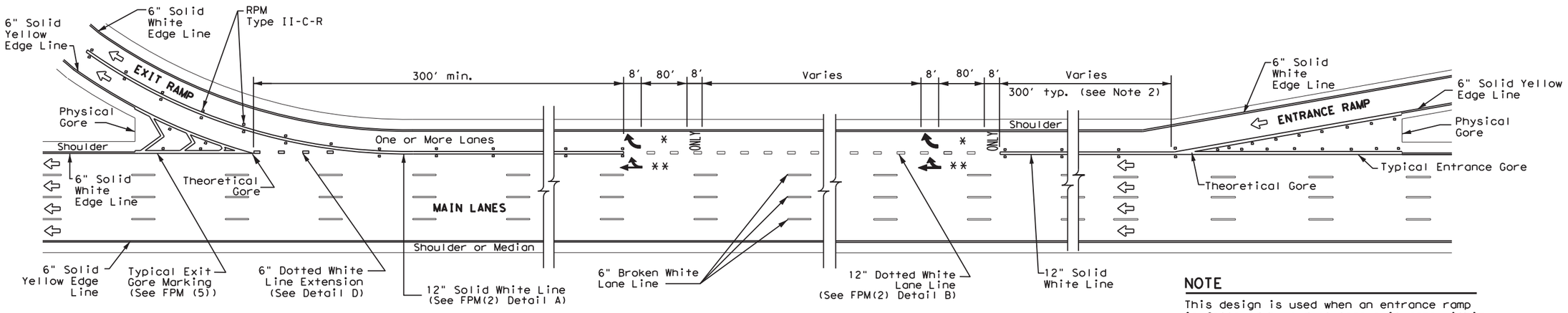
LEGEND	
⇦	Traffic Flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R
↱	Pavement marking arrow (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used
**	Arrow markings are optional

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.

GENERAL NOTES

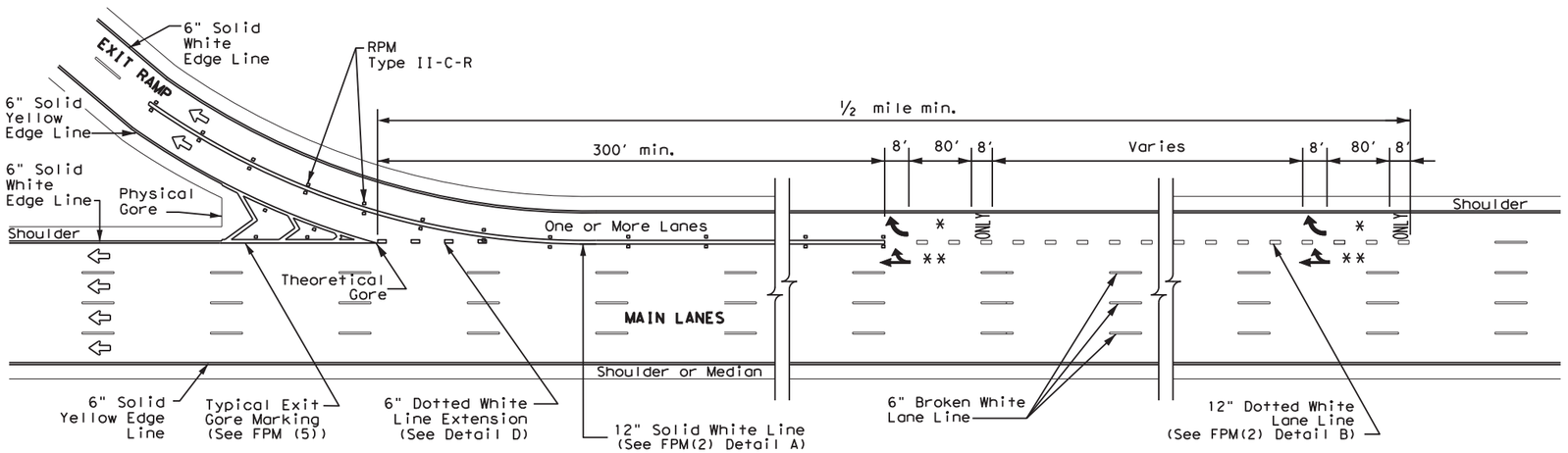
1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.



SINGLE LANE ENTRANCE WITH MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

NOTE

This design is used when an entrance ramp is followed by a dual lane exit ramp within 2400' downstream (theoretical gore to theoretical gore).



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS MULTIPLE LANE DROP (EXIT) DETAILS

FPM(4)-22

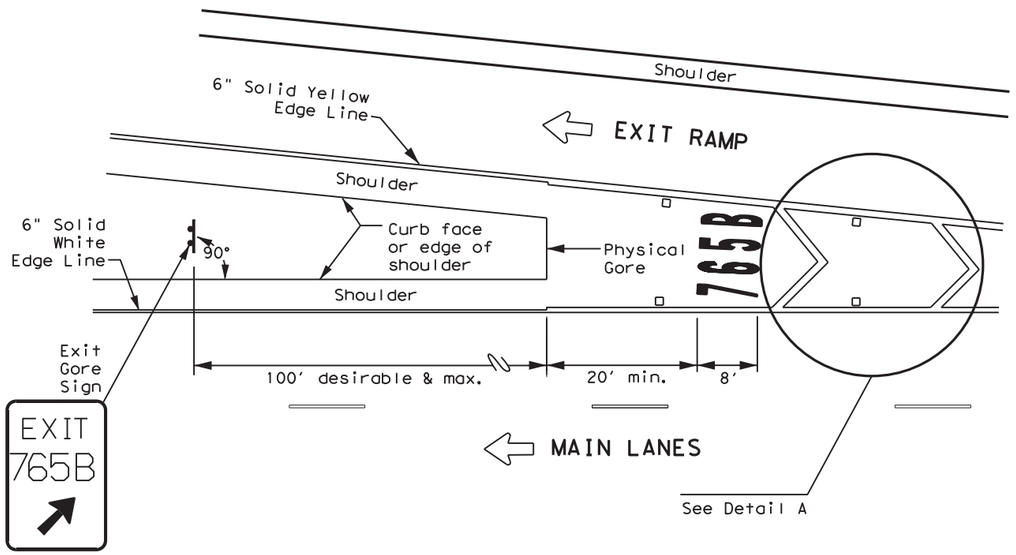
FILE: fpm(4)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635, Etc.	IH 45
2-77 2-10	DIST	COUNTY		SHEET NO.
5-00 2-12	HOU	HARRIS		134
8-00 10-22				

230

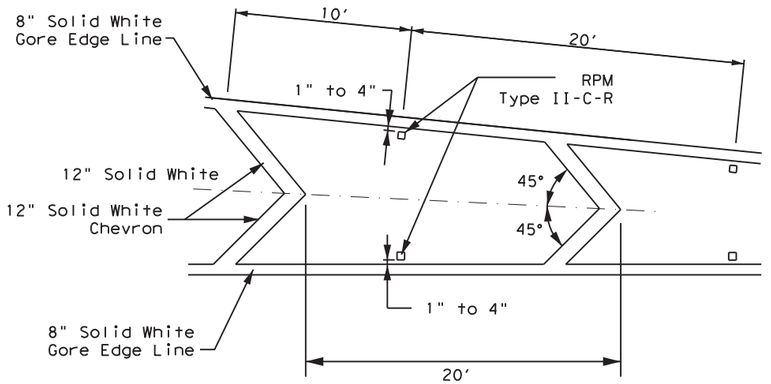
DATE=$DATE$
FILE=$FILE$

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

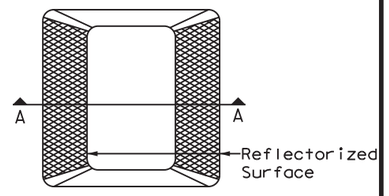
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

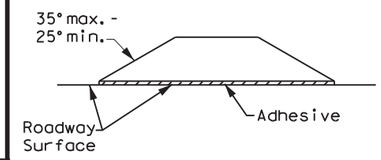
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

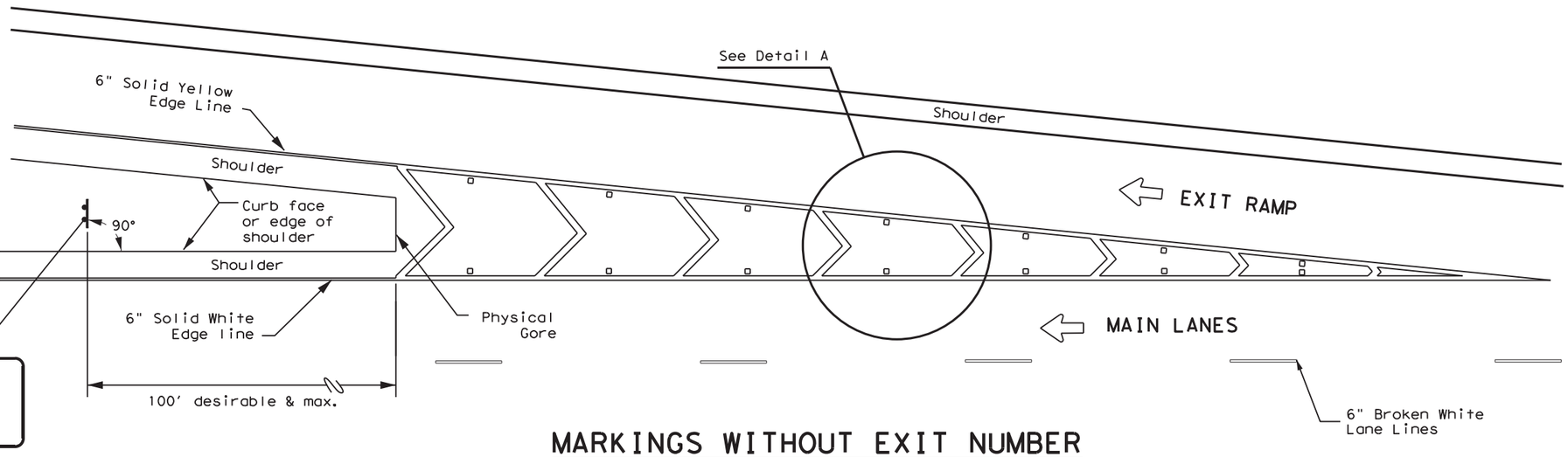
LEGEND	
⇦	Traffic flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R



Type II (Top View)



SECTION A



MARKINGS WITHOUT EXIT NUMBER

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

Texas Department of Transportation

Traffic Safety Division Standard

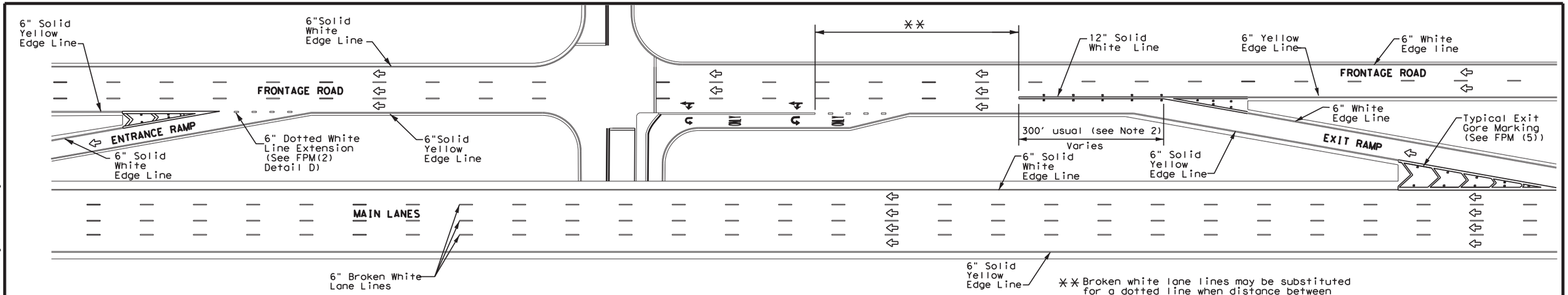
EXIT GORE PAVEMENT MARKINGS

FPM(5)-22

FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-19 10-22	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		135

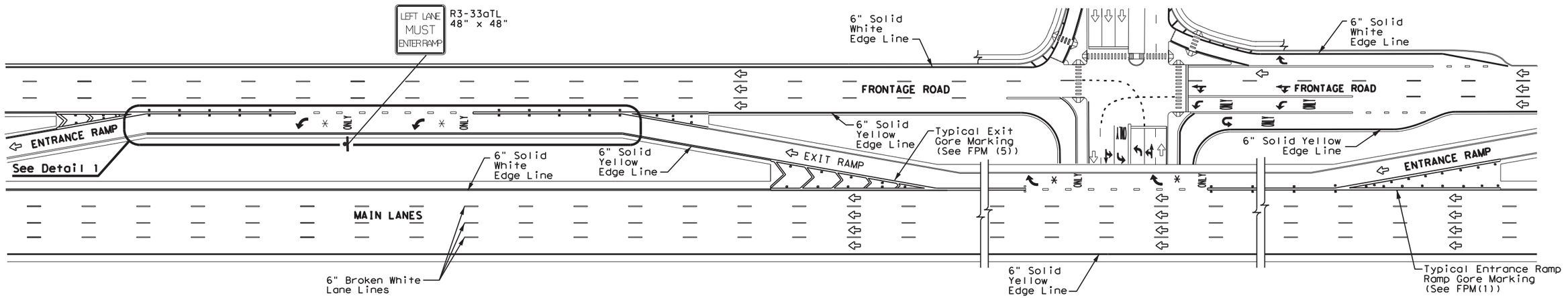
23E

DATE: $DATE$
FILE: $FILE$

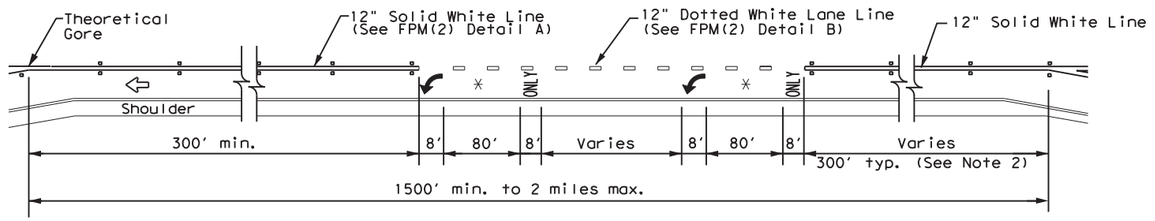


** Broken white lane lines may be substituted for a dotted line when distance between solid lines is <300'. Use 8" white dotted lines with 3' segments and 9' gaps.

DIAMOND INTERCHANGE



URBAN X-RAMP WITH FRONTAGE ROAD AUXILIARY LANE



DETAIL 1

(Frontage Road Auxiliary Lane for X-Ramps)

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.

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY AND FRONTAGE ROAD PAVEMENT MARKINGS

FPM(6)-22

FILE: fpm(6)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-22	0500	03	635, ETC.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		136

DATE:
FILE:

23F

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)

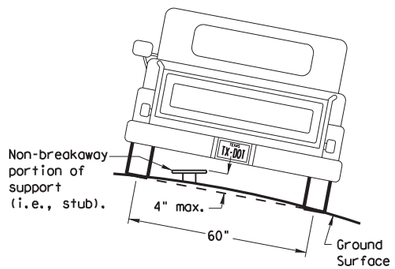
Anchor Type

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))

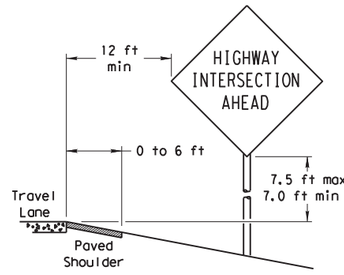
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

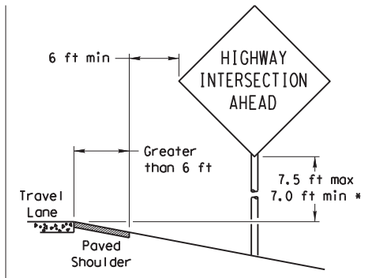
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

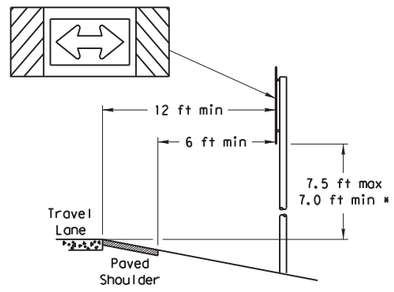
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



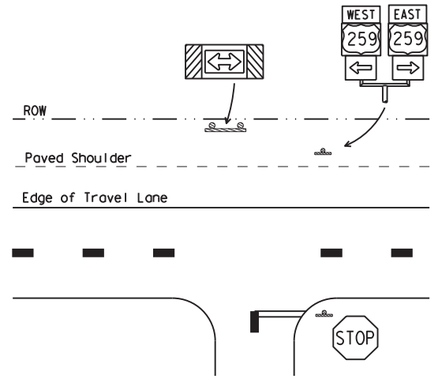
GREATER THAN 6 FT. WIDE

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.

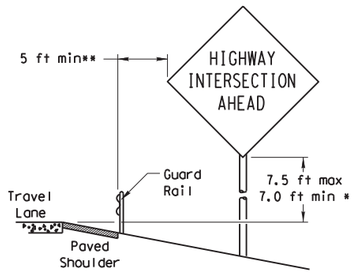
T-INTERSECTION



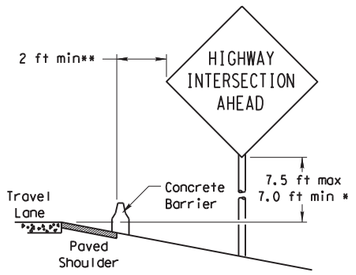
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



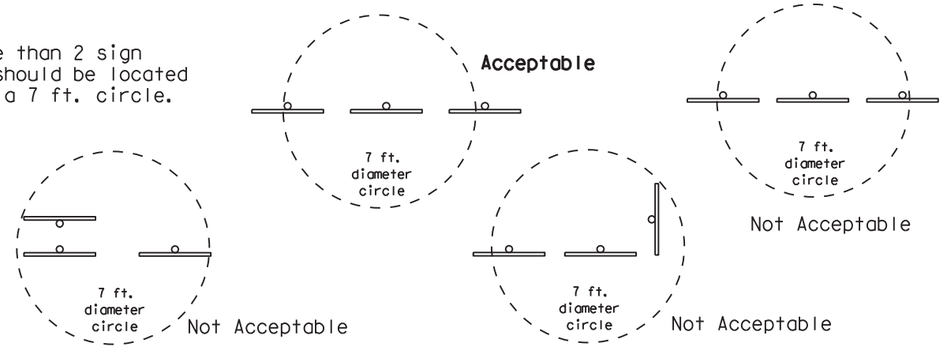
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

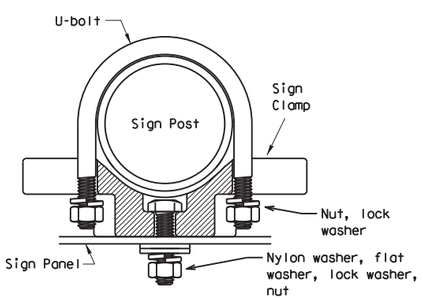
****Sign clearance based on distance required for proper guard rail or concrete barrier performance.**

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

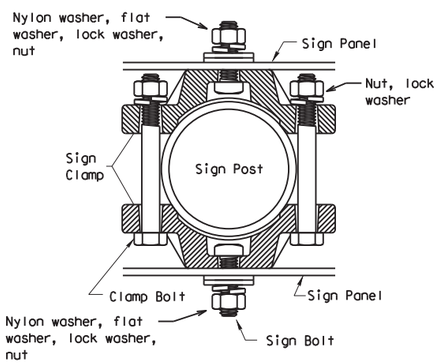


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

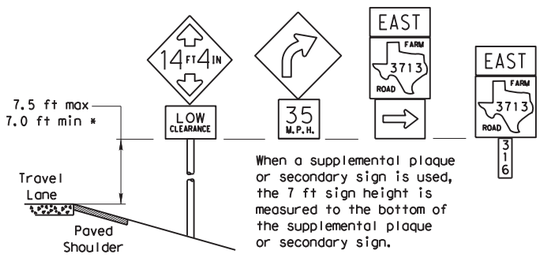
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



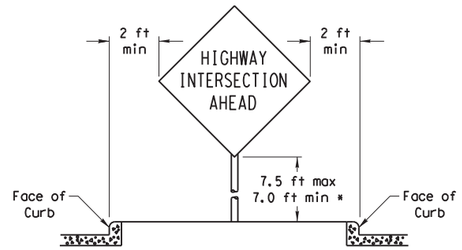
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



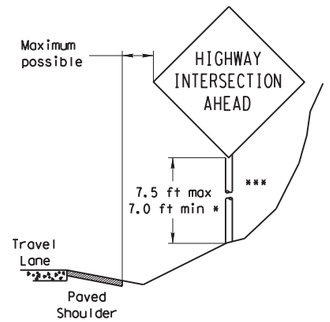
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

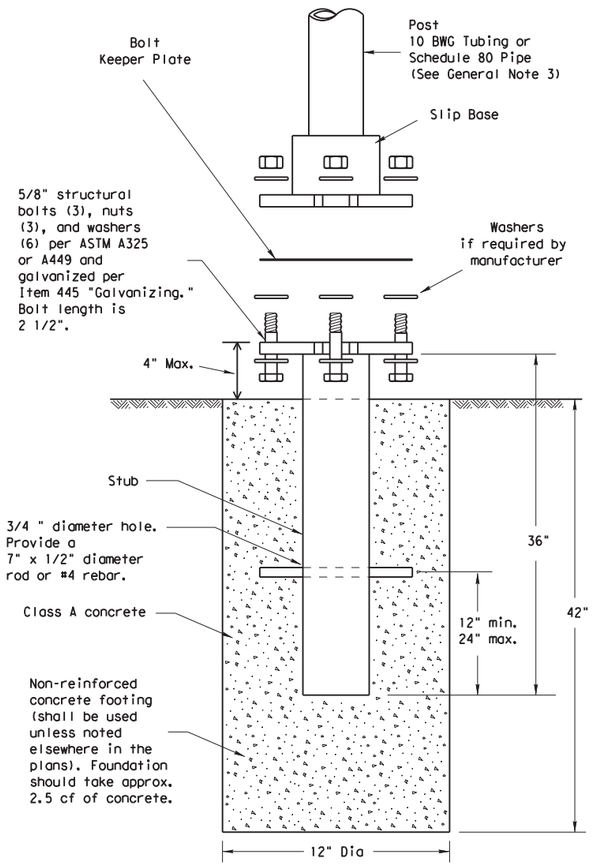
REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0500	03	635, Etc.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		137

DATE:$DATE$
FILE:$FILE$

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.

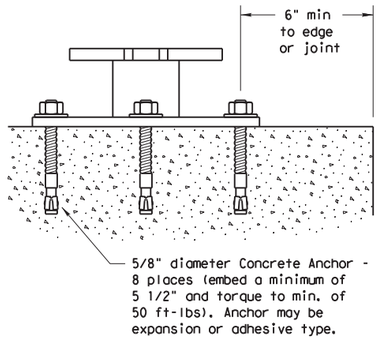
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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.

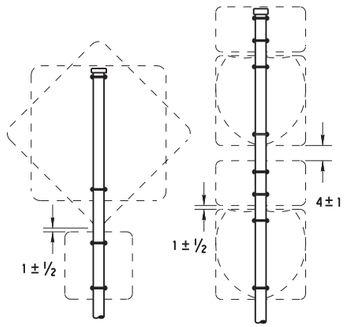
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

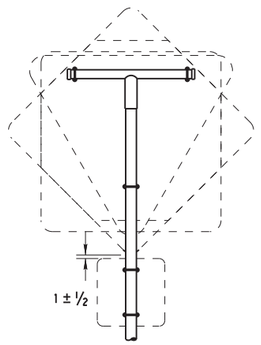
SMD(SLIP-1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0500	03	635, Etc.	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		138

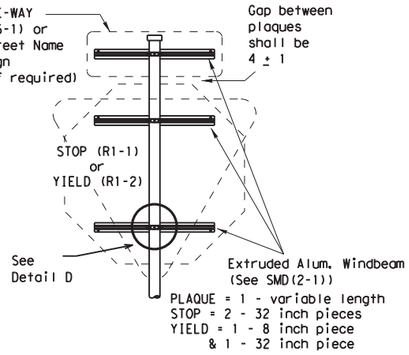
DATE:$DATE$
FILE:$FILE$



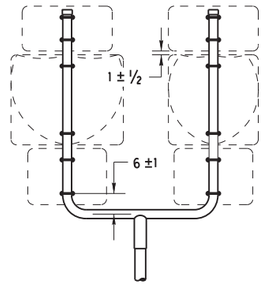
SM RD SGN ASSM TY XXXXX(1)XX(P)



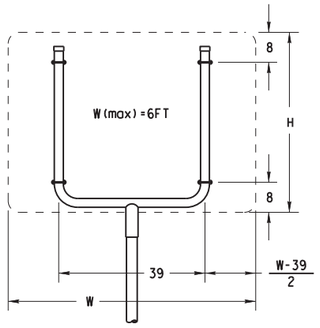
SM RD SGN ASSM TY XXXXX(1)XX(T)



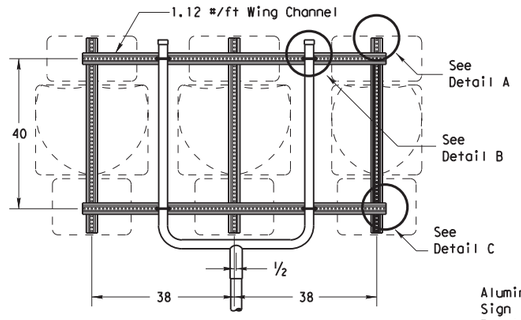
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



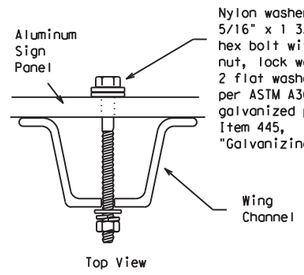
SM RD SGN ASSM TY XXXXX(1)XX(U)



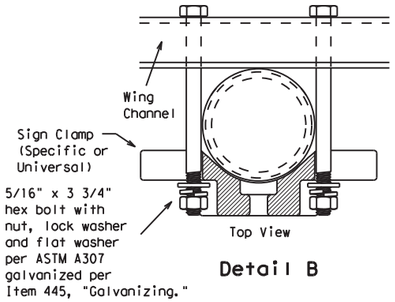
SM RD SGN ASSM TY XXXXX(1)XX(U)



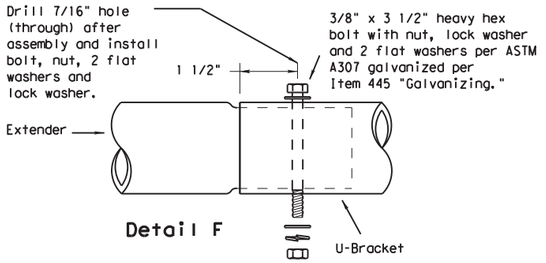
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail A

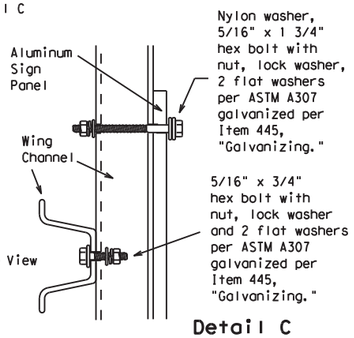


Detail B

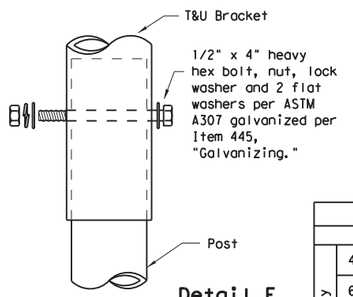


Detail F

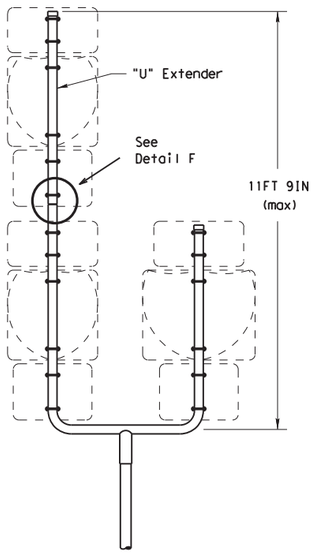
Splices shall only be allowed behind the sign substrate.



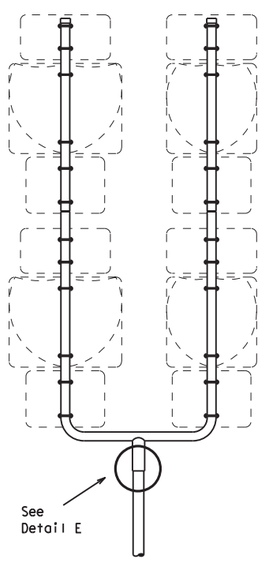
Detail C



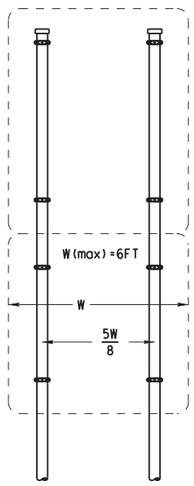
Detail E



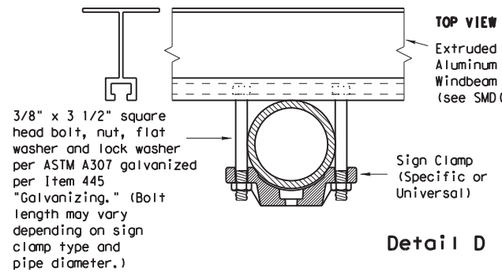
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



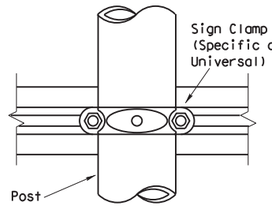
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



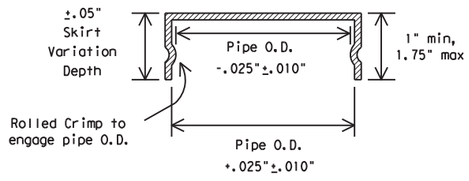
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



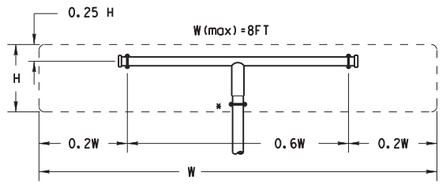
FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.



All dimensions are in english unless detailed otherwise.

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

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

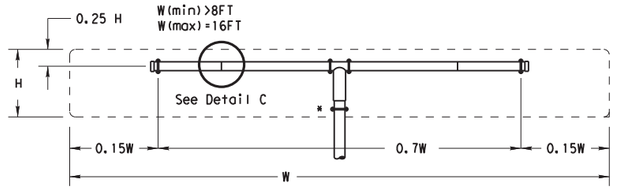
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0500	03	635, Etc.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		139

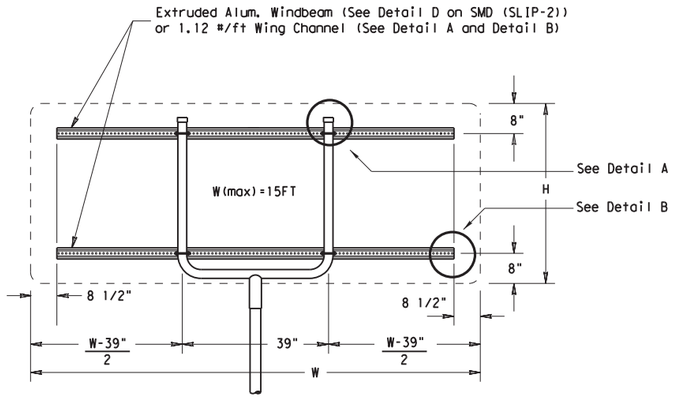
9-08 REVISIONS

DATE: $DATE$
FILE: $FILE$

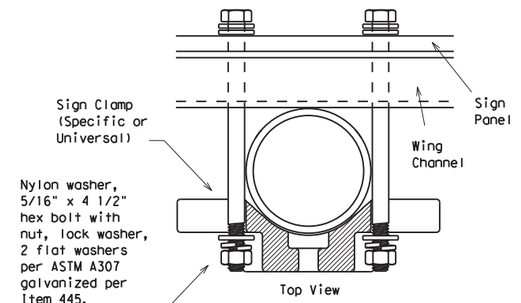


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

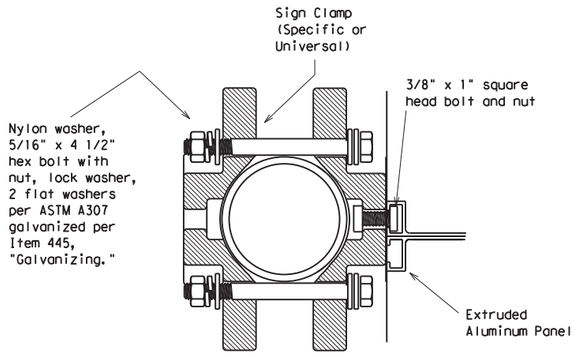
(* - See Note 12)



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

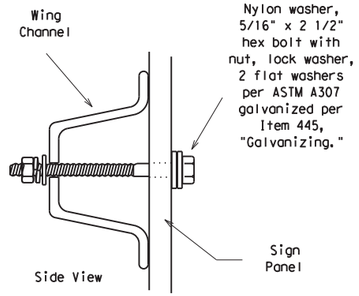


Detail A

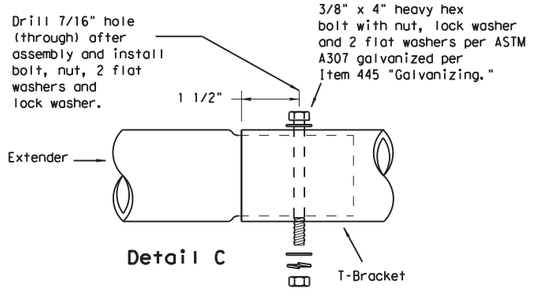


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

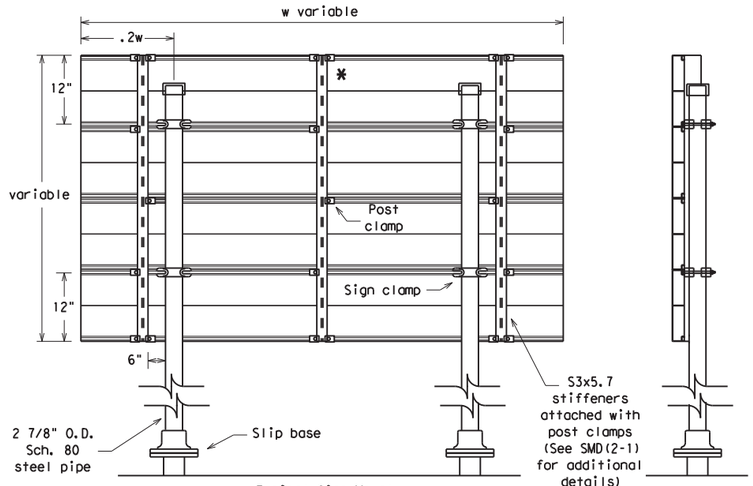


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

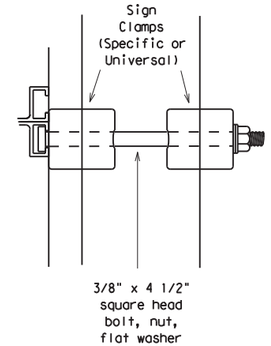


Typical Sign Mount

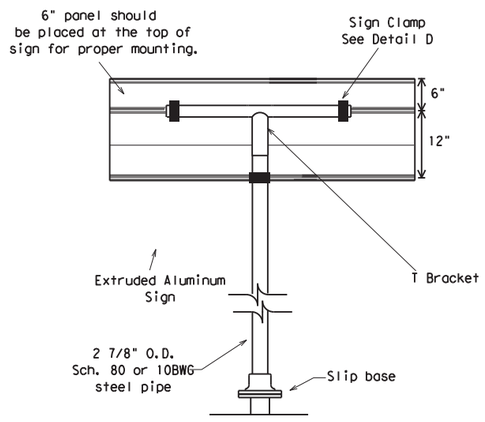
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

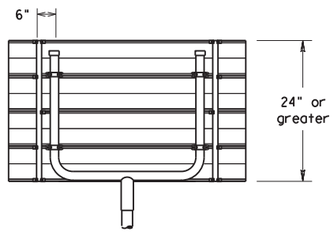
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS

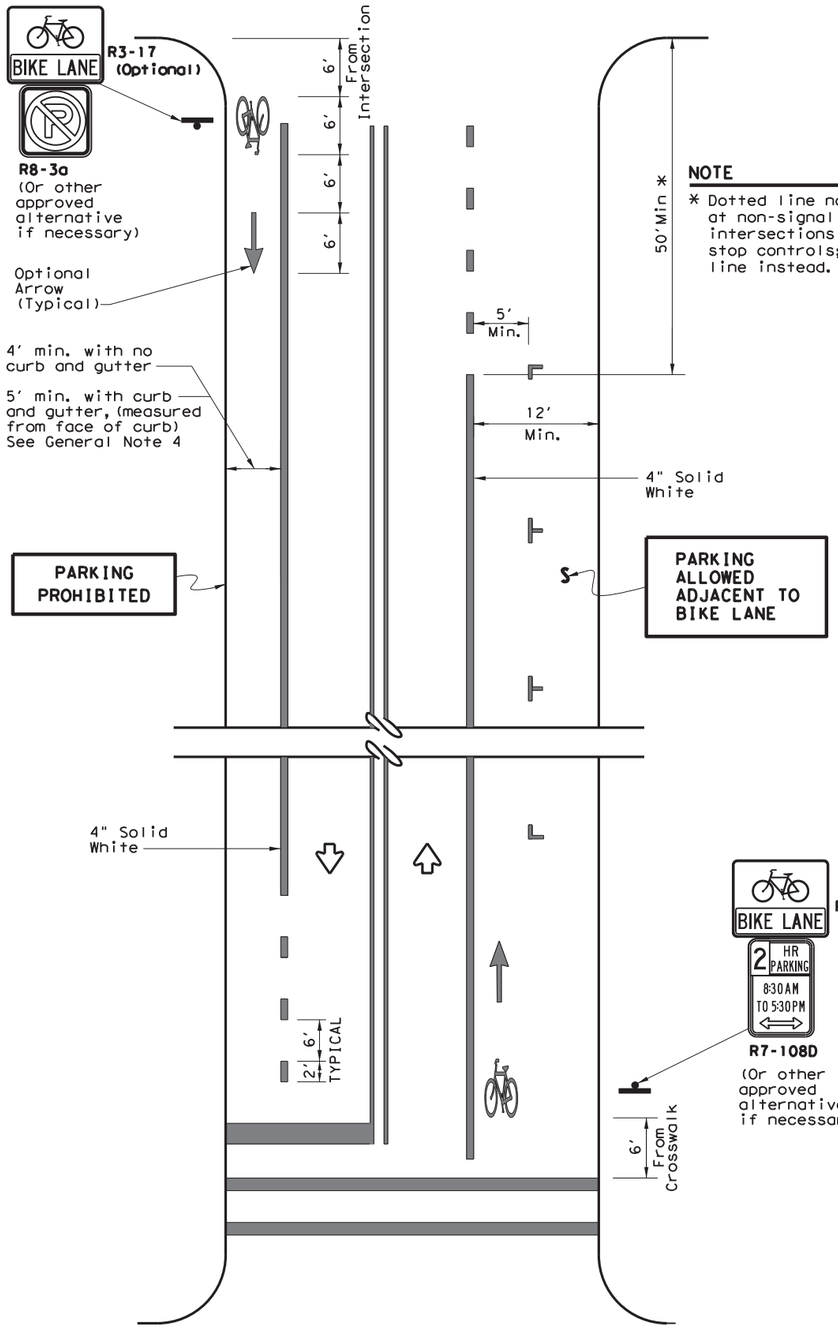
9-08

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

CONT	SECT	JOB	HIGHWAY
0500	03	635, Etc.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		140

DATE:$DATE$
FILE:$FILE$

DATE:
FILE:



NOTE

* Dotted line not necessary at non-signalized minor intersections with no stop controls; Use solid line instead.

NOTES

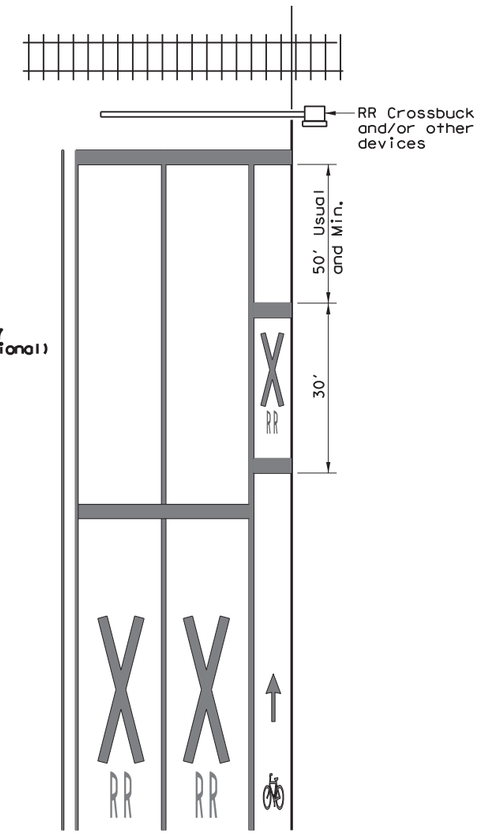
1. Bicycle lane pavement markings typically repeated after each intersection or signalized driveway.
2. On uninterrupted sections of roadway, bicycle lane pavement markings typically repeated as follows:

   -1200' for 45 MPH or less roads
   -2500' for 50 MPH and greater roads.

TWO-WAY STREET

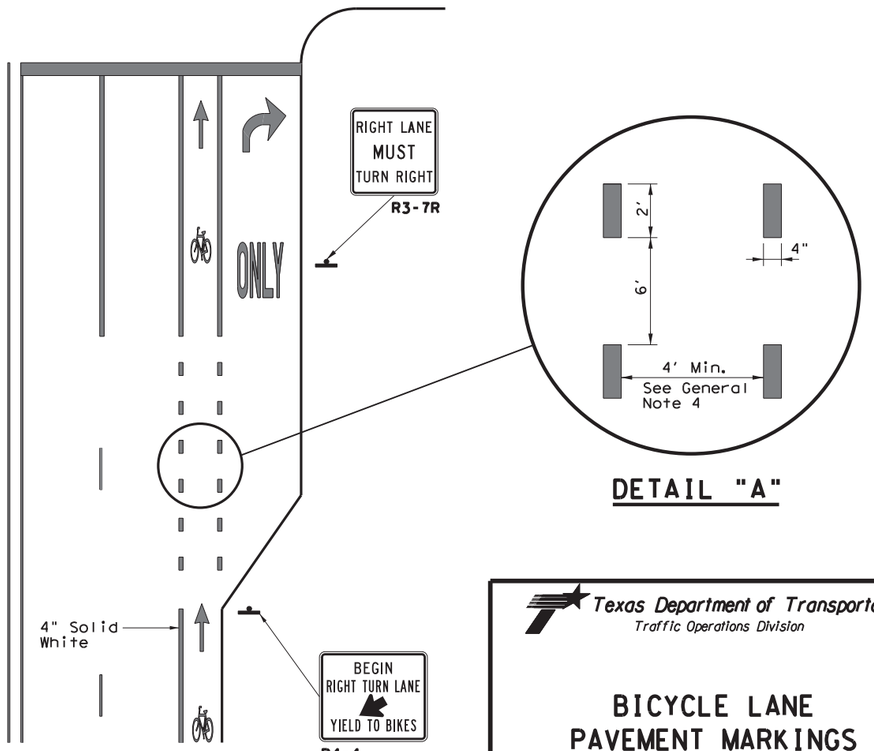
GENERAL NOTES

1. All bicycle lane pavement markings shall be white unless otherwise noted.
2. All pavement marking materials shall meet the required Department Material Specifications as specified by the plans.
3. Exact sign placement and details are shown elsewhere in the plans.
4. The current edition of AASHTO'S Guide for the Development of Bicycle Facilities should be referenced for variations in design, other geometric conditions, and lane width options.
5. Other bicycle lane symbol or word markings as shown in the Texas Manual on Uniform Traffic Control Devices may be used. Details for words, arrows and symbols as shown in the Standard Highway Sign Designs for Texas.
6. The "BIKE LANE" (R3-17) sign with the "AHEAD" (R3-17a) sign mounted directly below should be installed in advance of the beginning of a marked bike lane.
7. The "BIKE LANE" (R3-17) sign with the "END" (R3-17b) sign mounted directly below should be installed at the end of marked bicycle lane.



(See RCPM Standard for travel lane details)

RAILROAD CROSSING APPROACH



RIGHT TURN ONLY LANE

DETAIL "A"

LEGEND	
	Sign
	Traffic Flow

SPECIFICATION REFERENCE TABLE	
Traffic Paint	DMS-8200
Hot Applied Thermoplastic	DMS-8220
Permanent Prefabricated Pavement Markings	DMS-8240
Glass Traffic Beads	DMS-8290

Texas Department of Transportation
Traffic Operations Division

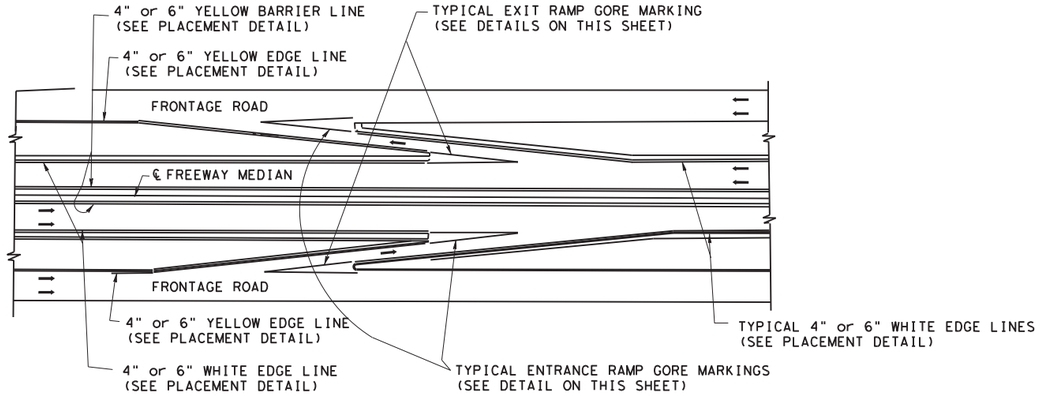
BICYCLE LANE PAVEMENT MARKINGS

BLPM-10

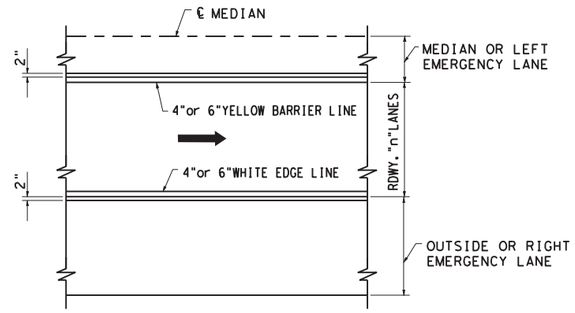
REVISIONS

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

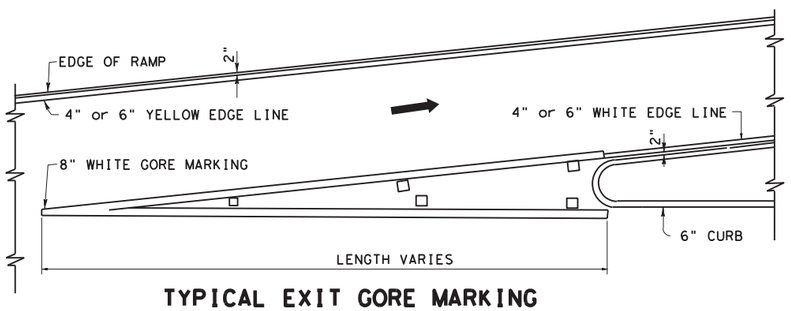
CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		141



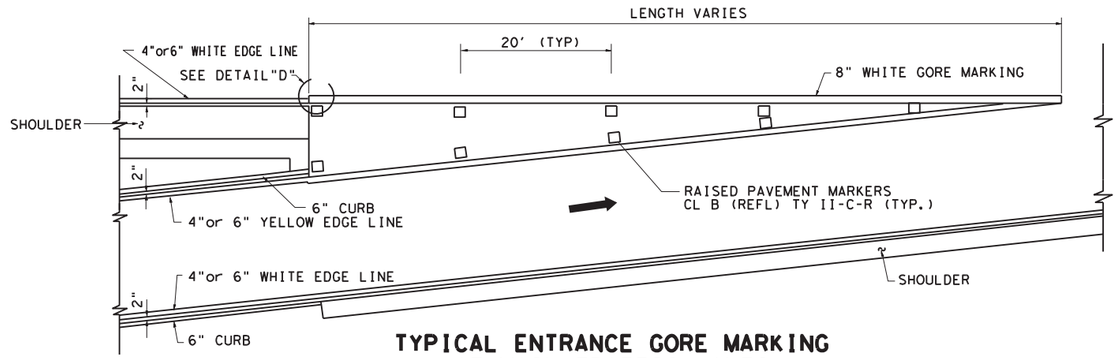
TYPICAL LAYOUT



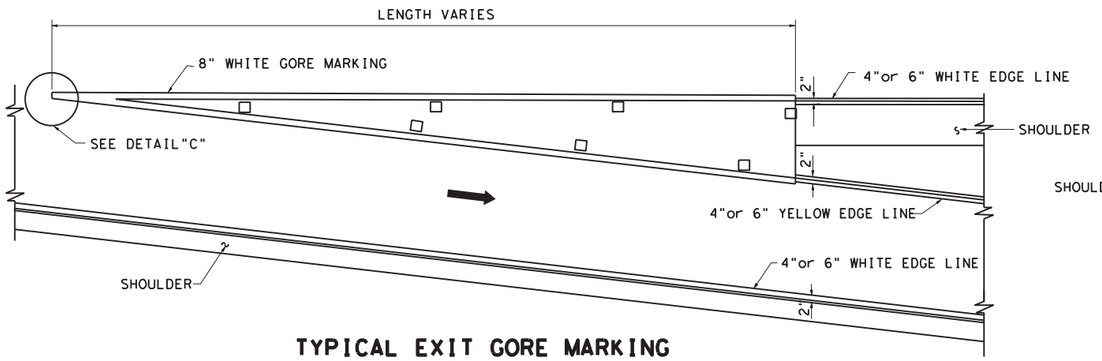
TYPICAL PLACEMENT FOR BARRIER AND EDGE LINES



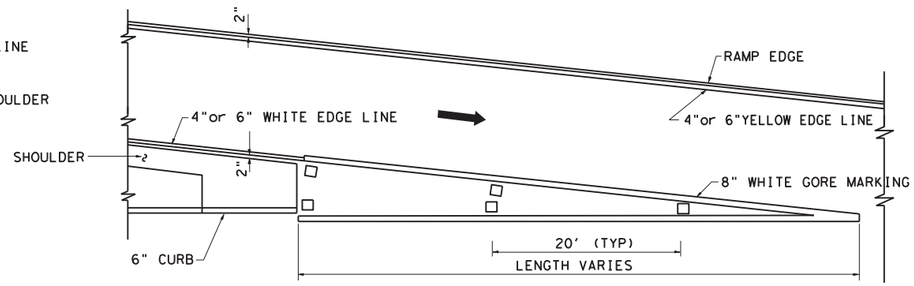
TYPICAL EXIT GORE MARKING AT FRONTAGE ROAD



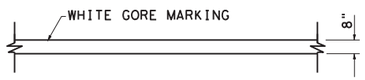
TYPICAL ENTRANCE GORE MARKING AT MAIN TRAFFIC LANES



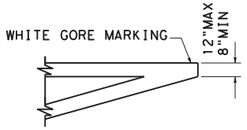
TYPICAL EXIT GORE MARKING AT MAIN TRAFFIC LANES



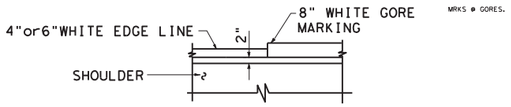
TYPICAL ENTRANCE GORE MARKING AT FRONTAGE ROAD



DETAIL "A"



DETAIL "C"



DETAIL "D "

SHEET 1 of 2

Texas Department of Transportation
Houston District

TYPICAL STANDARD PAVEMENT MARKINGS

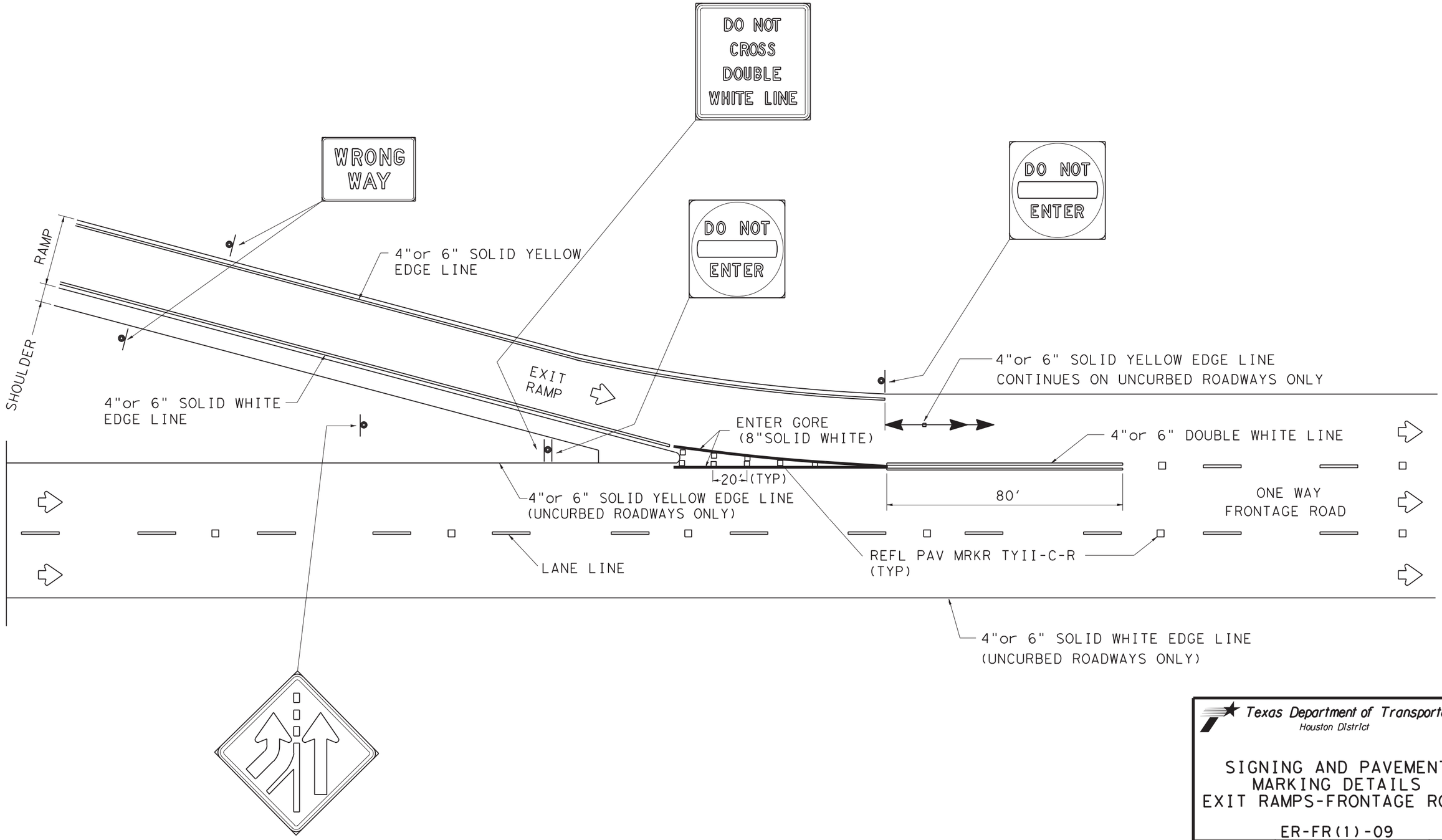
(RAMP AND GORE DETAILS)

PM(R&G)-10

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 4/2010	HOU			142
	COUNTY	CONTROL	SECT JOB	HIGHWAY
	HARRIS	0500	03 635,ETC	IH 45

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

STD N-5



DRAWING SCALE: NONE

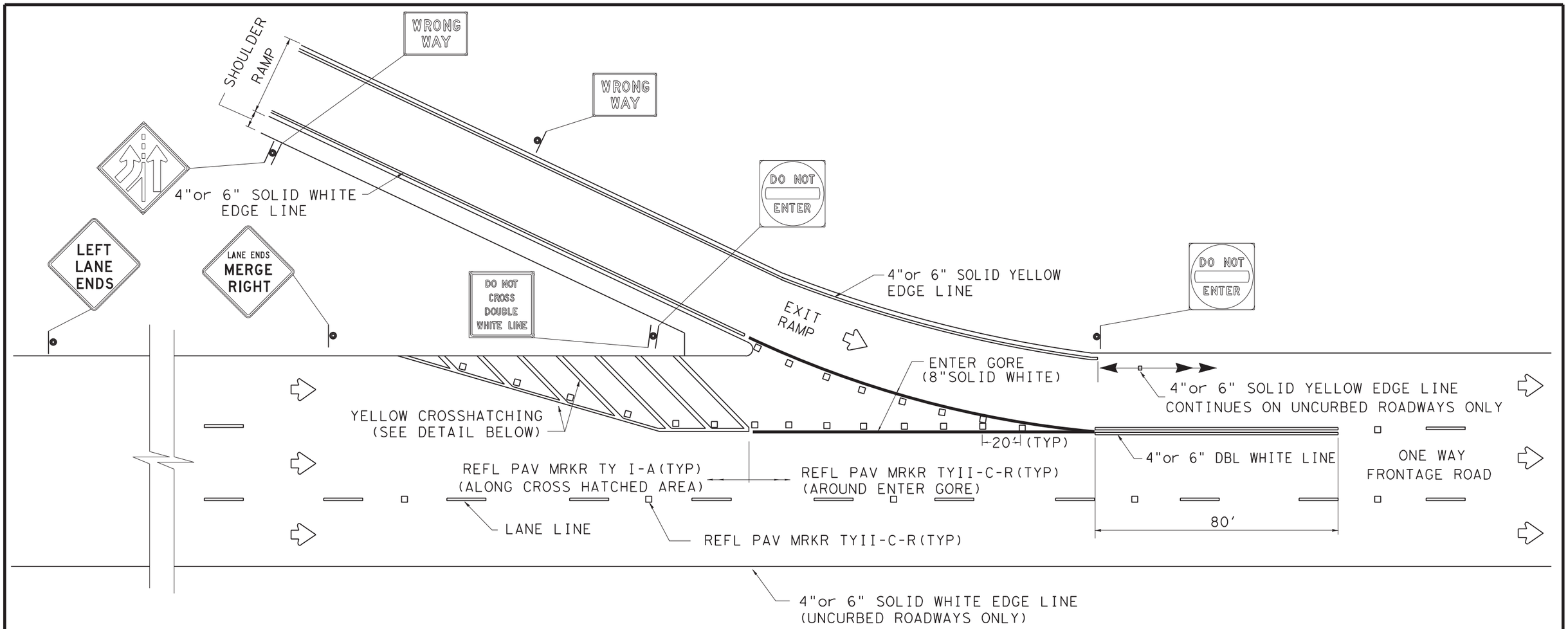
Texas Department of Transportation
Houston District

SIGNING AND PAVEMENT MARKING DETAILS EXIT RAMPS-FRONTAGE ROAD

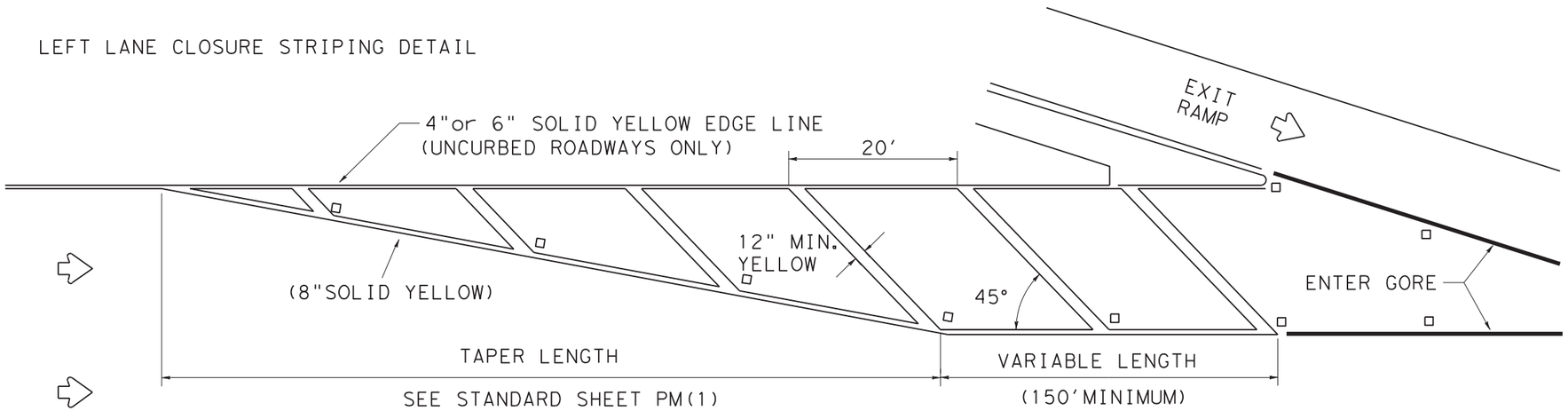
ER-FR(1)-09

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 1998	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS FEB., 2008 DEC., 2009	HOU				143
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0500	03	635,ETC	IH 45

STD N-25



LEFT LANE CLOSURE STRIPING DETAIL



DRAWING SCALE: NONE

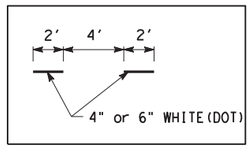
Texas Department of Transportation
Houston District

SIGNING AND PAVEMENT MARKING DETAILS EXIT RAMPS-FRONTAGE ROAD

ER-FR(2)-09

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 1998	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS FEB., 2008 DEC., 2009	HOU				144
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0500	03	635,ETC	IH 45

STD N-26



DETAIL "A"

4"or 6" WHITE(DOT)(TO INTERSECTING ROADWAY WITHOUT MANDATORY TURN LANES). SEE DETAIL "A"

4" or 6" WHITE(DOT)(TO INTERSECTING ROADWAY WITH ONE EXCLUSIVE AND ONE OPTIONAL TURN LANE). SEE DETAIL "A"

4"or 6" WHITE(DOT) SEE DETAIL "A"

8" WHITE SOLID W/ RAISED REFLECTIVE PAVEMENT MARKERS @ 20' SPA.

℄ MAINLANES

290+00

4"or 6" WHITE (DOT)(TO INTERSECTING ROADWAY W/ TWO EXCLUSIVE LEFT TURN LANES). SEE DETAIL "A"

4"or 6" WHITE(DOT)(TO INTERSECTING ROADWAY WITHOUT MANDATORY TURN LANES). SEE DETAIL "A"

*4"or 6" WHITE(SLD) 40 LF EA.

TYPICAL PLACEMENT OF DOTTED EXTENSION AT INTERSECTIONS

Texas Department of Transportation
Houston District

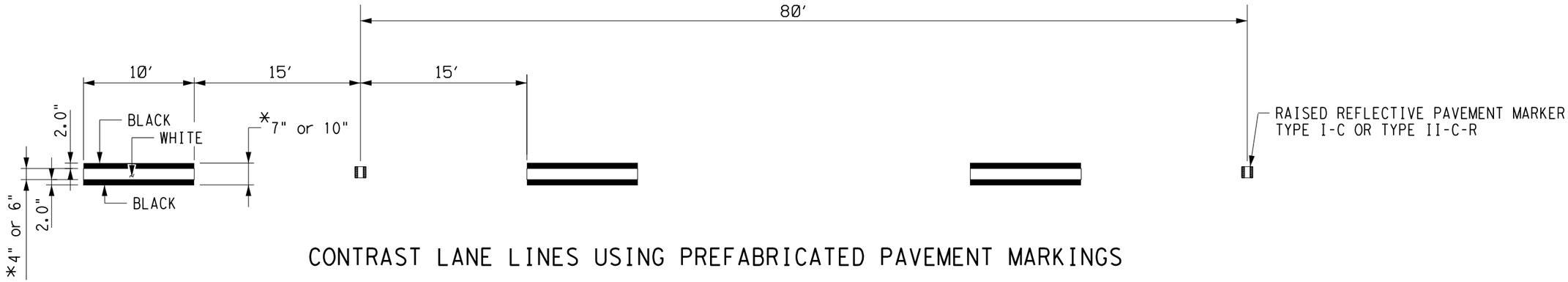
PAVEMENT MARKINGS
(DOTTED EXTENSION DETAILS)

PM(DOT)-11

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2010	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS 4/2010 4/2011	HOU				145
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0500	03	635,ETC	IH 45

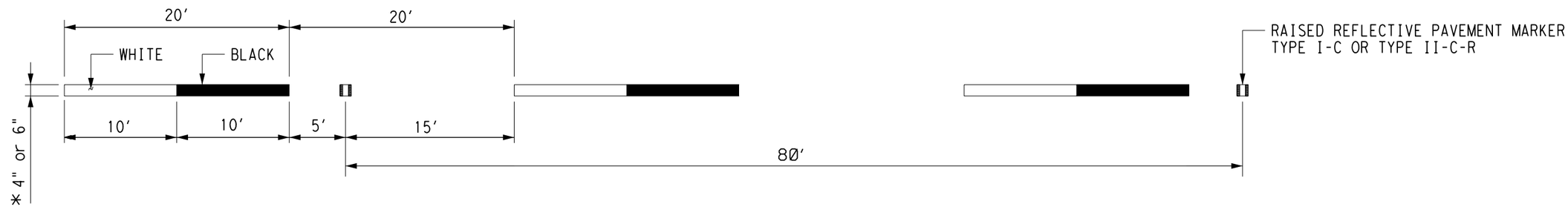
DATE: $DATE$
FILE: $FILE$

STD N-28



CONTRAST LANE LINES USING PREFABRICATED PAVEMENT MARKINGS

DIRECTION OF TRAFFIC



CONTRAST LANE LINES USING LIQUID APPLICATIONS
(MULTIPOLYMER, THERMOPLASTIC, ETC.)

* AS SHOWN ON THE PLANS.

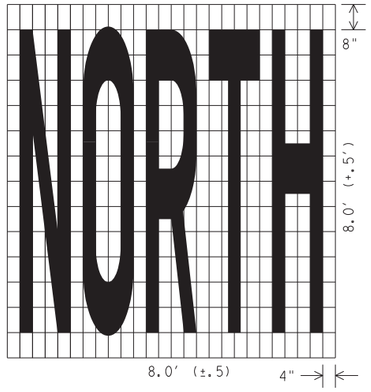
Texas Department of Transportation
Houston District

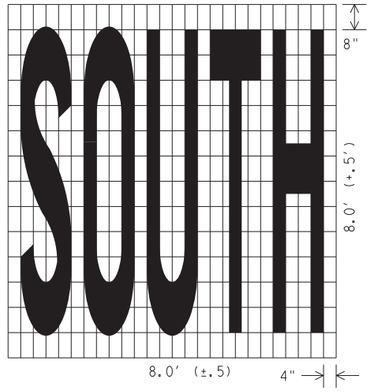
PAVEMENT MARKINGS
(CONTRAST LANE LINES)
PM(CLL)-14

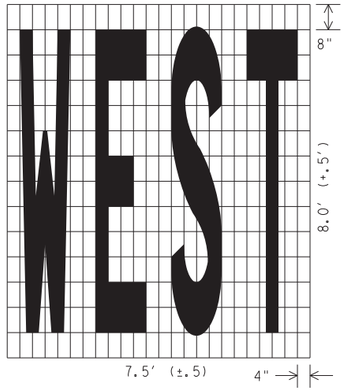
FILE:	DN:	CK:	DW:	CK:
© TxDOT 2003	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 01-10-06 02-12-08 10-2019 9" to 10"	HOU			146
	COUNTY	CONTROL	SECT	JOB / HIGHWAY
	HARRIS	0500	03	635, Etc. / IH 45

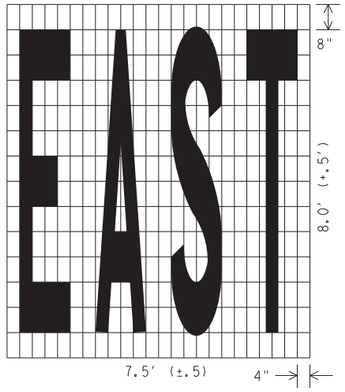
STD N-30

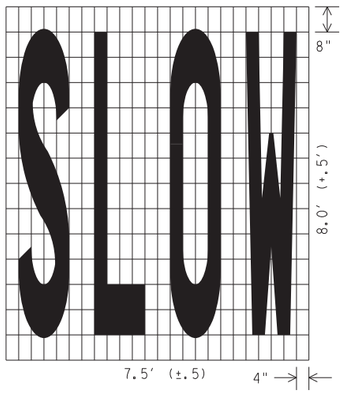
DATE: 2/27/2024
FILE: H:\Standards\146 PM(CCL)-14 (HOU DIST).dgn
635

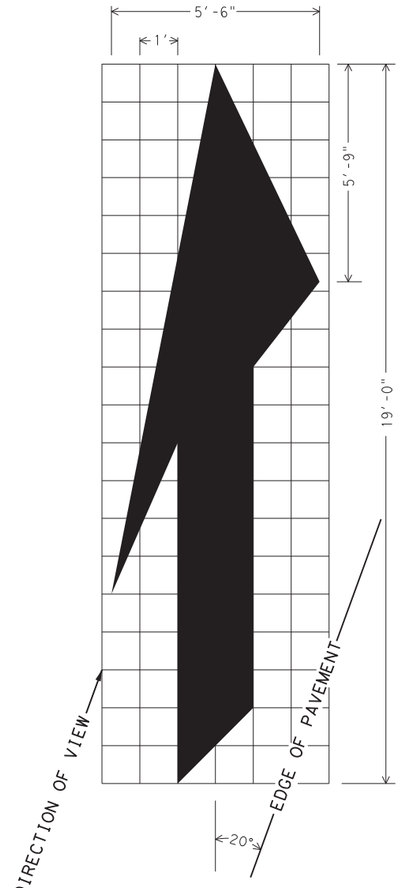






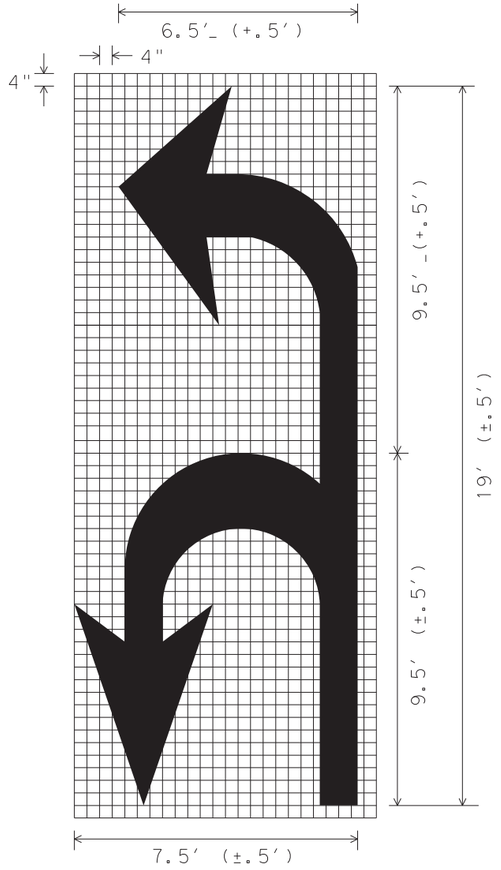




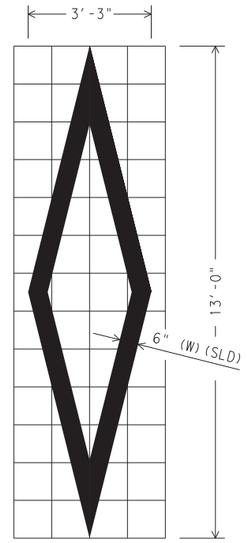


ISOMETRIC ARROW

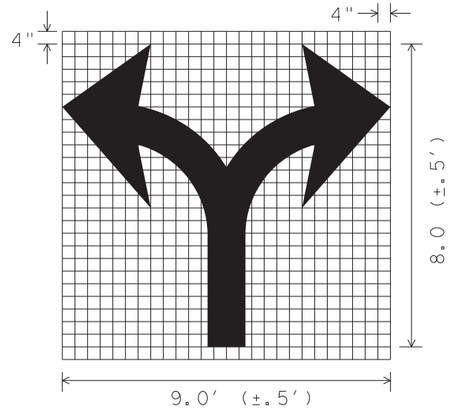
12 INCH GRID
AREA = 42 SQ. FT.
RIGHT LANE DROP ARROW
(FOR LEFT LANE, USE MIRROR IMAGE)



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			147
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0500	03	635,ETC	IH 45

DATE: $DATE$
FILE: $FILE$

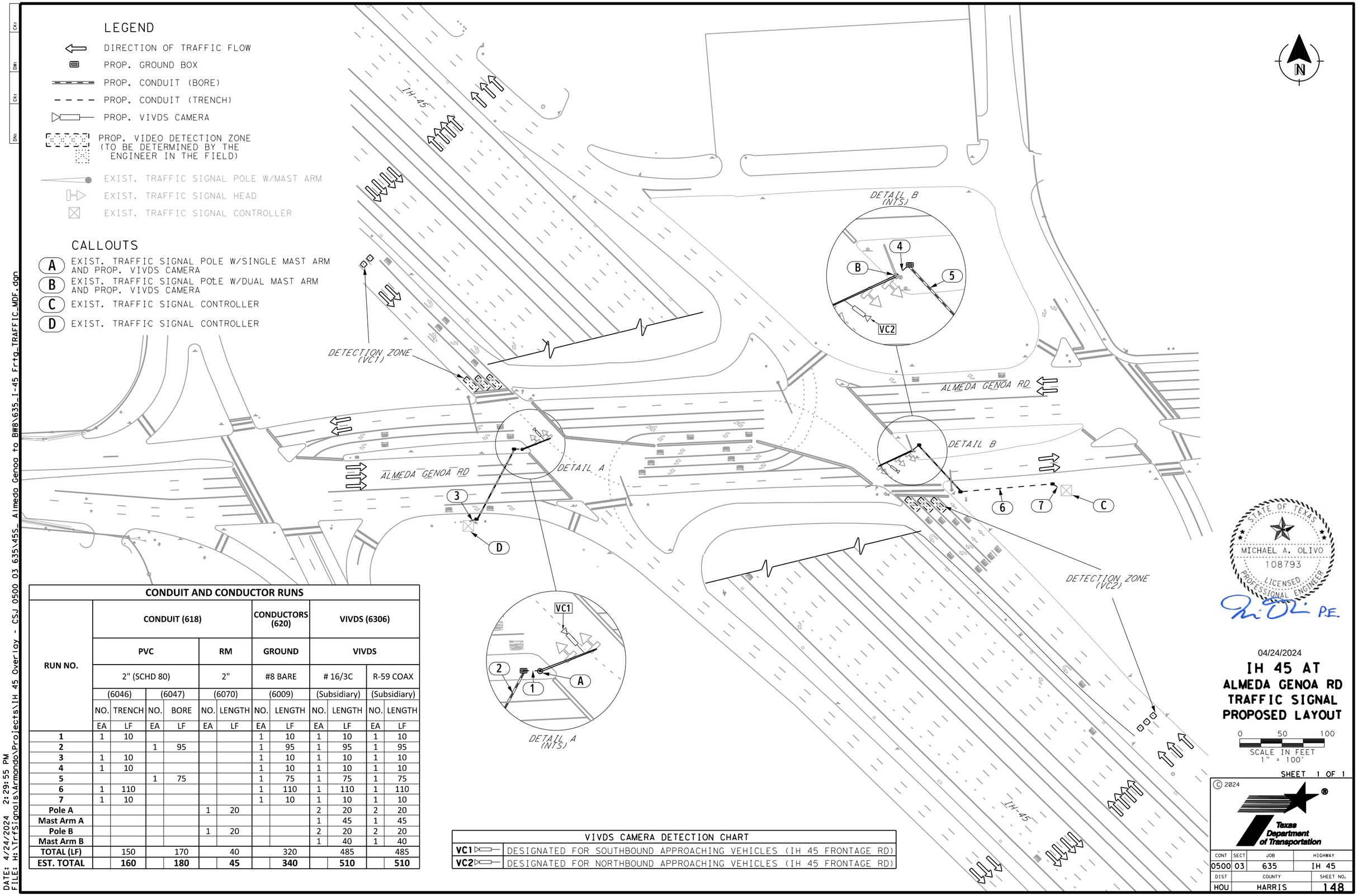
STD-N31

LEGEND

- DIRECTION OF TRAFFIC FLOW
- PROP. GROUND BOX
- PROP. CONDUIT (BORE)
- PROP. CONDUIT (TRENCH)
- PROP. VIVDS CAMERA
- PROP. VIDEO DETECTION ZONE (TO BE DETERMINED BY THE ENGINEER IN THE FIELD)
- EXIST. TRAFFIC SIGNAL POLE W/MAST ARM
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. TRAFFIC SIGNAL CONTROLLER

CALLOUTS

- (A) EXIST. TRAFFIC SIGNAL POLE W/SINGLE MAST ARM AND PROP. VIVDS CAMERA
- (B) EXIST. TRAFFIC SIGNAL POLE W/DUAL MAST ARM AND PROP. VIVDS CAMERA
- (C) EXIST. TRAFFIC SIGNAL CONTROLLER
- (D) EXIST. TRAFFIC SIGNAL CONTROLLER



CONDUIT AND CONDUCTOR RUNS

RUN NO.	CONDUIT (618)						CONDUCTORS (620)		VIVDS (6306)			
	PVC				RM		GROUND		VIVDS			
	2" (SCHD 80)				2"		#8 BARE		# 16/3C		R-59 COAX	
	(6046)		(6047)		(6070)		(6009)		(Subsidiary)		(Subsidiary)	
	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	1	10					1	10	1	10	1	10
2			1	95			1	95	1	95	1	95
3	1	10					1	10	1	10	1	10
4	1	10					1	10	1	10	1	10
5			1	75			1	75	1	75	1	75
6	1	110					1	110	1	110	1	110
7	1	10					1	10	1	10	1	10
Pole A					1	20			2	20	2	20
Mast Arm A									1	45	1	45
Pole B					1	20			2	20	2	20
Mast Arm B									1	40	1	40
TOTAL (LF)		150		170		40		320		485		485
EST. TOTAL		**160**		**180**		**45**		**340**		**510**		**510**

VIVDS CAMERA DETECTION CHART

VC1	DESIGNATED FOR SOUTHBOUND APPROACHING VEHICLES (IH 45 FRONTAGE RD)
VC2	DESIGNATED FOR NORTHBOUND APPROACHING VEHICLES (IH 45 FRONTAGE RD)

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

04/24/2024

IH 45 AT ALMEDA GENOA RD TRAFFIC SIGNAL PROPOSED LAYOUT

0 50 100
SCALE IN FEET
1" = 100'

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		148

DATE: 4/24/2024 2:29:55 PM
FILE: H:\Traffic Signals\Armando\Projects\IH 45 Overlay - CSJ 0500 03 635\45S_ Almeda Genoa to BW8\635_I-45 Frtg_TRAFFIC_MDF.dgn

NOTES FOR PERMANENT TRAFFIC SIGNAL(S):

1. LOCATE VIVDS CAMERAS, 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 ALL CONDUITS CONTAINING SIGNAL CABLES AND ELECTRICAL CONDUCTORS.
4. CAP SPARE CONDUITS INSTALLED IN POLE FOUNDATIONS AND GROUND BOXES USING APPROVED CAPPING DEVICES.
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 CITY OF HOUSTON. 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 CITY OF HOUSTON AT NO COST TO THE CONTRACTOR. INSTALL THIS EQUIPMENT AT NO COST TO THE CITY OF HOUSTON. SUCH MATERIALS WILL BE PROVIDED AT THE CITY OF HOUSTON TRAFFIC OPERATIONS CENTER 2200 PATTERSON STREET, HOUSTON, TEXAS 77007 TELEPHONE NUMBER 713-803-3011.
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. FURNISH VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS) CABLE RECOMMENDED BY MANUFACTURER OR PURCHASE CABLE FROM THE SAME MANUFACTURER THAT SUPPLIED/PROVIDED THE VIVDS EQUIPMENT.
10. FOR VIVDS CAMERA(S) MOUNTED TO LUMINAIRE ARMS, STRAP THE VIVDS CABLE TO THE LUMINAIRE ARMS WITH A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.
11. REFER TO TXDOT'S WEBSITE FOR PREQUALIFIED PRODUCTS LIST REGARDING VIVDS CAMERAS, VEHICLE LED TRAFFIC SIGNAL LAMP UNIT, SYMBOLIC PEDESTRIAN SIGNAL HEAD, SYMBOLIC PEDESTRIAN SIGNAL LAMP, CONDUIT, CONDUCTORS, GROUND BOXES, AND ELECTRIC SERVICE. CHECK WEBSITE PERIODICALLY FOR CURRENT UPDATES.
12. THE LOCATION OF THE VIVDS DETECTION ZONE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER AND/OR CITY OF HOUSTON TRAFFIC OPERATIONS SECTION.
13. GROUND ALL EXISTING METAL GROUND BOX COVERS AS OUTLINED ON LATEST STANDARD SHEET ED (4)-14. REPLACEMENTS FOR THESE GROUND BOXES MUST BE MADE OF POLYMER CONCRETE AS DETAILED ON THE LATEST STANDARD SHEET ED (4)-14. THE MATERIALS AND LABOR ASSOCIATED WITH THIS WORK IS SUBSIDIARY TO VARIOUS BID ITEMS IN THE PROJECT.
14. IF EXISTING GROUND BOXES ARE FOUND TO BE INSUFFICIENT IN SIZE TO ACCOMMODATE THE PROPOSED CONDUITS AND CABLES AS SHOWN ON THE PLANS OR IF THEY HAVE BEEN DAMAGED TO THE EXTENT THEY WILL NOT ACCOMMODATE THE ADDITIONAL CONDUITS AND CABLES, REPLACE THE GROUND BOX WITH A NEW GROUND BOX (SIZE AS REQUIRED) OR INSTALL A NEW GROUND BOX ADJACENT TO THE EXISTING GROUND BOX AS APPROVED BY THE ENGINEER. SUCH REPAIR OR REPLACEMENT IS INCIDENTAL TO ITEM 624, "GROUND BOX".
15. IF THE ENGINEER IN THE FIELD FINDS THE EXISTING CONDUITS IN THE SIGNAL POLE FOUNDATION INADEQUATE TO ACCOMMODATE THE PROPOSED CABLES, ATTACH A NEW CONDUIT (SIZE AS REQUIRED) TO THE SIGNAL POLE FOUNDATION. IF ADEQUATE ROOM EXISTS BETWEEN THE SIGNAL POLE AND THE FOUNDATION, INSTALL THE CONDUIT UNDER THE SIGNAL POLE. IF ADEQUATE ROOM DOES NOT EXIST BETWEEN THE SIGNAL POLE AND THE FOUNDATION, ATTACH THE CONDUIT TO THE SIGNAL POLE FOR THE PROPOSED CABLES. SUCH WORK IS CONSIDERED INCIDENTAL TO THE BID ITEM 618, "CONDUIT".
16. CLAMP ALL CONDUITS ATTACHED TO SIGNAL POLE FOUNDATION OR WOOD POLES WITH CONDUIT STRAPS AND CLAMPS BACKS (MALLEABLE IRON) AT A MAXIMUM SPACING OF 5 FT. CENTER TO CENTER.

STATE OF TEXAS
MICHAEL A. OLIVO
108793
LICENSED
PROFESSIONAL ENGINEER
P.E.

04/24/2024

IH 45 AT ALMEDA GENOA RD VIVDS DETECTION NOTES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		149

DATE: 4/24/2024 2:30:05 PM
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DATE: 1/17/2024
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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:		CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS		0500	03	635,ETC	IH 45	
		DIST	COUNTY		SHEET NO.	
		HOU	HARRIS			

71A

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DATE: 1/17/2024
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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.

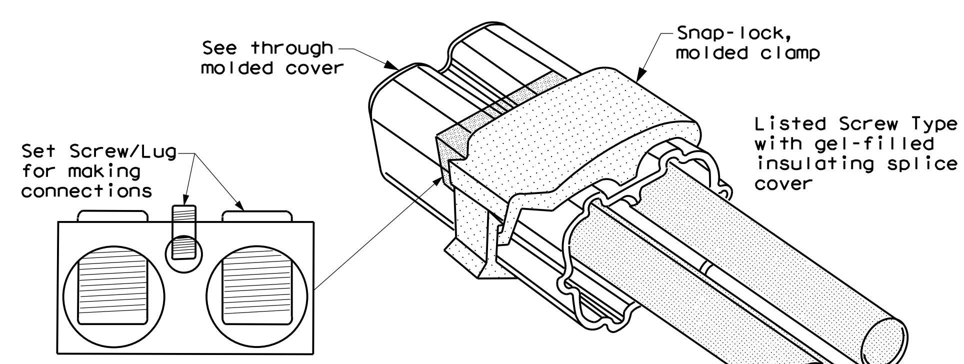
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

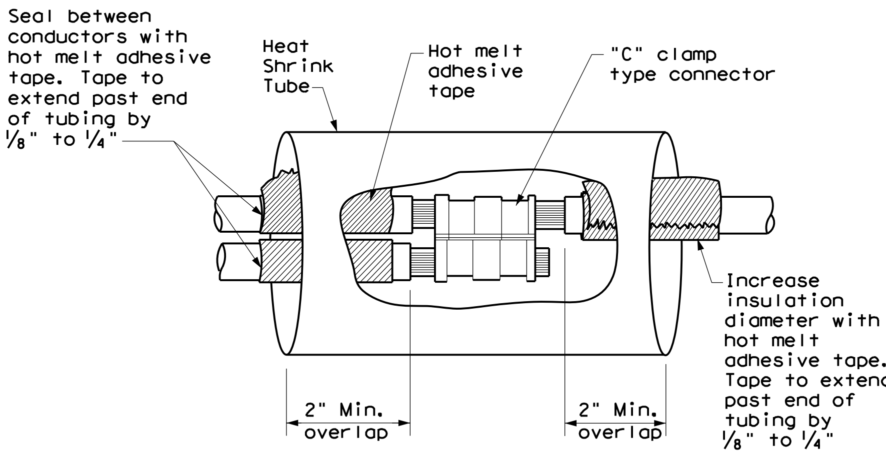
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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.

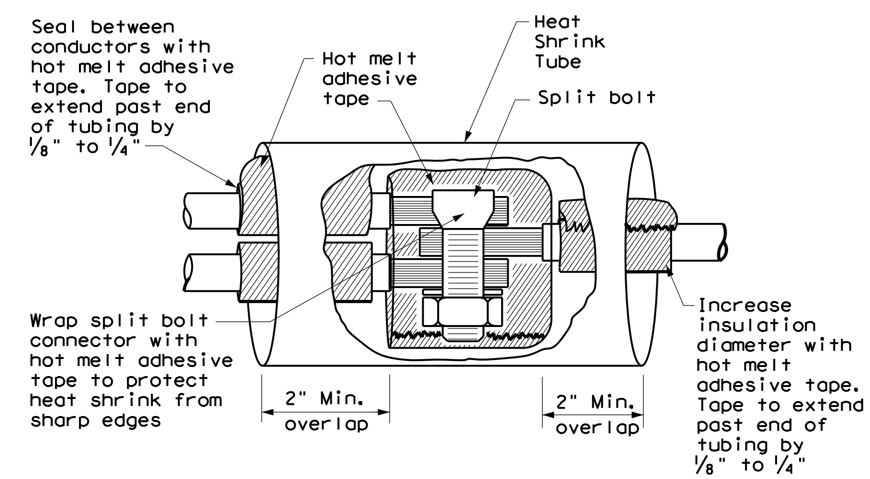
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type

Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC	IH 45
	DIST		COUNTY	SHEET NO.
	HOU		HARRIS	

71C

DATE: 1/17/2024
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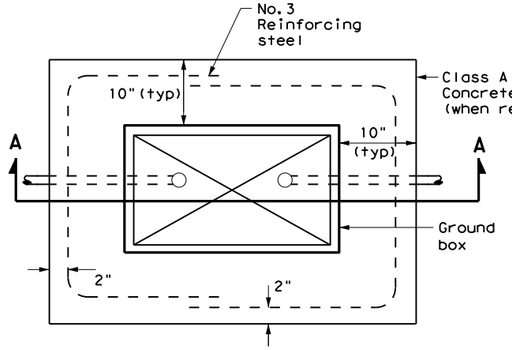
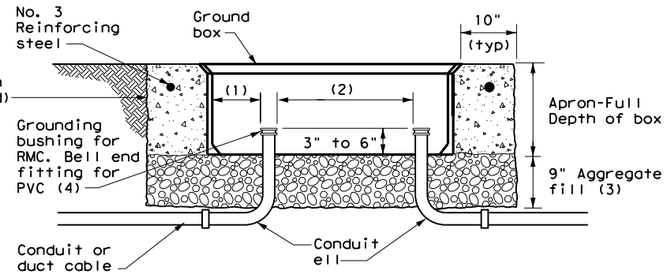


PLAN VIEW



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 bushings.

(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 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.

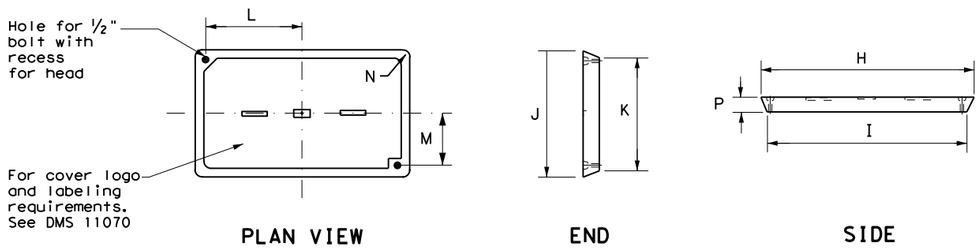
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers 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.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW END SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0500	03	635,ETC	IH 45
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		

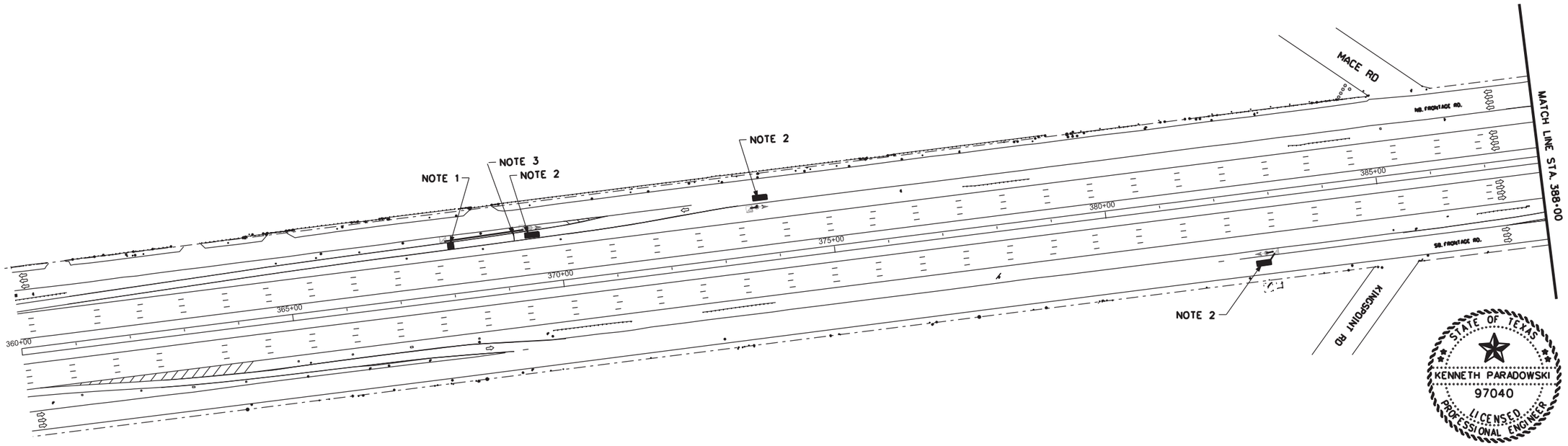
71D

NOTES:

1. EXISTING
   1 TYPE 1 LOOP
   INSTALL
   1 TYPE 1 LOOP

2. EXISTING
   1 TYPE 3 LOOP
   INSTALL
   1 TYPE 3 LOOP

3. EXISTING
   PREFAB PAV MARK TY "C" (W)(24")(SLD)
   INSTALL
   REFL PAV MRK TY B (Y)(24")(SLD)



ALMEDA-GENOA

LEGEND

- EXISTING CONDUIT
- EXISTING GROUND BOX TYPE 1
- EXISTING DETECTOR TYPE 1 LOOP
- EXISTING DETECTOR TYPE 3 LOOP
- EXISTING RAMP METER
- EXISTING RAMP METER CABINET

STATE OF TEXAS
KENNETH PARADOWSKI
97040
LICENSED
PROFESSIONAL ENGINEER

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April 18 , 2024

Kenneth Paradowski, P.E.

SCALE 1"=200'
FILE NAME: IH45S-635-01 Almeda.dgn

Texas Department of Transportation

IH-45

COMPUTERIZED TRANSPORTATION MANAGEMENT SYSTEM LAYOUT

SHEET 1 OF 5

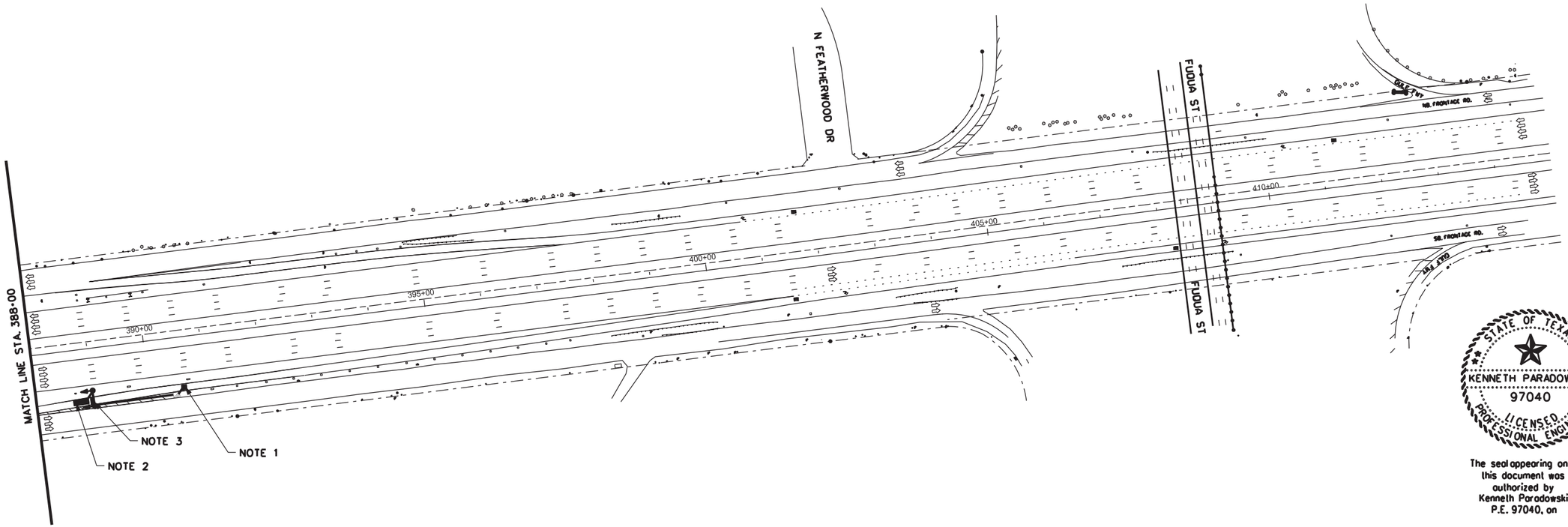
CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		153

NOTES:

1. EXISTING
   1 TYPE 1 LOOP
   INSTALL
   1 TYPE 1 LOOP

2. EXISTING
   1 TYPE 3 LOOP
   INSTALL
   1 TYPE 3 LOOP

3. EXISTING
   PREFAB PAV MARK TY "C" (W)(24")(SLD)
   INSTALL
   REFL PAV MRK TY B (Y)(24")(SLD)



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KENNETH PARADOWSKI
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LICENSED PROFESSIONAL ENGINEER

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April 18 , 2024

Kenneth Paradowski, P.E.

SCALE 1"=200'
SEE SHEET 1 OF 5 FOR LEGEND
FILE NAME: IH45-635-02 Fuqua.dgn

Texas Department of Transportation

IH-45

COMPUTERIZED TRANSPORTATION MANAGEMENT SYSTEM LAYOUT

SHEET 2 OF 5

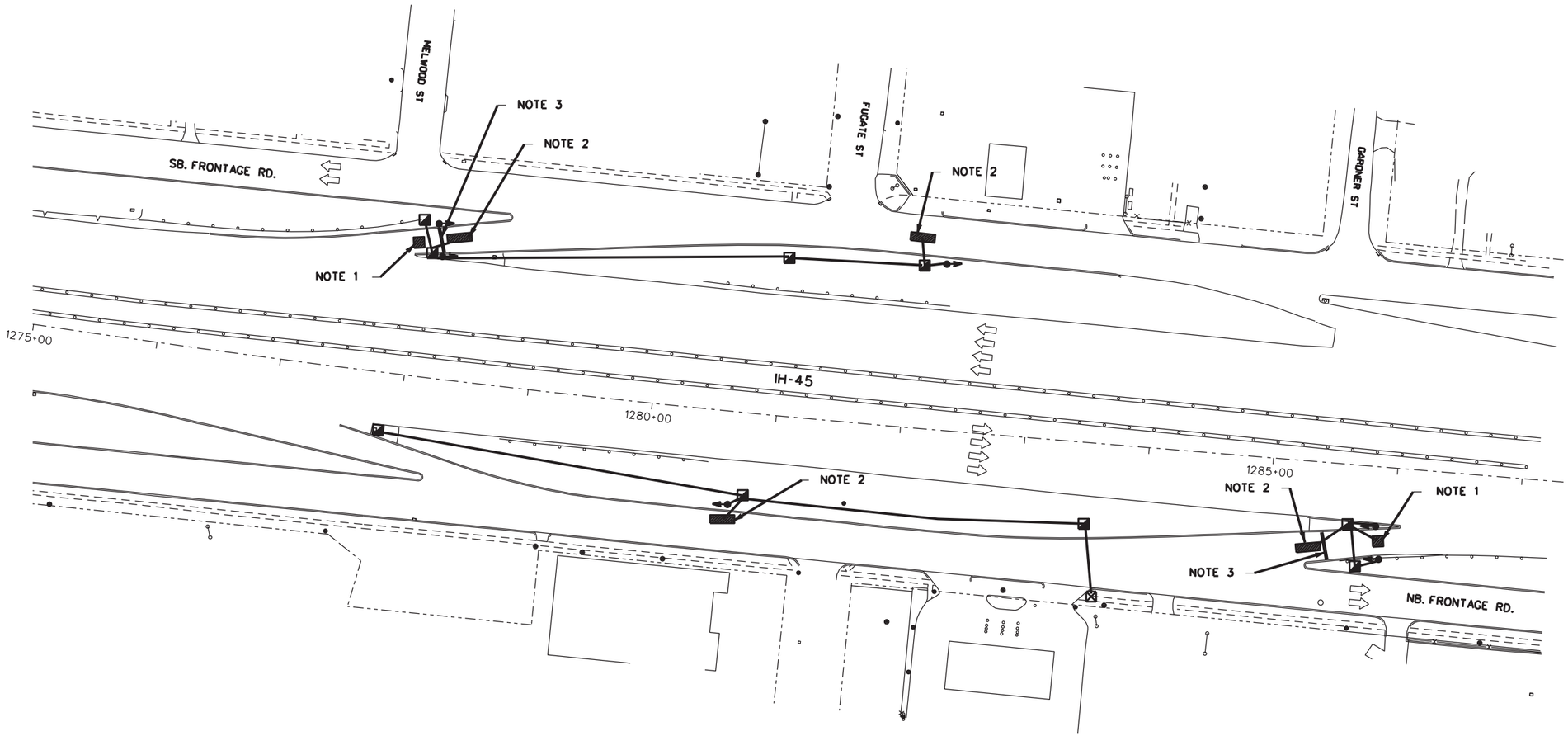
CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		154

NOTES:

1. EXISTING
   1 TYPE 1 LOOP
   INSTALL
   1 TYPE 1 LOOP

2. EXISTING
   1 TYPE 3 LOOP
   INSTALL
   1 TYPE 3 LOOP

3. EXISTING
   PREFAB PAY MARK TY "C" (W)(24")(SLD)
   INSTALL
   PREFAB PAY MARK TY B (Y)(24")(SLD)



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Texas Department of Transportation

IH-45

COMPUTERIZED TRANSPORTATION MANAGEMENT SYSTEM LAYOUT

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		155

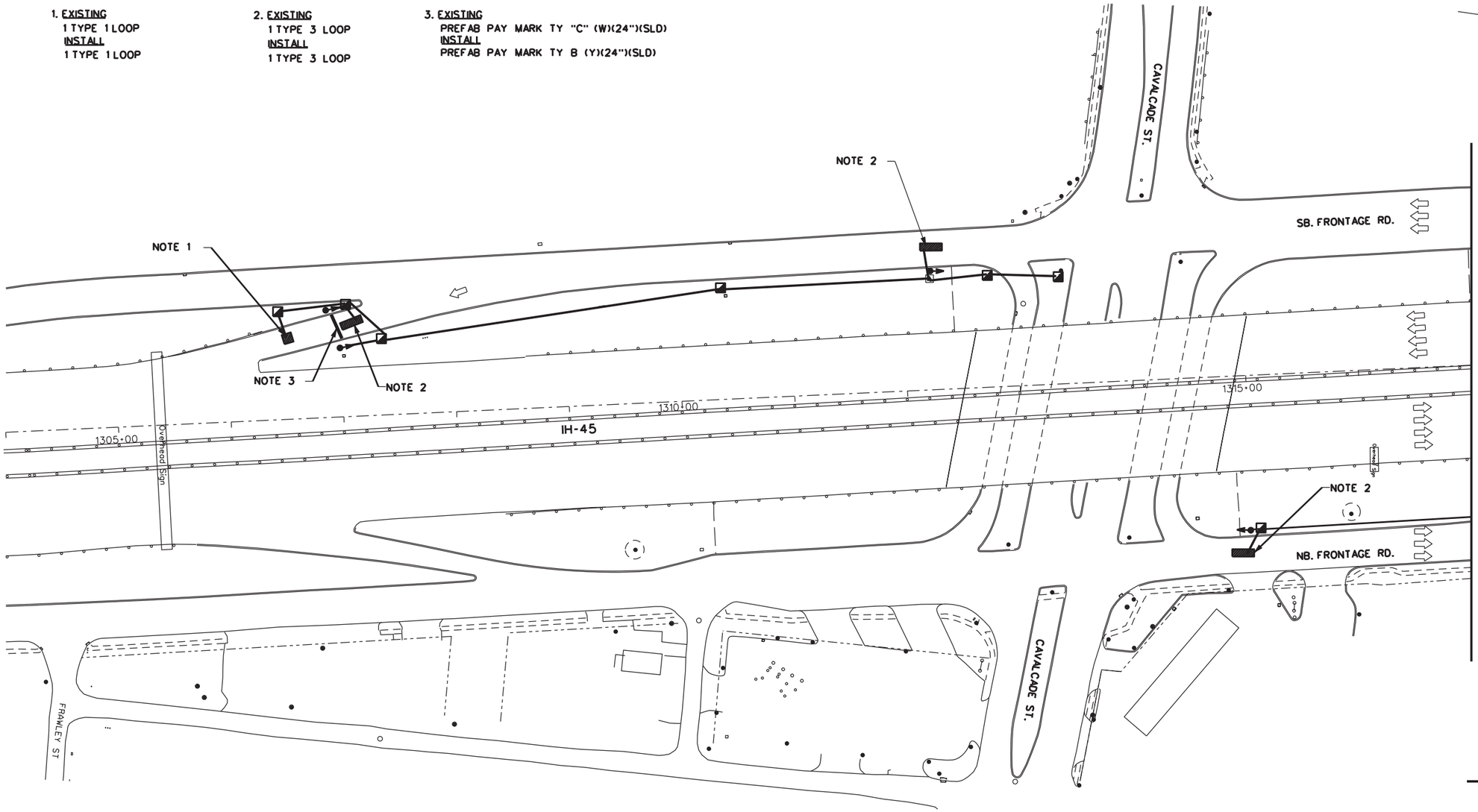
SCALE: 1" = 100'
SEE SHEET 1 OF 5 FOR LEGEND
FILE NAME: IH45-635-03.dgn

NOTES:

1. EXISTING
   1 TYPE 1 LOOP
   INSTALL
   1 TYPE 1 LOOP

2. EXISTING
   1 TYPE 3 LOOP
   INSTALL
   1 TYPE 3 LOOP

3. EXISTING
   PREFAB PAY MARK TY "C" (W)(24")(SLD)
   INSTALL
   PREFAB PAY MARK TY B (Y)(24")(SLD)



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KENNETH PARADOWSKI
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PROFESSIONAL ENGINEER

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April 18 , 2024

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SCALE: 1" = 100'

SEE SHEET 1 OF 5 FOR LEGEND

FILE NAME: IH45-635-04-Cavalcade St.dgn

Texas Department of Transportation

IH-45

COMPUTERIZED TRANSPORTATION MANAGEMENT SYSTEM LAYOUT

SHEET 4 OF 5

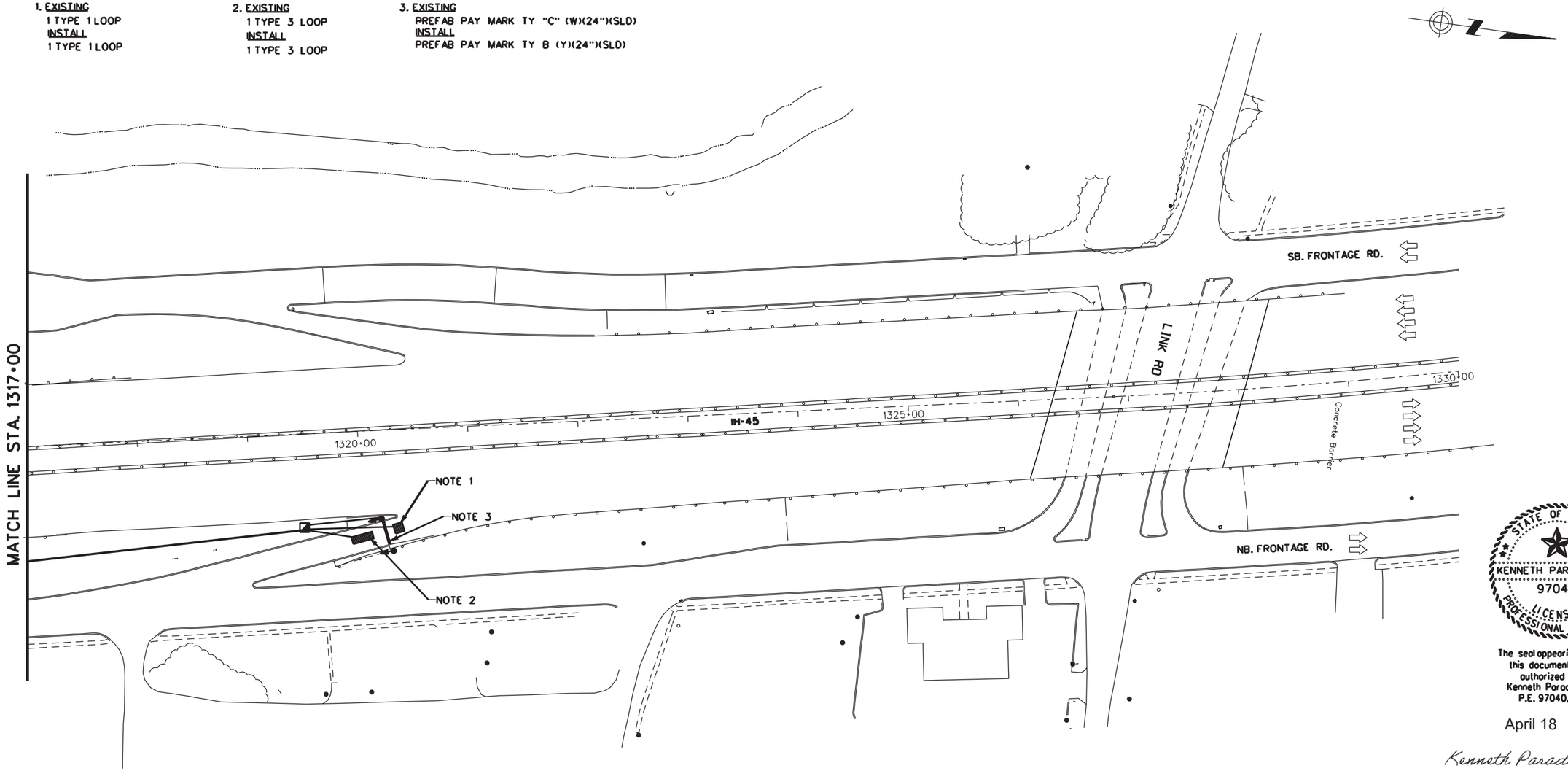
CONT	SECT	JOB	HIGHWAY
0500	03	636, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		156

NOTES:

1. EXISTING
   1 TYPE 1 LOOP
   INSTALL
   1 TYPE 1 LOOP

2. EXISTING
   1 TYPE 3 LOOP
   INSTALL
   1 TYPE 3 LOOP

3. EXISTING
   PREFAB PAY MARK TY "C" (W)(24")(SLD)
   INSTALL
   PREFAB PAY MARK TY B (Y)(24")(SLD)



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KENNETH PARADOWSKI
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April 18 , 2024

Kenneth Paradowski, P.E.

SCALE: 1" = 100'

SEE SHEET 1 OF 5 FOR LEGEND

FILE NAME: IH45-635-05 LINK RD.dgn

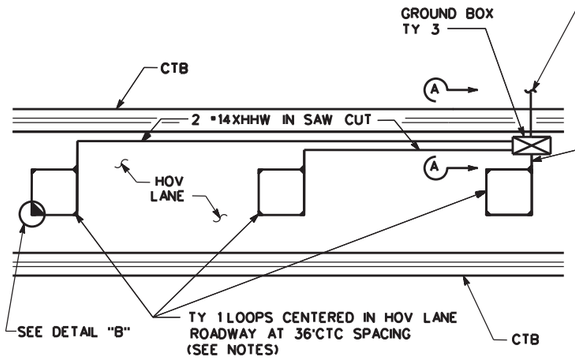
Texas Department of Transportation

IH-45

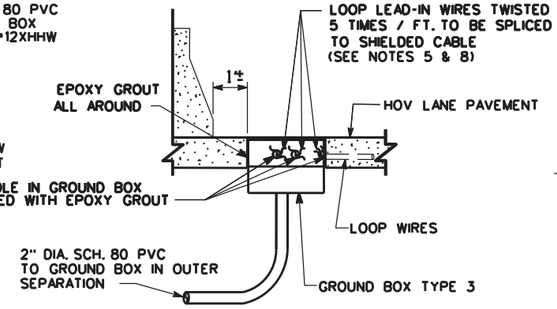
COMPUTERIZED TRANSPORTATION MANAGEMENT SYSTEM LAYOUT

SHEET 5 OF 5

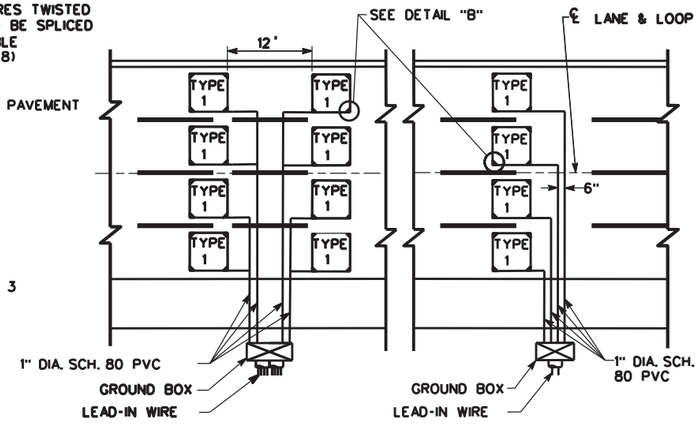
CONT	SECT	JOB	HIGHWAY
0500	03	635, ETC.	IH 45
DIST	COUNTY		SHEET NO.
HOU	HARRIS		157



HOV LANE LOOP INSTALLATION LAYOUT



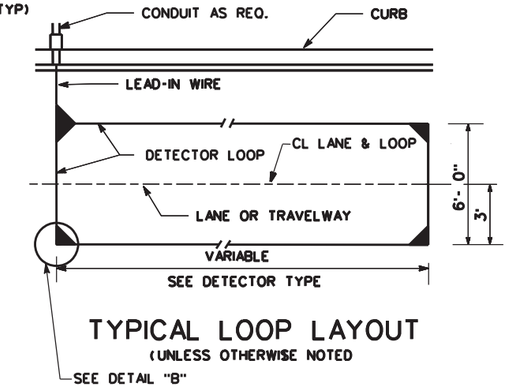
SECTION A-A



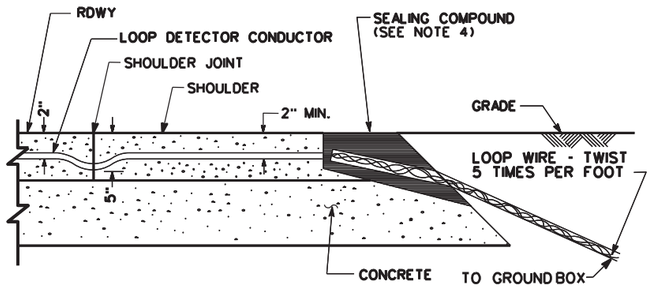
NOTE: SEE LAYOUT FOR LOCATION OF GROUND BOX, PLACEMENT MAY BE ON ROADWAY SHOULDER OR OUTSIDE OF SHOULDER.

TRAP LOOPS NON-TRAP LOOPS

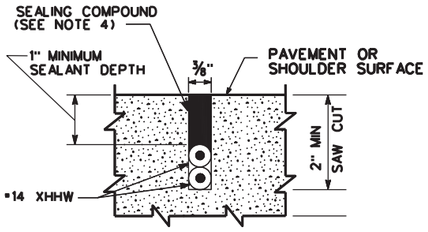
TYPICAL LOOP DETECTOR LAYOUT



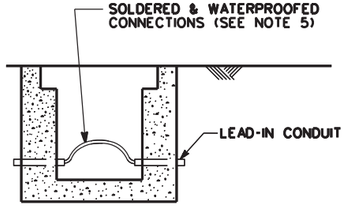
TYPICAL LOOP LAYOUT
(UNLESS OTHERWISE NOTED



TYPICAL SECTION OF PAVEMENT CUT FOR LOOP DETECTORS (WITHOUT CURB)



TYPICAL SECTION OF PAVEMENT CUT FOR LOOP DETECTORS



GROUND BOX CONNECTION (TYPICAL DETAIL)

LEAD-IN LENGTH CHART

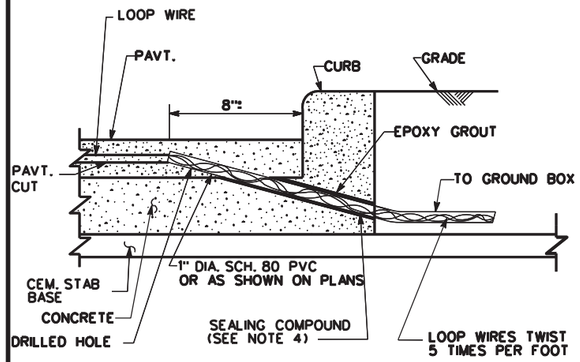
LEAD-IN CABLE LENGTH (FEET)	NUMBER OF TURNS REQUIRED IN LOOP
1-400	3
401-800	4
801-1200	5
1201-1500	6

LOOP SIZE

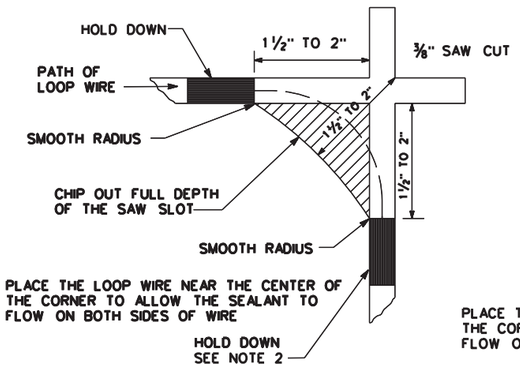
TYPE 1 - 6' X 6'
TYPE 11 - 6' X 12'
TYPE 111 - 6'X 24'
TYPE 1V - 6' X 40'

GENERAL NOTES:

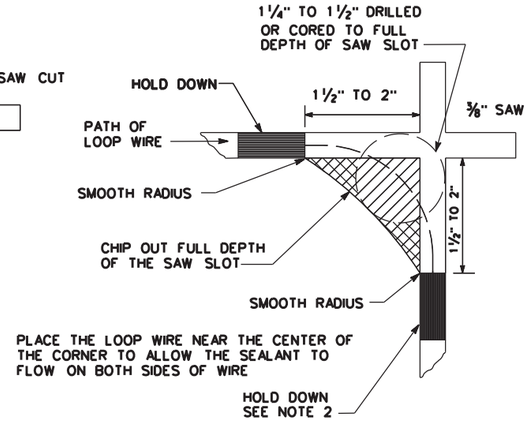
1. ENSURE WIRE FOR LOOPS IS #14XHHW STRANDED AS DESCRIBED IN THE NATIONAL ELECTRICAL CODE.
2. HOLD THE LOOP WIRE IN PLACE EVERY TWO FEET WITH SHORT STRIPS OF RUBBER OR NEOPRENE FLEXIBLE TUBING OR POLYETHYLENE FOAM SEALANT BACKER APPROXIMATELY ONE INCH IN LENGTH. FILL THE SLOT WITH LOOP SEALER WHEN STRIPS ARE LEFT IN PLACE.
3. PAYMENT FOR LOOP DETECTORS INCLUDES LOOP CONDUCTOR WIRE FROM EDGE OF ROADWAY TO SPLICE IN GROUND BOX.
4. ENSURE SPLICE BETWEEN LEAD-IN CONDUCTORS AND THE LOOP WIRE IS MADE IN A GROUND BOX BY SOLDERING. ENSURE THE SPLICE IS COMPLETELY WATERPROOF AND ENCAPUSLATED WITHIN A SCOTCHCAST 82-A OR SCOTCHCAST 82-A1 SPLICE ENCLOSURE.
5. ENSURE DETECTOR LEAD-IN CABLE IS SHIELDED, STRANDED, XHHW, SIZE 12 AWG
6. MAKE THE PAVEMENT CUT WITH A CONCRETE SAW TO NEAT LINES AND LOOSE MATERIAL REMOVED. PLACE THE SEALING COMPOUND WHEN THE CUT IS CLEAN AND DRY.
7. THREE (3) FEET MIN. OF LOOP WIRE IS TO BE COILED IN THE PULL BOX IN HOV ROADWAY TO ALLOW FOR SPLICING TO SHIELDED CABLE.
8. THE LOOP WIRE IS IN A BLACK FLEXIBLE VINYL OR POLYETHYLENE TUBING OF .184 INCH MINIMUM I.D., .031 INCH MINIMUM WALL THICKNESS AND .26 MINIMUM O.D., HAVING A SMOOTH BORE. ENSURE THE TUBING IS NOT ADHERE TO THE LOOP WIRE IN ANY WAY AND RESIST DETERIORATION FROM OILS, SOLVENTS, AND TEMPERATURES UP TO 100° C. ENSURE THE TUBING IS HIGHLY ABRASION RESISTANT AND REMAIN FLEXIBLE FROM -30° C TO 100° C.
9. CONDUIT FROM EDGE OF ROADWAY TO GROUND BOX IS CONSIDERED INCIDENTAL TO THE ITEM DETECTOR LOOP OF THE VARIOUS TYPES.
10. LONGER LOOP LEAD-IN LENGTH REQUIRES USE OF MORE TURNS IN LOOP.(SEE LOOP LEAD-IN LENGTH CHART).



TYPICAL INSTALLATION OF LOOP DETECTORS (WITH CURB)



CHIPPED OUT CORNER



CORE CORNER

DETAIL B - CORNER DETAILS

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April 18 , 2024

Kenneth Paradowski, P.E.

FILE NAME: CTMSLD.DGN

TEXAS DEPARTMENT OF TRANSPORTATION
IH 45

COMPUTERIZED TRANSPORTATION MANAGEMENT SYSTEM INSTALLATION DETAILS

(LOOP DETECTOR) SHEET 1 OF 1

DN: GP	DRAWING	DATE	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: KBP	ORIGINAL	JAN 12	6	TEXAS				IH 45
DW: GP				STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RFB									
TR:				HOUSTON	HARRIS	0500	03	635,ETC.	158
CK TR:									

NAME:

AD-76-0

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: Jul 07, 2022
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	0500	03	635, ETC	I-45
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	HOU	Harris		161

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0500-03-635, ETC.

1.2 PROJECT LIMITS:
From: ALMEDA-GENOA RD

To: SL 8

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 29.6065186 ,(Long) -95.2055841

END: (Lat) 29.6277899 ,(Long) -95.2289363

1.4 TOTAL PROJECT AREA (Acres): _____

1.5 TOTAL AREA TO BE DISTURBED (Acres): 27.756

1.6 NATURE OF CONSTRUCTION ACTIVITY:
MILL AND OVERLAY

1.7 MAJOR SOIL TYPES:

Soil Type	Description
N/A	

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- [x] PSLs determined during preconstruction meeting
- [ ] PSLs determined during construction
- [ ] No PSLs planned for construction

Type	Sheet #s
N/A	

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- [x] Mobilization
- [x] Install sediment and erosion controls
- [ ] Blade existing topsoil into windrows, prep ROW, clear and grub
- [x] Remove existing pavement
- [ ] Grading operations, excavation, and embankment
- [ ] Excavate and prepare subgrade for proposed pavement widening
- [ ] Remove existing culverts, safety end treatments (SETs)
- [ ] Remove existing metal beam guard fence (MBGF), bridge rail
- [x] Install proposed pavement per plans
- [ ] Install culverts, culvert extensions, SETs
- [ ] Install mow strip, MBGF, bridge rail
- [ ] Place flex base
- [ ] Rework slopes, grade ditches
- [ ] Blade windrowed material back across slopes
- [ ] Revegetation of unpaved areas
- [ ] Achieve site stabilization and remove sediment and erosion control measures
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- [ ] Sediment laden stormwater from stormwater conveyance over disturbed area
- [x] Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- [x] Solvents, paints, adhesives, etc. from various construction activities
- [ ] Transported soils from offsite vehicle tracking
- [x] Construction debris and waste from various construction activities
- [ ] Contaminated water from excavation or dewatering pump-out water
- [ ] Sanitary waste from onsite restroom facilities
- [ ] Trash from various construction activities/receptacles
- [ ] Long-term stockpiles of material and waste
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
N/A	

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- [X] Development of plans and specifications
- [X] Perform SWP3 inspections
- [X] Maintain SWP3 records and update to reflect daily operations
- [ ] Other: _____
- [ ] Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- [X] Day To Day Operational Control
- [X] Maintain schedule of major construction activities
- [X] Install, maintain and modify BMPs
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
IH-45	0500-03-635, ETC.		162
STATE	STATE DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0500	03	635, ETC.	IH-45

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☐ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
N/A		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

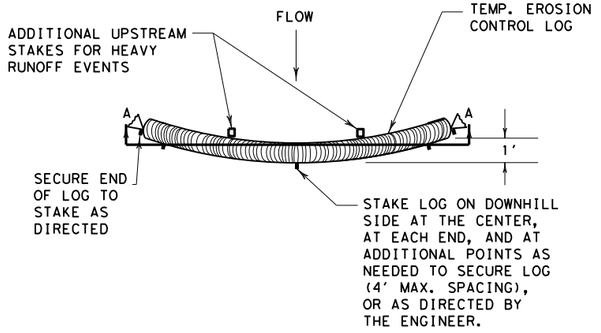
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

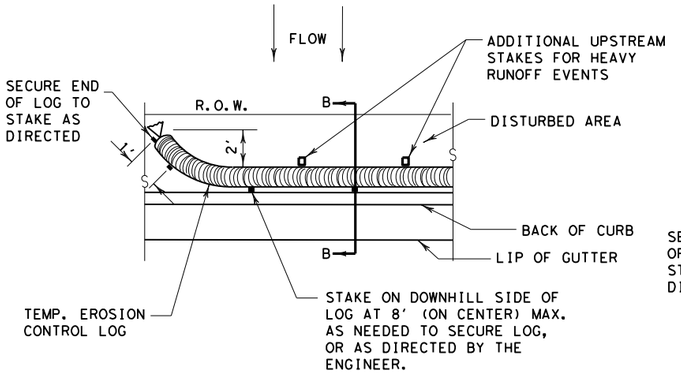
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
IH-45	0500-03-635, ETC.		163
STATE	STATE DIST.	COUNTY	
TEXAS		HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0500	03	635, ETC.	IH-45

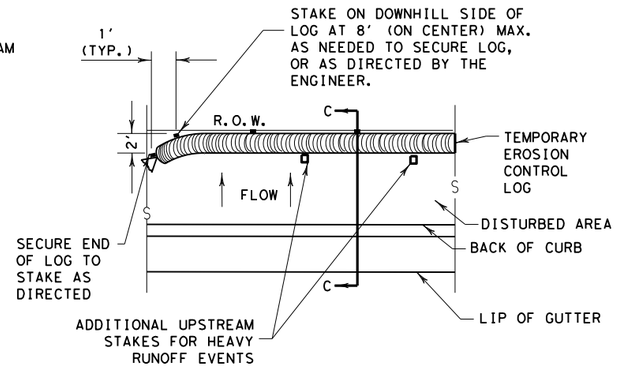
DATE:
FILE:



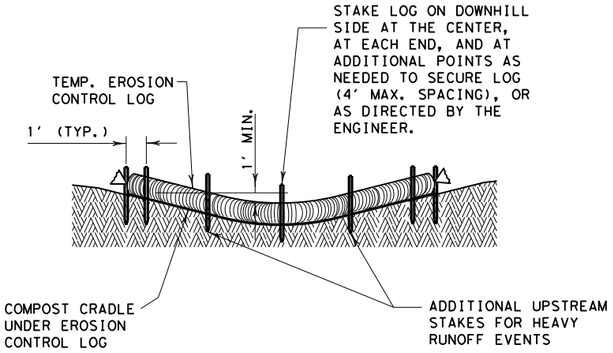
PLAN VIEW



PLAN VIEW



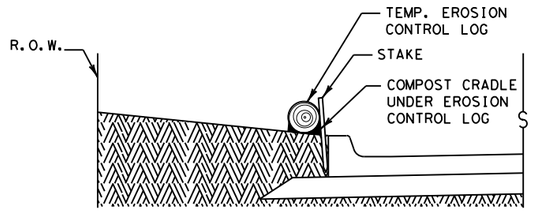
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

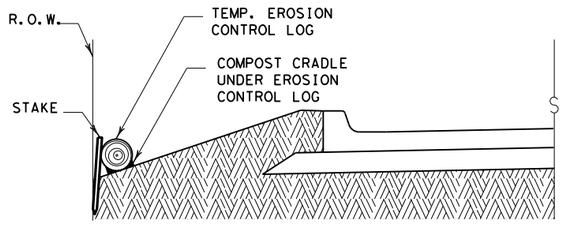
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

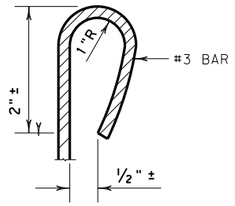
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



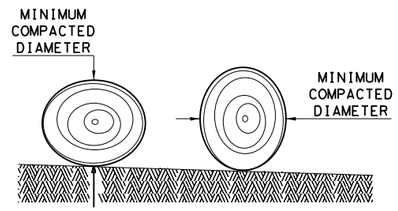
REBAR STAKE DETAIL

LEGEND

CL-D	EROSION CONTROL LOG DAM
CL-BOC	EROSION CONTROL LOG AT BACK OF CURB
CL-ROW	EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
CL-SST	EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
CL-SSL	EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
CL-DI	EROSION CONTROL LOG AT DROP INLET
CL-CI	EROSION CONTROL LOG AT CURB INLET
CL-GI	EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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.

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	0500	03	635,ETC.		IH 45		
	DIST	COUNTY			SHEET NO.		
	HOU	HARRIS			164		

DATE:
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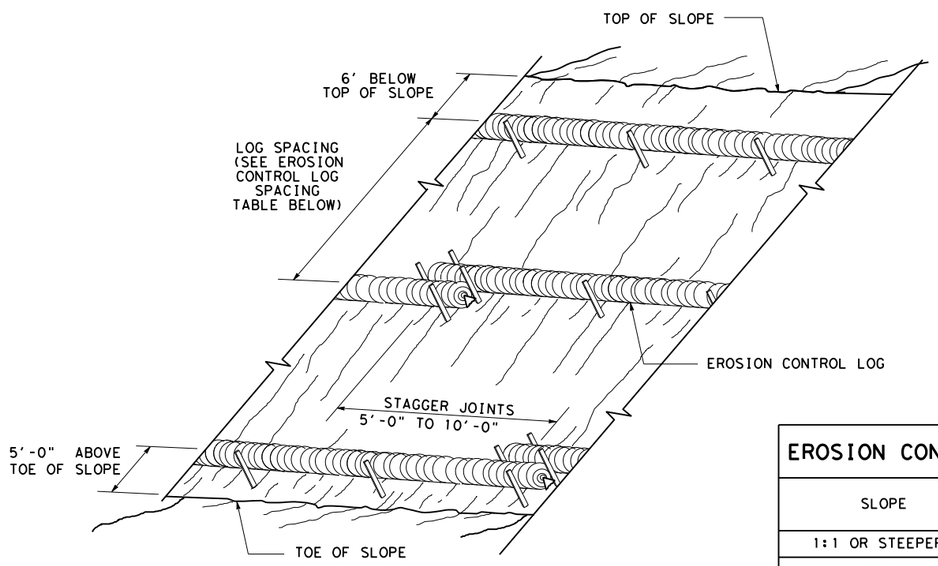
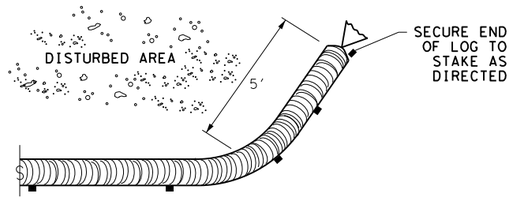


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

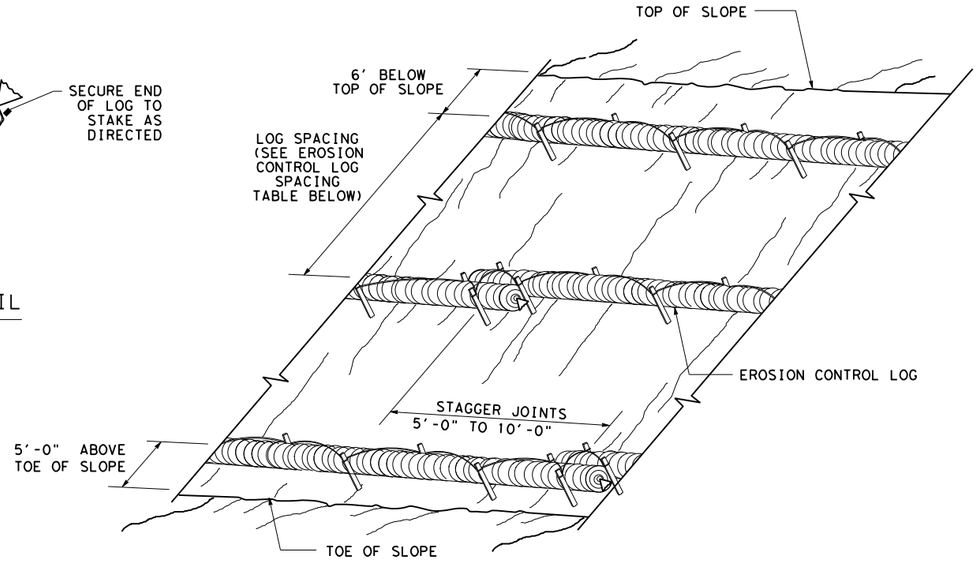
CL-SST



END SECTION RAP DETAIL

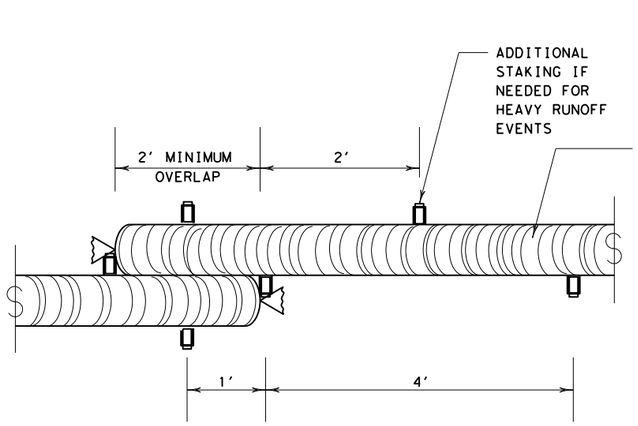
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

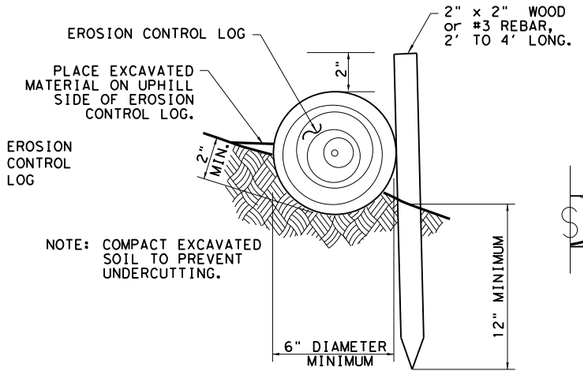
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

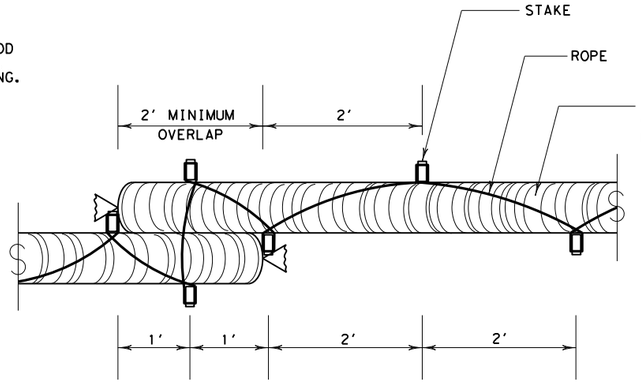


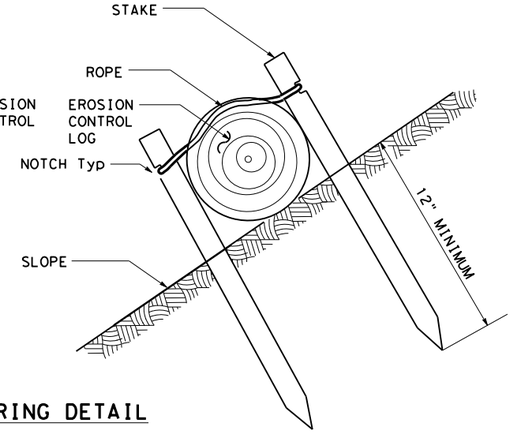


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

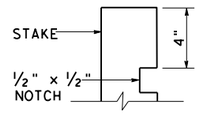
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

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	
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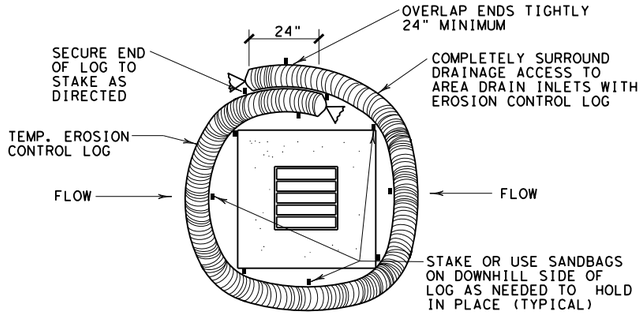
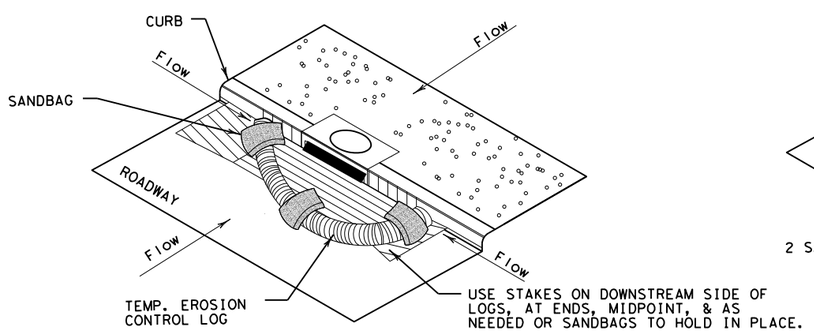
	DIST		COUNTY			SHEET NO.
	HOU		HARRIS			165

DATE:
FILE:



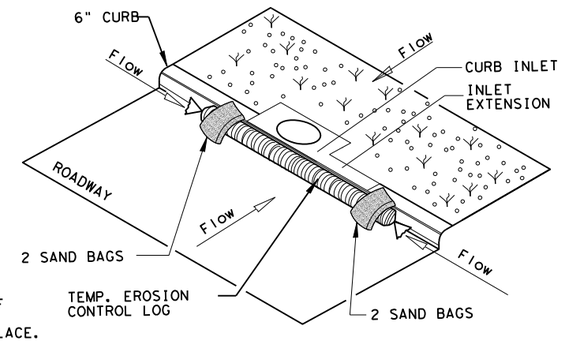
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

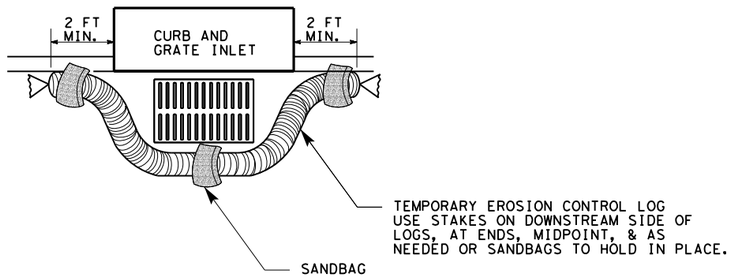
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

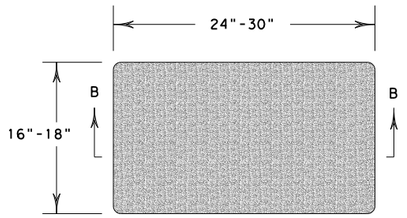
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	0500	03	635,ETC.		IH 45		
	DIST	COUNTY				SHEET NO.	
	HOU	HARRIS				166	